Kansas State Agricultural College Bulletin

Volume II | May 1, 1918 | Number 6

CATALOGUE

FIFTY-FIFTH SESSION

1917-1918

ANNOUNCEMENTS

1918-1919

MANHATTAN, KANSAS
PUBLISHED BY THE COLLEGE

7-2554

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The State Board of Administration

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GOVERNOR ARTHUR CAPPER, *ex-officio Chairman*[2]
E. W. HOCH, *Vice Chairman*
WILBUR N. MASON, *Acting Secretary*
HARVEY J. PENNEY[3]
C. W. GREEN[4]

JAMES A. KIMBALL, *Business Manager*
JAS. T. LARDNER, *Assistant Business Manager*

Administrative Officers

President of the College	WILLIAM M. JARDINE
Vice President, and Dean of the Division of General Science	J. T. WILLARD
Dean of the Division of Agriculture and Director of the Agricultural Experiment Station	F. D. FARRELL
Dean of the Division of Engineering and Director of the Engineering Experiment Station	A. A. POTTER
Dean of the Division of Home Economics	HELEN B. THOMPSON
Acting Dean of the Division of College Extension	H. J. UMBERGER
Acting Dean of the Summer School	H. L. KENT
Dean of Women	MARY P. VAN ZILE
Principal of the School of Agriculture	H. L. KENT
Registrar	JESSIE McD. MACHIR
Librarian	ARTHUR B. SMITH
Custodian of Buildings and Grounds	JACOB LUND
Engineer of Power Plant, Superintendent of Building and Repair	G. R. PAULING

1. Since January 13, 1919.
2. Previous to January 13, 1919.
3. Since March 3, 1919.
4. Previous to March 3, 1919.

CALENDAR

1919

JANUARY

S	M	T	W	T	F	S
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FEBRUARY

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APRIL

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MAY

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SEPTEMBER

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OCTOBER

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1920

JANUARY

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FEBRUARY

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MARCH

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JUNE

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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The College Calendar

1919

June 6, Friday.—Registration of students for Summer School begins at 8 a. m.
June 7, Saturday.—*All classes meet according to schedule
June 7 to August 8, Saturday to Friday.—Summer School in session, nine weeks
Sept. 5, Friday.—All members of the instructional force on duty, at 9 a. m.
Sept. 6, Saturday.—Meeting of assigners with Committee on Schedule at 2 p. m.
Sept. 6, Saturday.—Meeting of assigners with deans at 3 p. m.
Sept. 8, Monday.—Admission and registration of students begin at 8 a. m.
Sept. 8, Monday.—†Special courses for auto-mechanics, tractor operators, machinists, blacksmiths, and carpenters begin
Sept. 9, Tuesday.—Housekeepers' Course begins; registration at 8 a. m.
Sept. 10, Wednesday.—Registration of students closes at 11 a. m.
Sept. 10, Wednesday.—Opening convocation, 11 a. m. to 12 m.
Sept. 10, Wednesday.—*All classes meet according to schedule, beginning at 1 p. m.
Oct. 4, Saturday.—Examinations to remove conditions
Oct. 11, Saturday.—Scholarship deficiency reports due
Nov. 8, Saturday.—Midsemester scholarship deficiency reports due
Nov. 10, Monday.—‡Special semester begins; registration at 8 a. m.
Nov. 26, Wednesday.—Thanksgiving vacation begins at 12 m.
Nov. 29, Saturday.—Thanksgiving vacation closes at 6 p. m.
Dec. 20, Saturday.—Housekeepers' Course closes at 12 m.
Dec. 20, Saturday.—Winter vacation begins at 6 p. m.

1920

Jan. 3, Saturday.—Winter vacation closes at 6 p. m.
Jan. 5, Monday.—Short Course in Agriculture and Creamery Short Course begin.
Jan. 5, Monday.—Special courses for auto mechanics, electricians, tractor operators, machinists, blacksmiths, carpenters, and radio-operators begin
Jan. 17 to 24, Saturday to Saturday.—Examinations at close of semester
Jan. 24, Saturday.—First semester closes at 11 a. m.
Jan. 27, Tuesday.—Admission and registration of students begin at 8 a. m.
Jan. 27, Tuesday.—Housekeepers' Course begins; registration at 8 a. m.
Jan. 28, Wednesday.—Registration of students closes at 11 a. m.
Jan. 28, Wednesday.—*All classes meet according to schedule, beginning at 1 p. m.
Feb. 2 to 7, Monday to Saturday.—Farm and Home Week
Feb. 21, Saturday.—Examinations to remove conditions
Feb. 28, Saturday.—Scholarship deficiency reports due
Feb. 28, Saturday.—Short Course in Agriculture and Creamery Short Course close at 12 m.
Mar. 27, Saturday.—Special semester closes at 11 a. m.
April 3, Saturday.—Midsemester scholarship deficiency reports due
April 15, Thursday.—Announcement of elections of seniors to Phi Kappa Phi
May 8, Saturday.—Housekeepers' Course closes at 12 m.
May 14 to 20, Friday to Thursday.—Examinations for seniors
May 20 to 26, Thursday to Wednesday.—Examinations at close of semester
May 27, Thursday.—Commencement day

May 28, Friday.—Registration of students for Summer School begins at 8 a. m.
May 29 to July 30, Saturday to Friday.—Summer School in session, nine weeks

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Sept. 13, Monday.—Admission and registration of students begins at 8 a. m.
Sept. 15, Wednesday.—Registration of students closes at 11 a. m.

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* Students must be present at the first meeting of each class or render a reasonable excuse. Failure to take out an assignment is not accepted as an excuse for absence from classes. A fee of one dollar is charged those who enroll after the time set for close of registration unless a reasonable excuse is offered.

† These special courses begin the first Monday of every month from September to May, also, at the beginning of the Summer School.

‡ For the special semester, which is planned for the benefit of young men who must remain on the farm for the greater part of the year, such classes will be organized as the demand seems to justify. Prospective students should write early, stating what studies they desire to pursue. The College authorities will then know what classes to schedule. Announcement of classes scheduled will be made late in October.

Standing Committees of the Faculty

ADMISSION: Jessie McD. Machir, J. V. Cortelyou, B. L. Remick, Ina Holroyd, Bessie W. Birdsall, J. O. Hamilton, W. H. Andrews, G. A. Dean, M. C. Tanquary, J. P. Calderwood.

ADVANCED CREDIT: *College.*—R. R. Price, L. E. Call, H. H. King, J. R. Macarthur, Elizabeth Rothermel, J. T. Willard.

School of Agriculture.—J. W. Zahnley, E. V. James, W. T. Stratton, Wilma Orem.

ASSIGNMENT: Jessie McD. Machir, L. A. Fitz, W. H. Andrews, A. E. White, Araminta Holman.

ATHLETICS: President Jardine, M. F. Ahearn, Z. G. Clevenger, G. A. Dean, H. H. King, E. L. Holton, R. A. Seaton.

CATALOGUE: J. V. Cortelyou, J. T. Willard, H. W. Davis.

COLLEGE RULES: R. R. Price, J. T. Willard, J. E. Kammeyer.

DEBATE: J. R. Macarthur, O. H. Burns, J. E. Kammeyer.

DISCIPLINE: Albert Dickens, L. A. Fitz, L. E. Conrad, J. W. Searson, Mary P. Van Zile.

GRADUATE STUDY: L. E. Conrad, L. E. Call, Helen B. Thompson, H. H. King.

PUBLIC EXERCISES: J. E. Kammeyer, J. V. Cortelyou, A. E. Westbrook, J. W. Searson, E. L. Holton, W. H. Andrews, W. A. Lippincott.

SCHEDULE OF CLASSES: A. E. White, J. T. Willard, W. T. Stratton, R. I. Throckmorton, L. E. Conrad, Alice Skinner.

STUDENT AFFAIRS: J. R. Macarthur, Mary P. Van Zile, H. H. King, W. A. Lippincott, A. E. Westbrook, C. F. Baker, H. L. Kent, Elizabeth Rothermel.

STUDENT HEALTH: L. E. Conrad, L. D. Bushnell, Z. G. Clevenger.

Officers of Instruction and Administration

PRESIDENT

HENRY JACKSON WATERS,[1] B. S. A., LL. D.,

President of the College (1909-Dec. 31, 1917).*

B. S. A., University of Missouri, 1886; LL. D., New Hampshire State College, 1913; LL. D., University of Missouri, 1916.

WILLIAM M. JARDINE, B. S. A., LL. D.,

President of the College (March 1, 1918); Dean of the Division of Agriculture (1910, 1913 – Feb. 28, 1918); Director of the Agricultural Experiment Station (Jan. 1, 1913 – Feb. 28, 1918).

B. S. A., Utah Agricultural College, 1904; LL. D., Campbell College, 1916. ‡ A 30; 1020 Houston.

JULIUS TERRASS WILLARD, M. S., Sc. D.,

Acting President of the College (Jan. 1 to Feb. 28, 1918); Vice President of the College (March 1, 1918); Dean of Division of General Science (1909); Vice Director, Agricultural Experiment Station (1907); Chemist, Agricultural Experiment Station (1897); Professor of Chemistry (1883, 1901).

† B. S., 1883; M. S., 1886; Sc. D., 1907. A 47; 1725 Poyntz.

PROFESSORS

JOHN DANIEL WALTERS, M. S., A. D.,

Professor of Architecture, Emeritus (1876, 1917).

M. S., 1883; A. D., 1908. E 56; 809 N. Eleventh.

BENJAMIN LUCE REMICK, Ph. M.,

Professor of Mathematics (1900).

Ph. B., Cornell College, 1889; Ph. M, ibid, 1892. A 71; 613 Houston.

HERBERT FULLER ROBERTS,[2] LL. B., M. S.,

Professor of Botany (1901); Botanist, Agricultural Experiment Station (1901).

A. B., University of Kansas, 1891; LL. B., Northwestern University, 1893; M. S., 1898. H 58; 1920 Poyntz.

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1. Resigned.

2. Absent on leave, 1917-'18.

* One date standing immediately after the title shows when the office was assumed. In the case of two dates separated by a comma, the first indicates when services with the College began, the second when present office was assumed; dates separated by a dash indicate times of assumption and termination, respectively, of the duties indicated in the title.

† In a statement of degrees without mentioning the institution conferring them the Kansas State Agricultural College is to be understood.

‡ The College buildings are designated by letters, as follows:

A—Anderson Hall (Main).
Ag—Agricultural Hall.
C—Denison Hall.
D—Dairy Hall.
E—Mechanical Engineering Hall.
F—Fairchild Hall (Library).
G—School of Agriculture Hall.
H—Horticultural Hall.
K—Kedzie Hall (Printing).
L—Domestic Science and Art Hall.
M—Auditorium.
N—Nichols Gymnasium.
R—Farm Machinery Hall.
S—Engineering Shops.
V—Veterinary Hall.
W—Chemistry Annex.
X—Dairy Commission Hall.

ALBERT DICKENS, M. S.,
Professor of Horticulture (1899, 1902); Horticulturist, Agricultural Experiment Station (1899, 1902).
B. S., 1893; M. S., 1901. H 30; 509 N. Manhattan.

RALPH RAY PRICE, A. M.,
Professor of History and Civics (1903); Acting Dean of Division of General Science (Jan. 1 to March 1, 1918).
A. B., Baker University, 1896; A. M., University of Kansas, 1898. F 57; 826 Houston.

JULIUS ERNEST KAMMEYER, A. M., LL. D.,
Professor of Economics (1903, 1904).
A. B., Central Wesleyan College, 1886; A. M., ibid., 1889; LL. D., Kansas City University, 1912. A. 52; 1805 Leavenworth.

JOHN VANZANDT CORTELYOU, Ph. D.,
Professor of Modern Languages (1904, 1916).
A. B., University of Nebraska, 1897; A. M., ibid., 1901; Ph. D., University of Heidelberg, 1904. N 59; 325 N. Fourteenth.

JOHN ORR HAMILTON, B. S.,
Professor of Physics (1901, 1908).
B. S., University of Chicago, 1900. C 57; 331 N. Fourteenth.

MARY PIERCE VAN ZILE,
Dean of the Division of Home Economics (1908, 1913); Professor of Domestic Science (1908).
L 30; 1322 Fremont.

LOWELL EDWIN CONRAD, M. S.,
Professor of Civil Engineering (1908, 1909).
B. S., Cornell College, 1904; C. E., ibid., 1906; M. S., Lehigh University, 1908. E 32; 317 N. Seventeenth.

LESLIE ARTHUR FITZ, B. S.,
Professor of Milling Industry (1910, 1912).
B. S., 1902. Ag 40; 1014 Houston.

EDWIN LEE HOLTON, A. B.,
Professor of Education (1910, 1913); Dean of the Summer School (1910, Jan. 25, 1918).
A. B., Indiana University, 1904. A 32; 217 N. Fourteenth.

ANDREY ABRAHAM POTTER, S. B.,
Dean of the Division of Engineering (1913, 1917); Director of the Engineering Experiment Station (1913, 1914); Professor of Steam and Gas Engineering (1905, 1910).
S. B., Massachusetts Institute of Technology, 1903. E 30; 1328 Fremont.

ROY ANDREW SEATON,[3] M. S.,
Professor of Applied Mechanics and Machine Design (1904, 1914).
B. S., 1904; M. S., 1910; S. B., Massachusetts Institute of Technology, 1911.

JAMES WILLIAM SEARSON,[2] A. M.,
Professor of English (1910, 1911).
A. B., University of Nebraska, 1896; A. M., ibid., 1899. K 27; 1320 Fremont.

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2. Absent on leave, 1917-'18.
3. Absent on leave, in military service, since February 3, 1918.

OLLIE EZEKIEL REED, M. S.,
Professor of Dairy Husbandry (1910, 1911).
B. S. in Agr., University of Missouri, 1908; M. S., ibid., 1910.
D 30; 321 N. Sixteenth.

ARTHUR BOURNE SMITH, Ph. B., B. L. S.,
Librarian (1911).
Ph. B., Wesleyan University, 1900; B. L. S., University of Illinois, 1902.
F 32; R. R. 2.

WILLIAM ADAMS LIPPINCOTT, M. S.,
Professor of Poultry Husbandry (1912).
A. B., Illinois College, 1903; B. S., Iowa State College, 1911; M. S., University of Wisconsin, 1917. Ag 38; 321 N. Eighteenth.

WILBER ANDREW COCHEL, A. B., B. S.,
Professor of Animal Husbandry (1912).
A. B., University of Missouri, 1897; B. S., ibid., 1905. Ag 8; 215 N. Fourteenth.

LELAND DAVID BUSHNELL, M. S.,
Professor of Bacteriology (1909, 1912).
B. S., Michigan Agricultural College, 1905; M. S., University of Kansas, 1915.
V 54; 1414 Humboldt.

BESSIE WEBB BIRDSALL,
Professor of Domestic Art (1912).
Graduate, Drexel Institute, 1903. L 55; 900 Leavenworth.

LELAND EVERETT CALL, M. S.,
Professor of Agronomy (1907, 1913); Acting Dean of Division of Agriculture and Acting Director of Agricultural Experiment Station (May 1, 1918).
B. S. in Agr., Ohio State University, 1906; M. S., ibid., 1912.
Ag 58; 223 N. Fourteenth.

GEORGE ADAM DEAN, M. S.,
Professor of Entomology (1902, 1913).
B. S., 1895; M. S., 1905. F 52; 327 N. Seventeenth.

ROBERT KIRKLAND NABOURS, Ph. D.,
Professor of Zoölogy (1910, 1913); Curator of the Natural History Museum (1910).
Ed. B., University of Chicago, 1905; Ph. D., ibid., 1911. F 54; 210 S. Tenth.

LEONARD WHITTLESEY GOSS, D. V. M.,
Professor of Pathology (1905, 1913).
D. V. M., Ohio State University, 1905. V 58; 723 Houston.

RALPH RALPH DYKSTRA, D. V. M.,
Professor of Surgery (1911, 1913).
D. V. M., Iowa State College, 1905. V 31; 607 Houston.

MARGARET HELEN HAGGART, A. M.,
Professor of Domestic Science (1914).
B. S., 1905; A. M., Columbia University, 1914. L 43; 1809 Leavenworth.

CLARENCE ERLE REID, B. S.,
Professor of Electrical Engineering (1914).
B. S. in E. E., Purdue University, 1902. C 33; 421 N. Sixteenth.

EDWARD NORRIS WENTWORTH,[4] M. S.,
Professor of Animal Breeding (1914).
B. S. A., Iowa State College, 1907; M. S., ibid., 1909.

FRANCES LANGDON BROWN,[8] A. B., B. S.,
State Leader of Emergency Home Demonstration Agents, Division of College Extension (1909; Nov. 1, 1917).
B. S., 1909; A. B., Kansas State Normal School, 1910. A 35; 510 N. Ninth.

EDWARD CARL JOHNSON, A. M.,
Dean of the Division of College Extension (1912, 1915).
A. B., University of Minnesota, 1906; A. M., ibid., 1907. A 33; 321 N. Fourteenth.

MICHAEL FRANCIS AHEARN, M. S.,
Professor of Landscape Gardening (1904, 1915).
B. S., Massachusetts Agricultural College, 1904; M. S., 1913. H 32; 507 Laramie.

NELSON ANTRIM CRAWFORD, Jr., A. M.,
Professor of Industrial Journalism and Superintendent of Printing (1910, 1915).
A. B., State University of Iowa, 1910; A. M., University of Kansas, 1914. K 52; 221 N. Juliette.

ARTHUR EDGAR WESTBROOK, A. B., B. Mus.,
Director of Music and Professor of Voice (1915).
A. B., Albion College, 1910; B. Mus., ibid., 1911. M 30; 1446 Fairchild.

JOHN ROBERTSON MACARTHUR, Ph. D.,
Professor of English (1914, 1916).
A. B., University of Manitoba, 1892; Ph. D., University of Chicago, 1903. K 27; 1126 Bluemont.

ZORA GOODWIN CLEVENGER,
Professor of Physical Education and Director of Athletics (1916).
Graduate, Summer School of Physical Education and Athletics, Chautauqua, N. Y., 1905. N 35; 327 N. Fifteenth.

CHARLES MOSES SIEVER,[5] Ph. G., M. D.,
College Physician (1916).
Ph. G., Trinity University, 1903; M. D., ibid., 1903; M. D., University of Kansas, 1907. A 65; 1323 Anderson.

ANDREW CLEVELAND HARTENBOWER, B. S.,
Superintendent of Institutes and Extension Schools, Division of College Extension (July 1, 1917).
B. S., Oklahoma College of Agriculture and Mechanic Arts, 1905. A 34; College Heights.

WALTER WILLIAM CARLSON, B. S., M. E.,
Professor of Shop Practice (1910, 1917); Superintendent of Shops (1910, 1912).
B. S., 1908; M. E., 1916. S 62; 1130 Bluemont.

SAMUEL CECIL SALMON, B. S.,
Professor of Farm Crops (1913, 1917).
B. S., South Dakota Agricultural and Mechanical College, 1907. Ag 82; 1648 Leavenworth.

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4. Absent on leave, in military service, since May 11, 1917.
5. Absent on leave, in military service, June 20, 1917, to February 3, 1918.
8. In coöperation with the U. S. Department of Agriculture.

JAMES GORDON EMERSON,[6] J. D.,
Professor of Public Speaking (1915, 1917).

CECIL FRANKLIN BAKER, M. S.,
Professor of Architecture (1917).
A. B., University of Illinois, 1907; B. S., Massachusetts Institute of Technology, 1907; M. S., ibid., 1909. E 57; 1719 Fairchild.

KARL JOHN THEODORE EKBLAW, M. S., M. E.,
Professor of Farm Engineering (1917).
B. S., University of Illinois, 1909; M. S., ibid., 1912; M. E., Yale University, 1917. R 28; 1019 Houston.

WILLIAM PATRICK JOSEPH O'NEILL, Captain U. S. Cavalry, Retired.
Professor of Military Science and Tactics, and Commandant of Cadets (Oct. 27, 1917).
Graduate, United States Military Academy, 1911. N 29; 1334 Fremont.

ODIS HERSCHEL BURNS,[7] A. B.,
Professor of Public Speaking (Jan. 5 to July 1, 1918).
G 56; 1615 Anderson.

WALTER HORACE BURR,[8]
Director of Rural Service, Division of College Extension (1914, 1915).
A 37; 105 S. Juliette.

HARRY UMBERGER,[8] B. S.,
County Agent Leader, Division of College Extension (1917).
B. S., 1905. A 2; 419 N. Eighteenth.

MYRON GARFIELD BURTON, A. M.,
Director of Home Study Service, Division of College Extension (1915).
A. B., Muncie (Ind.) Normal Institute, 1913. A 4; 1006 Bluemont.

OTIS EARLE HALL,[8] A. B.,
Director of Junior Extension Service, Division of College Extension (1914).
A. B., Wabash College, 1907. A 35; 901 Osage.

ASSOCIATE PROFESSORS

HARRY LLEWELLYN KENT,[16] B. S.,
Principal of School of Agriculture and Associate Professor of Education (1913).
A. B., Kansas State Normal School, 1912; B. S., 1913. G 29 and 30; 321 Delaware.

WILLIAM HIDDLESON ANDREWS, A. B.,
Associate Professor of Education (1906; Dec. 1, 1913).
A. B., University of Chicago, 1900. A 64; 630 Moro.

HERBERT HIRAM KING,[2] A. M., M. S.,
Associate Professor of Chemistry (1906, 1914).
C 56; 916 Humboldt.

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2. Absent on leave, 1917-'18.
6. Absent on leave, in military service, since Jan. 5, 1918.
7. Temporary appointment.
8. In coöperation with the U. S. Department of Agriculture.
16. Absent on leave, February 1 to July 1, 1918.

CHARLES OSCAR SWANSON, M. Agr.,
Associate Professor of Agricultural Chemistry (1909, 1914); Associate Chemist in Agricultural Experiment Station (1906, 1914).
A. B., Carlton College, 1899; M. Agr., University of Minnesota, 1905. C 6; 931 Bluemont.

HARRY BRUCE WALKER,[9] B. S. in C. E.,
Associate Professor of Irrigation and Drainage Engineering (1914); Drainage and Irrigation Engineer, Division of College Extension (1910).
B. S. in C. E., Iowa State College, 1910.

ALFRED EVERETT WHITE, M. S.,
Associate Professor of Mathematics (1909, 1914).
B. S., Purdue University, 1904; M. S., ibid., 1909. A 72; 1743 Fairchild.

IVOR VICTOR ILES, A. M.,
Associate Professor of History and Civics (1911, 1915).
A. B., University of Kansas, 1905; A. M., ibid., 1905. F 4; 1725 Fairchild.

JAMES BURGESS FITCH,[2] B. S.,
Associate Professor of Dairy Husbandry (1910, 1915).
B. S., Purdue University, 1910.

HALLAM WALKER DAVIS, A. M.,
Associate Professor of English (1913, 1915).
A. B., Indiana University, 1909; A. M., Columbia University, 1913. A 69; 532 N. Fourteenth.

ROBERT HENRY BROWN, B. M.,
Associate Professor of Music (1900, 1916); Conductor of Orchestra (1905).
B. M., Kansas Conservatory of Music, 1893; B. S., 1898. M 29; 331 N. Seventeenth.

JAMES HENRY BURT, D. V. M.,
Associate Professor of Veterinary Medicine (1909, 1916).
V. S., Ontario Veterinary College, 1895; D. V. M., Ohio State University, 1905. V 32; 800 Poyntz.

CHARLES WILBUR McCAMPBELL, B. S., D. V. M.,
Associate Professor of Animal Husbandry (1910, 1916).
B. S., 1906; D. V. M., 1910. Ag 5; 800 Laramie.

RAY IAMS THROCKMORTON, B. S.,
Associate Professor of Agronomy (1911, 1916).
B. S., Pennsylvania State College, 1911. Ag 60; 825 Houston.

JAMES EDWARD ACKERT, Ph. D.,
Associate Professor of Zoölogy (1913, 1916); Parasitologist, Agricultural Experiment Station (1913).
A. B., University of Illinois, 1909; A. M., ibid., 1911; Ph. D., ibid., 1913. F 58; 1422 Poyntz.

PAUL SMITH WELCH, Ph. D.,
Associate Professor of Entomology (1913, 1916).
A. B., James Millikin University, 1910; A. M., University of Illinois, 1911; Ph. D., ibid., 1913. F 64A; 1621 Anderson.

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2. Absent on leave, 1917-'18.
9. Absent on leave, in military service, since Sept. 20, 1917.

GEORGE SHERWOOD HINE,[1] B. S. A.,
State Dairy Commissioner (1910, 1912 – May 1, 1918).
B. S. A., University of Wisconsin, 1907. X 26; 307 N. Sixteenth.

CHARLES ROZELL WEEKS, B. S., B. Ed.,
Superintendent, Fort Hays Branch Agricultural Experiment Station (1916).
B. S., University of Nebraska, 1907; B. Ed., Peru (Neb.) State Normal School, 1912. Hays, Kan.

OLIVER WILLIAM HUNTER,[10] M. S.,
Associate Professor of Bacteriology (1911; Dec. 31, 1917).
B. S., 1909; M. S., University of Wisconsin, 1911.

OLIVE AMY SHEETS, M. S.,
Associate Professor of Domestic Science (1914, 1917).
A. B., Ohio State University, 1908; B. S., ibid., 1910; M. S., University of Wisconsin, 1914. L 35; 421 N. Sixteenth.

JONTA BOEN MARCELLUS,[8] B. S., in C. E.,
Associate Professor of Irrigation and Drainage Engineering (Oct. 22, 1917); Drainage and Irrigation Engineer, Division of College Extension (Oct. 22, 1917).
B. S. in C. E., University of Kansas, 1904. E 32; 822 Vattier.

PORTER JOSEPH NEWMAN, M. S.,
Associate Professor of Chemistry (1909; Jan. 1, 1918); Acting Head of Department of Chemistry (1909; Jan. 1, 1918).
B. S., Franklin College, 1908; M. S., ibid., 1910. C 30, 64; 914 Leavenworth.

E. G. KELLEY,
Specialist in Entomology, Division of College Extension (Apr. 15, 1918).
A 33; ———.

ASSISTANT PROFESSORS

WILMER ESLA DAVIS, A. B.,
Assistant Professor of Botany (1909).
A. B., University of Illinois, 1903; Graduate, Ohio Normal University, 1894. H 57; 1209 Vattier.

GEORGE OGDEN GREENE,[1] M. S.,
Specialist in Horticulture, Division of College Extension (1901, 1912–Apr. 1, 1918).
B. S., 1900; M. S., 1902. A 36; 917 Fremont.

ALVIN SCOTT NEALE,[1] B. S. A.,
Assistant Superintendent of Institutes (1913; Apr. 1, 1918) and Specialist in Dairy Husbandry (1913; Apr. 1, 1918), Division of College Extension.
B. S. A., Ohio State University, 1904. A 34; 1646 Fairchild.

JOSIAH SIMSON HUGHES, Ph. D.,
Assistant Professor of Chemistry (1910, 1913).
B. S., Ohio Wesleyan University, 1908; M. S., ibid., 1909; A. M., Ohio State University, 1910; Ph. D., ibid., 1917. C 41; 344 N. Fifteenth.

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1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.
10. Absent in military service.

GRACE EMILY DERBY, A. B.,
Assistant Librarian (1911, 1913).
A. B., Western College for Women, 1905. F 32; 1633 Fairchild.

HOWARD W. BRUBAKER, Ph. D.,
Assistant Professor of Chemistry (1913).
B. S., Carleton College, 1899; Ph. D., University of Pennsylvania, 1904.
C 64; 1116 Fremont.

INA FOOTE COWLES, B. S.,
Assistant Professor of Domestic Art (1902, 1914).
B. S., 1901. L 56; 1021 Houston.

RAYMOND GARFIELD TAYLOR, A. M.,
Assistant Professor of History and Civics (1910, 1914).
A. B., University of Kansas, 1907; A. M., University of Chicago, 1915.
F 4; 1610 Leavenworth.

EUSTACE VIVIAN FLOYD, B. S.,
Assistant Professor of Physics (1911, 1914).
B. S., Earlham College, 1903. C 57; 1451 Laramie.

HARRISON ELEAZER PORTER,[1] B. S.,
Assistant Professor of Mathematics (1908, 1914 – Oct. 10, 1917).
B. S., 1907.

WILLIAM TIMOTHY STRATTON, A. M.,
Assistant Professor of Mathematics (1910, 1914).
A. B., Indiana University, 1906; A. M., ibid., 1913. A 70; 1020 Vattier.

MARY THERESA HARMAN, Ph. D.,
Assistant Professor of Zoölogy (1912, 1914).
A. B., University of Indiana, 1907; A. M., ibid., 1909; Ph. D., ibid., 1912.
F 61; 1430 Poyntz.

CLAUDE M. VESTAL,[17] B. S. A.,
Assistant Professor of Animal Husbandry (1912, 1914).
B. S. A., Purdue University, 1911. Ag 7; 1809 Leavenworth.

GEORGE ELLSWORTH RABURN,[2] M. S.,
Assistant Professor of Physics (1910, 1914).
A. B., University of Michigan, 1917; M. S., ibid., 1913. C 61; ———.

EDGAR LEMUEL TAGUE, A. M.,
Assistant Professor of Chemistry (1914); Assistant in Protein Chemistry, Agricultural Experiment Station (1914).
A. B., University of Kansas, 1908; A. M., ibid., 1909. C 3; 617 N. Manhattan.

WALDO ERNEST GRIMES, B. S.,
Assistant Professor of Farm Management (1913; Jan. 1, 1915).
B. S., 1913. Ag 60; 1739 Fairchild.

ADA RICE, M. S.,
Assistant Professor of English (1889, 1915); Assistant Principal of School of Agriculture (1913).
B. S., 1895; M. S., 1912. G 28; 917 Osage.

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1. Resigned.
2. Absent on leave, 1917-'18.
17. Exchange professor in University of California, 1917-'18.

ELDEN VALORIUS JAMES, A. M.,
Assistant Professor of History and Civics (1912, 1915).
A. B., Marietta College, 1901; A. B., University of Michigan, 1905; A. M., Marietta College, 1908. F 1; 621 Humboldt.

JOSEPH HENRY MERRILL, Ph. D.,
Assistant Professor of Entomology (1912, 1915); Assistant Entomologist, Agricultural Experiment Station (1912).
B. S., Dartmouth College, 1905; Ph. D., Massachusetts Agricultural College, 1914. F 52; 626 Moro.

SIEBELT LUKE SIMMERING, M. S., M. E.,
Assistant Professor Steam and Gas Engineering (1914, 1915).
B. S., University of Colorado, 1910; M. E., ibid., 1916; M. S., University of Illinois, 1913. S 55; 1733 Anderson.

FORREST FAYE FRAZIER, C. E.,
Assistant Professor of Civil Engineering (1911, 1915).
C. E., Ohio State University, 1910. E 55; 915 Fremont.

CLAUDE CARROLL CUNNINGHAM, B. S.,
Assistant Professor of Coöperative Experiments (1907, 1915).
B. S., 1903. Ag 59; 1018 Laramie.

ROBERT WARREN CONOVER, A. M.,
Assistant Professor of English (1915).
A. B., Wesleyan University, 1911; A. M., ibid., 1914. A 58; 1709 Laramie.

HELEN HAY HALM, B. S.,
Assistant Professor of Home Economics and Education (1915).
B. S., 1908; B. S., Columbia University, 1915. L 41; 1612 Laramie.

MALCOLM C. SEWELL, M. S.,
Assistant Professor of Soils (1914, 1915).
B. S., 1912; M. S., Ohio State University, 1914. Ag. 60; 530 N. Sixteenth.

FREDERICK ALFRED WIRT,[1] B. S.,
Assistant Professor of Farm Machinery, in Charge (1913, 1916 – Nov. 1, 1917).
B. S., University of Nebraska, 1913.

ARAMINTA HOLMAN,[2]
Assistant Professor of Home Art, in Charge (1913, 1916).
Graduate, Kansas State Normal School, 1890. A 67; ———.

FRED SAWYER MERRILL,[1] B. S.,
Assistant Professor of Horticulture (1912, 1916 – Jan. 1, 1918).
B. S., Massachusetts Agricultural College, 1912.

ALBERT GARLAND HOGAN,[11] Ph. D.,
Assistant Professor of Chemistry, Agricultural Experiment Station (1914, 1916).
A. B., University of Missouri, 1907; B. S., ibid., 1909; A. M., ibid., 1912; Ph. D., Yale University, 1914.

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1. Resigned.
2. Absent on leave, 1917-'18.
11. Absent on leave, in military service, since December 1, 1917.

MAURICE COLE TANQUARY, Ph. D.,
Assistant Professor of Entomology (1912, 1916); Assistant Entomologist, Agricultural Experiment Station (1912, 1916).
A. B., University of Illinois, 1907; A. M., ibid., 1908; Ph. D., ibid., 1912. F 62; R. R. 1.

EMERY ANDREW BAUER, B. S., B. P. E.,
Assistant Professor of Physical Education for Men (1916).
B. S., Colgate University, 1902; B. P. E., International Y. M. C. A. College, 1908. N 37; 1616 Fairview.

ROYCE GERALD KLOEFFLER, B. S.,
Assistant Professor of Electrical Engineering (1916).
B. S. in E. E., University of Michigan, 1913. C 33; 831 Vattier.

ADOLPH GEORGE SCHULZ,
Assistant Professor of Athletics and Assistant Coach (1916).
Student, University of Michigan, 1904-'08. N 35; 308 N. Sixteenth.

WYLIE BRODBECK WENDT, B. C. E.,
Assistant Professor of Applied Mechanics (1916); Acting Professor of Military Science and Acting Commandant of Cadets (June 16–Oct. 26, 1917).
B. C. E., University of Kentucky, 1906. E 8A; 1623 Anderson.

CLINTON ELLICOTT PEARCE, S. B.,
Assistant Professor of Applied Mechanics and Machine Design (1917).
S. B., Massachusetts Institute of Technology, 1913. S 63; 615 N. Eleventh.

THEODORE MACKLIN,[2] Ph. D.,
Assistant Professor of Agricultural Economics (1915, 1917).
B. S. A., Iowa State College, 1911; Ph. D., University of Wisconsin, 1917. A 59A; ———.

GEORGE MERRITT POTTER, D. V. M.,
Specialist in Veterinary Medicine, Division of College Extension (1917).
D. V. M., Ohio State University, 1906. V —; 1615 Anderson.

LEO EDWARD MELCHERS, M. S.,
Assistant Professor of Botany, in Charge (1914, 1917).
B. S., Ohio State University, 1912; M. S., ibid., 1913. H 58; 1801 Leavenworth.

ROSS MADISON SHERWOOD, B. S.,
Specialist in Poultry Husbandry, Division of College Extension (1914).
B. S. in A. H., Iowa State College, 1910. Ag 38; 530 N. Fourteenth.

LEILA DUNTON, M. S.,
Assistant Professor of Milling Industry (1912, 1917).
B. S., 1910; M. S., 1912. Ag 40; 325 N. Seventeenth.

JENNIE LYNN COX,[18] B. S.,
Assistant Professor of Domestic Science (1913, 1917).
A. B., Fairmount College, 1903; B. S., 1913. L 42; 724 Houston.

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2. Absent on leave, 1917-'18.
18. Absent on leave, March 1 to July 1, 1918.

PERCY LEIGH GAINEY, A. M., M. S.,
Assistant Professor of Bacteriology (1914, 1917); Soil Bacteriologist, Agricultural Experiment Station (1914).
B. Agr., North Carolina College of Agriculture and Mechanic Arts, 1908; M. S., ibid., 1910; A. M., Washington University, 1911. V 26; 112 S. Twelfth.

LOULA ESDALE KENNEDY, A. B., R. N.,
Assistant Professor of Domestic Science (1915, 1917).
A. B., Goucher College, 1896; Graduate, Johns Hopkins Hospital Training School for Nurses, 1903; R. N., Maryland, 1905. L 47; 217 N. Fourteenth.

FRANCIS LAWRENCE SNOW,
Assistant Professor of Industrial Journalism (1915, 1917).
K 51; 1001 Thurston.

DON LAMAR BURK, A. M.,
Assistant Professor of English (1916, 1917).
A. B., DePauw University, 1914; A. M., ibid., 1915. A 69; 1721 Anderson.

ANDREW MINIE PATERSON, B. S.,
Assistant Professor of Animal Husbandry (1913, 1917).
B. S., 1913. Ag 13; 1100 Bluemont.

ROBERT KLINE BONNETT, M. S.,
Assistant Professor of Farm Crops (1913, 1917).
B. S., 1913; M. S., University of Wisconsin, 1916. Ag 82; 1819 Poyntz.

ELIZABETH MACLEAN, Ph. B., M. Di.,
Assistant Professor of English (1916, 1917).
B. Di., Iowa State Teachers' College, 1894; M. Di., Iowa State College, 1900; Ph. B., University of Chicago, 1909. K 59; 804 Moro.

VIVAN LEWIS STRICKLAND, A. M.,
Specialist in Educational Subjects, Home Study Service, Division of College Extension (1917).
A. B., University of Nebraska, 1906; A. M., ibid., 1915. A 4; 1512 Leavenworth.

JOHN IRWIN THOMPSON,[12] B. S.,
Assistant Professor of Animal Husbandry (1917-1918).
B. S. in A. H., Iowa State College, 1910.

HENRY HUXLEY FENTON, B. S.,
Specialist in Industrial Subjects, Home Study Service, Division of College Extension (1917).
B. S. in E. E., 1913. A 5; 618 Vattier.

JOHN CHRISTIAN PETERSON, Ph. D.,
Assistant Professor of Education (Oct. 1, 1917).
A. B., University of Utah, 1913; Ph. D., University of Chicago, 1917.
A 66; 1622 Osage.

JOHN HUNTINGTON PARKER, M. S.,
Assistant Professor of Farm Crops (Nov. 1, 1917).
B. S. in Agr., University of Minnesota, 1913; M. S. in Agr., Cornell University, 1916.
Ag 82; 319 N. Sixteenth.

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12. Exchange professorship.

GEORGE E. PIPER,[8]
Assistant County Agent Leader, Division of College Extension (Nov. 15, 1917).
B. S., Michigan Agricultural College, 1914. A 2; 800 Osage.

FRED D. MERRITT, Ph. D.,
Assistant Professor of Sociology and Economics (1917; Jan. 1, 1918).
B. S., Upper Iowa University, 1891; A. M., University of Iowa, 1898; Ph. D., ibid., 1900. A 59; 1621 Anderson.

GEORGE ELDON THOMPSON, B. S.,
Specialist in Crops and Soils, Division of College Extension (Jan. 1, 1916).
B. S., 1910. Ag 60; 1615 Anderson.

CARL POLLARD THOMPSON, B. S.,
Specialist in Animal Husbandry, Division of College Extension (1915).
B. S., 1904. Ag 13A; 1309 Poyntz.

THADDEUS HEDGES PARKS,[1] B. S. A.,
Specialist in Entomology, Division of College Extension (March 15, 1916 – April 15, 1918).
B. S. A., Ohio State University, 1909. A 33; 414 N. Ninth.

HARLEY JAMES BOWER,[8] M. S.,
Specialist in Soils, Division of College Extension (1913, 1917).
B. S., 1910; M. S., Ohio State University, 1912. Ag 60; 927 Humboldt.

EPHA ESTELLA MATHER,[8] B. S.,
Assistant Leader of Emergency Home Demonstration Agents, Division of College Extension (1914, 1917).
B. S., 1913. A 35; 1335 Anderson.

ELEANOR HAMILTON BARTLETT,[7] A. M.,
Assistant Professor of Domestic Science (Feb. 1 to June 1, 1918).
A. B., Mount Holyoke College, 1905; A. M., University of Chicago, 1913. L 34; 1809 Leavenworth.

JOSEPHINE LEVERETT,[7] A. M.,
Assistant Professor of Domestic Science (Feb. 1 to June 1, 1918).
A. B., University of Mississippi, 1912; A. M., Columbia University, 1917. L 35; 217 N. Fourteenth.

EARL ARTHUR STEWART, B. S.,
Assistant Professor of Physics (Feb. 1, 1918).
B. S., University of Chicago, 1915; B. Pd., Michigan State Normal College, 1910. C 36; ———.

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1. Resigned.
7. Temporary appointment.
8. In coöperation with the U. S. Department of Agriculture.

ASSOCIATES

CHESTER ALLEN ARTHUR UTT,[1] M. S.,
Associate in Food Analysis (1907, 1914 – March 1, 1918).
B. S., Cornell College, 1903; M. S., ibid., 1909.

RAYMOND CLIFFORD WILEY,[1] B. S.,
Associate in Feeding Stuffs and Fertilizer Analysis, Agricultural Experiment Station (1908, 1914 – Jan. 13, 1918).

EDWIN CYRUS MILLER, Ph. D.,
Associate in Plant Physiology, Agricultural Experiment Station (1910, 1917).
A. B., Lebanon College, 1906; A. B., Yale University, 1907; Ph. D., ibid., 1910. H 56; 813 Moro.

WILLIAM SYLVANUS STEVENS,[10] B. Sc. Pharm.,
Associate in Stock Remedy Analysis, Agricultural Experiment Station (Aug. 3, 1917 – May 1, 1918).
B. Sc. Pharm., Ohio State University, 1917. W 30; 810 Moro.

WALTER LEROY LATSHAW, B. S.,
Associate in Research Analysis, Agricultural Experiment Station (Nov. 17, 1914 – Dec. 1, 1917).
B. S., Pennsylvania State College, 1912. W 30; 317 N. Third.

INSTRUCTORS

DAISY DOROTHY ZEININGER, A. B.,
Instructor in Mathematics (1904, 1907).
A. B., Fairmount College, 1900. G 28; 601 Humboldt.

ANNETTE LEONARD, A. B.,
Instructor in English (1907, 1909).
A. B., University of Kansas, 1906. G 28; 1642 Fairchild.

WILLIAM LEONARD HOUSE,
Instructor in Wood Work (1909); Foreman of Carpenter Shop (1888).
S 29; 608 Moro.

FRANK CLYDE HARRIS, M. S.,
Instructor in Architecture (1909, 1911).
B. S., 1908; M. S., 1917. A 55; 624 Bluemont.

EDWARD GRANT,
Instructor in Molding (1913); Foreman of Foundry (1913).
S 42; 1638 Osage.

CHARLES WESLEY HOBBS, D. V. S.,
Instructor in Veterinary Medicine (1913).
D. V. S., Western Veterinary College, Kansas City, Mo., 1901. V 27; 303 N. Sixteenth.

CONSTANCE MIRIAM SYFORD, A. M.,
Instructor in English (1913).
A. B., University of Nebraska, 1909; A. M., ibid., 1911. G 32; 721 Poyntz.

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1. Resigned.
10. Absent in military service.

ARTHUR ROY FEHN, Ph. B.,
Instructor in Mathematics (1910, 1913).
Ph. B., Baldwin Wallace College, 1903. A 70; 1506 Poyntz.

LOUIS HENRY LIMPER, A. M.,
Instructor in Modern Languages (Feb. 1, 1914; 1917).
A. B., Baldwin Wallace College, 1907; A. M., University of Wisconsin, 1914.
N 61; 1324 Laramie.

INA EMMA HOLROYD, B. S.,
Instructor in Mathematics (1900, 1914).
B. S., 1897; B. S., Kansas State Normal School, 1916. G 28; 1001 Moro.

WILLIAM HENRY SANDERS, M. E.,
Instructor in Farm Motors (1914).
B. S., 1890; M. E., 1916. E 3; 826 Osage.

GRAYSON BELL McNAIR,[13] B. S.,
Instructor in Electrical Engineering (1913, 1914 – Jan. 1, 1918).
B. S., Purdue University, 1908.

EMMA FLORA FECHT,[14]
Instructor in Domestic Art (1913, 1914).
L 56; 203 N. Fourteenth.

RAY GATEWOOD,[1] B. S.,
Instructor in Animal Husbandry (1913, 1914 – Apr. 30, 1918).
B. S., Iowa State College, 1913. Ag 13; 323 N. Fifteenth.

ETHEL HANNAH JONES, B. S.,
Instructor in Domestic Art (1913, 1914).
B. S., Columbia University, 1913; Graduate, Pratt Institute, 1910.
L 64; 415 N. Sixteenth.

WALTER EDWIN TOMSON,[1] B. S.,
Instructor in Dairy Husbandry (1912, 1914 – Nov. 1, 1917).
B. S., 1912.

DANIEL EMMETT LYNCH,
Instructor of Forging (1914); Foreman of Blacksmith Shop (1914).
S 38; 913 Osage.

JAMES WALKER McCOLLOCH, B. S.,
Instructor in Entomology (1910, 1915).
B. S., 1912. F 64; 1626 Leavenworth.

ALICE EDNA SKINNER, B. S.,
Instructor in Domestic Science (1910, 1915).
B. S., 1909. L 42; 1314 Fremont.

FANNY DUNLAP, Ph. B., B. L. S.,
Head Cataloguer in Library (1915).
Ph. B., State University of Iowa, 1905; B. L. S., University of Illinois, 1915.
F 27; 1412 Laramie.

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1. Resigned.
13. Absent on leave, 1917-'18; resigned.
14. Absent on leave, September 1, 1917, to February 1, 1918.

JOHN EARL SMITH, A. M.,
Instructor of Physics (1915).
A. B., University of Indiana, 1912; A. M., University of Wisconsin, 1915.
C 38; 601 Vattier.

LEE RAYMOND DICE,[1] Ph. D.,
Instructor in Zoölogy, and Assistant Zoölogist in Agricultural Experiment Station (Feb. 1, 1916 – Oct. 1, 1917).
A. B., Leland Stanford University, 1911; M. S., University of California, 1914; Ph. D., ibid., 1915.

IRWIN T. BODE, B. S.,
Instructor and Research Assistant, Fort Hays Branch Agricultural Experiment Station (May 15, 1916).
B. S., Iowa State College, ———. Hays, Kan.

HELEN LOUISE GREEN, B. S.,
Instructor in Domestic Science (1912, 1916).
B. S., Simmons College, 1915. L 42; 1516 Leavenworth.

ETHEL VANDERWILT, B. S.,
Instructor in Animal Husbandry (1913, 1916).
B. S., 1913. Ag 8; 303 N. Sixteenth.

NELLIE IRENE McCLURG,[2] A. B.,
Instructor in Domestic Science (1914, 1916).
A. B., University of Illinois, 1912. L 42; ———.

EDGAR VERMONT COLLINS, B. S.,
Instructor in Farm Engineering (1915, 1917).
B. S. in Agr. Eng., Iowa State College, 1914; B. S., in Agron., ibid., 1914.
E 31; 1825 Leavenworth.

NORMAN EVERETT OLSON,[1] B. S.,
Instructor in Dairy Husbandry (1915, 1916 – Nov. 28, 1917).
B. S., Iowa State College, 1915.

JAMES WALTER ZAHNLEY, B. S.,
Instructor in Farm Crops (1915, 1916).
B. S., 1909. Ag 79; 1131 Laramie.

MARY MARIA BAIRD, B. S.,
Specialist in Home Economics, Home Study Service, Division of College Extension (1916).
B. S., 1917; Graduate, Kansas State Normal School, 1904. A 5; 1604 Humboldt.

AMOS HENRY HERSH, A. M.,
Instructor in Zoölogy (1916).
A. B., Franklin and Marshall College, 1914; A. M., ibid., 1915.
F 62; 1621 Anderson.

EDWARD JONES, B. M. E.,
Instructor in Shop Practice (1916).
B. M. E., Iowa State College, 1905. S 31; 923 Osage.

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1. Resigned.
2. Absent on leave, 1917-'18.

WALTER HENRY PIELEMEIER, A. B.,
Instructor in Physics (1916).
A. B., University of Michigan, 1916. C 61; 1014 Bluemont.

F. RAYMOND SMITH,[1] A. B.,
Instructor in Physics (1916; Jan. 25, 1918).
A. B., Albion College, 1914.

MARY EMELINE WRIGHT,[1]
Specialist in Home Economics, Division of College Extension (1916; Jan. 1, 1918).
Graduate, Kansas State Normal School, 1910.

JULES HENRY ROBERT, B. S.,
Instructor in Applied Mechanics and Machine Design (Oct. 16, 1916).
B. S., University of Illinois, 1914. E 8A; 1623 Anderson.

DANIEL WALTER ZIEGLER, B. S.,
Specialist in Animal Husbandry, Home Study Service, Division of College Extension (Nov. 1, 1916).
B. S., 1913. A 5; 1000 Kearney.

LOTTIE MILAM, B. S.,
Assistant Club Leader, Boys' and Girls' Club Work, Division of College Extension (March 20, 1917).
B. S., Oregon Agricultural College, 1914. A 35; 1419 Laramie.

WILLIAM LUTHER FRENCH,[1] B. S. A.,
Specialist in Agriculture, Home Study Service, Division of College Extension (Aug. 1, 1917 – Apr. 1, 1918).
B. S. A., University of Nebraska, 1906; Graduate, (Peru) Nebraska State Normal School, 1897. A 4; 1221 Laramie.

WILLIAM EARL PETERSEN,[8] M. S.,
Specialist in Dairy Husbandry, Division of College Extension (Aug. 1, 1917).
B. S. in Agr., University of Minnesota, 1916; M. S., ibid., 1917.
D 30; 609 N. Sixteenth.

CHARLES YOST,
Instructor in Machine Shop (1905, 1917).
S 32; 1230 Laramie.

JOHN THOMPSON PARKER,
Instructor in Woodwork (1916, 1917).
S 26; 926 Vattier.

GRACE CUSHING AVERILL,
Instructor in Home Art (1913, 1917).
Graduate, Wisconsin State Normal School, 1906. A 68; 1412 Leavenworth.

WILLIAM HENRY BALL,
Instructor in Woodwork (1913, 1917).
S 26; 1126 Pierre.

GRACE GLASGOW, M. S.,
Instructor in Bacteriology (1913, 1917).
B. S., University of Illinois, 1912; M. S., ibid., 1912. V 24; 203 N. Fourteenth.

1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.

STANLEY ALBERT SMITH, B. S.,
Instructor in Architecture (1913, 1917).
B. S., 1913. A 55A; 812 Laramie.

AVA PATRICIA ABERNETHY,
Instructor in Piano (1915, 1917).
Graduate, Laurence Conservatory, Appleton, Wis., 1911. M 53; 624 Poyntz.

JANE CAPE, B. S.,
Instructor in Domestic Science (1915, 1917).
B. S., University of Wisconsin, 1914. L 35; 421 N. Sixteenth.

EDGAR TALBERT KEITH, B. S.,
Instructor in Printing (1912, 1917).
B. S., 1912. K 1; 1421 Poyntz.

ETHEL MAY LORING,
Instructor in Charge of Physical Education for Women (1915, 1917).
Graduate, Sargent Normal School of Physical Education, 1915. N 1; 800 Houston.

EBEN HENRY TOOLE,[1] A. M.,
Instructor in Botany (1916, 1917 – Oct. 20, 1917).
A. B., University of Wisconsin, 1915; A. M., ibid., 1916.

PRESTON ESSEX McNALL, M. S.,
Specialist in Farm Management Studies, Division of College Extension (1913, 1914).
B. S. in E. E., 1909; B. S. in Agr., 1913; M. S., 1914. A 2; 817 Osage.

LOUIS COLEMAN WILLIAMS, B. S.,
Assistant Club Leader, Garden Clubs, Division of College Extension (1915, 1917).
B. S. 1912. A 34; 1110 Vattier.

MINNIE SEQUIST, A. B.,
Specialist in Home Economics, Division of College Extension (1916).
A. B., Kansas State Normal School; Graduate, Stout Institute, 1916.
A 36; 203 N. Fourteenth.

JULIA MARGARET BAKER, B. S.,
Specialist in English and History, Home Study Service, Division of College Extension (1917).
B. S., 1914; Graduate, Kansas State Normal School, 1912. A 5; 1006 Kearney.

DORRIS MARJORIE BUGBEY, Mus. B.,
Instructor in Violin (1917).
Mus. B., Conservatory of Music, Oberlin College, 1916, M 4; 1420 Humboldt.

EULA BERNICE BUTZERIN, R. N.,
Specialist in Home Economics, Division of College Extension (1917).
R. N., School for Nurses, Presbyterian Hospital, Chicago, 1914.
A 36; 1335 Anderson.

ADA DYKES,[7] A. B.,
Instructor in Public Speaking (1917 – '18).
A. B., University of Kansas, 1917.

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1. Resigned.
7. Temporary appointment.

MANFORD W. FURR, B. S.,
Instructor in Highway Engineering (1917).
B. S. in C. E., Purdue University, 1913. E 55; 816 Pierre.

JOHN B. GINGERY, D. V. M.,
Instructor in Veterinary Medicine (1917).
D. V. M., 1910. V 29; 1030 Bluemont.

LESTER DAVISSON HAMMOND, Ph. D.,
Instructor in Chemistry (1917).
A. B., University of Indiana, 1907; A. M., University of Wisconsin, 1910; Ph. D., ibid., 1916. C 64; 1020 Leavenworth.

RAY WILLIAM HAZLETT, A. M.,
Instructor in English (1917).
A. B., Oberlin College, 1915; A. M., ibid., 1916. A 53; 1621 Anderson.

PAUL REVERE IMEL, B. S.,
Specialist in Pig and Baby Beef Club Work, Division of College Extension (1917).
B. S., Purdue University, 1917. A 35; 1621 Anderson.

HERBERT FREDERICK LIENHARDT, D. V. M.,
Instructor in Bacteriology (1917).
D. V. M., University of Pennsylvania, 1916. V 53; 112 S. Twelfth.

FLORA SERAPHINE MONROE, B. S.,
Cafeteria Director (1917).
B. S., 1914. K 29; 225 N. Fourteenth.

WILMA OREM, A. M.,
Instructor in History and Civics (1917).
B. S., 1910; A. M., University of Michigan, 1916. G 32; R. R. 3.

GRACE MARGARET PALMER, A. B.,
Instructor in Home Art, in Charge (1917–1918).
A. B., Kansas State Normal School, 1913; Ph. B., University of Chicago, 1915. A 67; 1329 Anderson.

MARGARET RUSSEL, A. M.,
Instructor in English (1917).
A. B., Washburn College, 1913; A. M., Columbia University, 1915. A 54; 1723 Fairchild.

ELSIE HARRIET SMITH,
Instructor in Piano (1917).
Graduate, Certificate Course, Chicago Musical College, 1909. M 58; 1420 Humboldt.

ALONZO FRANKLIN TURNER,[8] B. S.,
Assistant County Agent Leader, Division of College Extension (1917).
B. S., 1905. A 2; 810 Moro.

ALBERT JOHN MACK, B. S.,
Instructor in Steam and Gas Engineering (Sept, 15, 1917).
B. S., 1912. E 53; 805 Laramie.

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8. In coöperation with the U. S. Department of Agriculture.

SUSANNA SCHNEMAYER, B. S.,
Specialist in Home Economics, Extension Schools, Division of College Extension (Sept. 15, 1917).
B. S., 1909. A 36; 910 N. Ninth.

CLIFFORD W. JOHNSTON,
Instructor in Voice (Sept. 18, 1917).
M 51; R. R. 2.

RICHARD ANTHONY MUTTKOWSKI, Ph. D.,
Instructor in Zoölogy, and Assistant Zoölogist in the Agricultural Experiment Station (Oct. 13, 1917).
A. B., St. Lawrence College, 1905; A. B., University of Wisconsin, 1913; Ph. D., ibid., 1916. F 54A; 703 Poyntz.

ROBERT ELLIOTT PRESTON, A. M.,
Instructor in Chemistry (Oct. 15, 1917).
A. B., Ripon College, 1914; A. M., ibid., 1916. W 26; 1317 Anderson.

NIELS FREDERICK PETERSEN,[1] A. M.,
Instructor in Botany (Oct 20, 1917 – March 31, 1918).
A. B., University of Nebraska, 1907; A. M., ibid., 1911. H 54; 1623 Anderson.

HIRAM SMOOTS DOTY, M. S.
Instructor in Botany (Oct. 22, 1917).
B. S., Iowa State College, 1912; M. S., ibid., 1915. H 54; 1623 Anderson.

VIRGIL DOWE SMILEY,[1] B. S.,
Instructor in Chemistry (Oct. 22, 1917 – March 31, 1918).
B. S., Franklin College, 1911. W 26; 1011 Bluemont.

ERNEST H. WIEGAND, B. S. A.,
Specialist in Poultry Club Work, Division of College Extension (Oct. 22, 1917).
B. S. A., University of Missouri, 1914. A 35; 1623 Anderson.

KATHERINE KIMMEL,
Instructor in Voice (Nov. 10, 1917.)
Graduate, Battle Creek (Mich.) Conservatory of Music, 1913.
M 52; 1420 Humboldt.

JAMES WILLIAM CRUMBAKER, B. S.,
Instructor in Animal Husbandry and Superintendent of Land and Livestock (1916; Nov. 12, 1917).
B. S., 1916. A. H. Barn.

CARL G. ELLING,[8] B. S.,
Specialist in Hog Production, Division of College Extension (1914; Nov. 12, 1917).
B. S., 1904. A 33; 922 Bertrand.

HERBERT HENLEY HAYMAKER, M. S.,
Instructor in Botany (Nov. 16, 1917).
B. S., 1915; M. S., University of Wisconsin, 1916. H 54; 319 N. Sixteenth.

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1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.

KARL KNAUS,[8] B. S.,
Assistant Leader of County Agricultural Agents, Division of College Extension (Jan. 10, 1916; Dec. 1, 1917).
B. S., 1914. A 2; 1000 Vattier.

LASSIE LANE,
Specialist in Extension Schools, Division of College Extension (Jan. 1, 1918).

GERTRUDE LYNN,
Specialist in Institutes in Home Economics, Division of College Extension (Jan. 1, 1918).
Graduate, Kansas Manual Training Normal School, 1907. A 36; 1020 Leavenworth.

RENA AURELIA FAUBION,[8] B. S.,
Specialist in Institutes in Home Economics, Division of College Extension (Jan. 21, 1918).
B. S., 1910. A 36; 1419 Laramie.

ROLLA WILLIAMS TITUS, A. M.,
Assistant Chemist, Agricultural Experiment Station (1917; Feb. 1, 1918).
A. B., Washburn College, 1909; A. M., University of Kansas, 1914. C 3; 616 Laramie.

HARRY EMERSON FOWLER,[7] A. B.,
Instructor in Chemistry (Feb. 1 to June 1, 1918).
A. B., University of Colorado, 1917. W 26; 1503 Fairchild.

ROY WILLIAM KISER,[8] B. S.,
Specialist in Animal Husbandry, Division of College Extension (Mar. 12, 1918).
B. S., 1914. A 34; 1630 Laramie.

FLORENCE TANNER ACKERT,[7] A. B.,
Instructor in Domestic Science (Mar. 20 – June 1, 1918).
A. B., University of Illinois, 1912. L 42; 1422 Poyntz.

WALTER MILLER, B. S., E. E.,
Instructor in Shop Practice (Mar. 25, 1918).
B. S., Purdue University, ——; E. E., ibid., ——. S 62; 411 N. Sixteenth.

HAROLD SIMONDS, A. B.,
Specialist in Horticulture, Division of College Extension (May 5, 1918).
A. B., Washington State College, 1916. A 36; ———.

ASSISTANTS

AMY ALENA ALLEN, B. S.,
Assistant in Printing (1900, 1909).
B. S., 1904. K 3; 1446 Fairchild.

JESSIE GULICK,
Assistant Cataloguer in Library (1907, 1911).
F 27; 421 N. Sixteenth.

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7. Temporary appointment.
8. In coöperation with the U. S. Department of Agriculture.

ALANSON LOLA HALLSTEAD, B. S.,
Assistant in Dry Farming, Fort Hays Branch Agricultural Experiment Station (1910).
B. S., 1903. Hays, Kan.

BRUCE STEINHOFF WILSON, B. S.,
Assistant in Coöperative Experiments (1910, 1912).
B. S., 1908. Ag 59; 514 N. Manhattan.

ASHER EULESTA LANGWORTHY, Ph. C.,
Feeding-stuffs Inspector, Agricultural Experiment Station (1912).
Ph. C., University of Kansas, 1911. Ag 26; West of Campus.

OLIVER CARLTON MILLER,[1]
Feeding-stuffs Inspector, Agricultural Experiment Station (1913; Sept. 22, 1917).

ROBERT GETTY,[8] B. S. A.,
Assistant in Forage Crops, Fort Hays Branch Agricultural Experiment Station (1913).
B. S. A., University of Nebraska, 1913. Hays, Kan.

FREDERICK ARTHUR KIENE,[8] B. S.,
Assistant in Cereal Crops, Fort Hays Branch Agricultural Experiment Station (1912).
B. S., 1906. Hays, Kan.

ERWIN JONES MONTAGUE, B. S.,
Accountant and Assistant Superintendent, Fort Hays Branch Agricultural Experiment Station (1913).
B. S., Oregon Agricultural College, 1913. Hays, Kan.

HAROLD MORTON JONES, B. S.,
Deputy State Dairy Commissioner (1913).
B. S., Purdue University, 1908. X; 808 N. Juliette.

WILLIAM PATRICK HAYES, B. S.,
Assistant in Entomology (1913, 1914).
B. S., 1913. F 59; 911 Bluemont.

REBECCA PAULINE BARTHOLOMEW,
Assistant in Domestic Science (1914).
L 47; 800 Houston.

LOUISE CALDWELL,[1] A. B.,
Specialist in Home Economics, Division of College Extension (1914 – Jan. 1, 1918).
A. B., Kentucky College for Women, 1904; Graduate, Drexel Institute, 1914.

MARION HARRISON,
Assistant in Domestic Art (1914).
Graduate, Mechanics Institute, Rochester, N. Y., 1913. L 65; 1314 Fremont.

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1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.

FLORENCE HUNT,[14]
Assistant in Domestic Art (1914).
Graduate, Pratt Institute, 1910. L 64; 1412 Leavenworth.

GRACE ADELLA PALMER,
Assistant in Domestic Art (1914).
Graduate, Mechanics Institute, 1914. L 65; 415 N. Sixteenth.

OTIS EVERETT STRODTMAN,[8] D. V. S.,
Deputy Inspector and College Representative, Marshall County Hog Cholera Eradication Project (1914).
D. V. S., Kansas City Veterinary College, 1911. Marysville, Kan.

LUCILE WARNOCK, A. B.,
Loan Assistant in Library (1914).
A. B., Monmouth College, 1913. F 31; 321 N. Sixteenth.

HUGH DURHAM, A. M.,
Assistant to the Dean of the Division of Agriculture (1915).
Graduate, Kansas State Normal School, 1901; A. B., University of Kansas, 1909; A. M., ibid., 1915. Ag 30; 730 Osage.

ISABEL MARCH HIATT, A. B.,
Assistant in Charge of Continuations, College Library (1915, 1917).
A. B., Washburn College, 1915. F 28; 421 N. Sixteenth.

CHARLES LORIN QUEAR,
Assistant in Office of the President (1916).
A 32; 825 Osage.

JAMES HENDRIX McADAMS, B. S.,
Assistant in Farm Extension and Accounting, Fort Hays Branch Agricultural Experiment Station (June, 1916).
B. S., 1916. Hays, Kan.

MABEL GERTRUDE BAXTER,
Class Reserves Assistant in Library (1916).
F 31; 1624 Fairchild.

FRED HARRISON BUNDY,
Assistant in Shop Practice (1916).
S 38; 1008 Ratone.

ARMIN MEREDITH DOERNER, B. S.,
Assistant in Landscape Gardening (1916).
B. S. in Agr., Oregon Agricultural College, 1916. H 32; 1621 Anderson.

LESTER HENRY DRAYER,
Assistant in Heat and Power (1916).
E 3; 1201 Kearney.

CECIL ELDER, D. V. M.,
Assistant in Pathology (1916).
D. V. M., 1916. V 56; R. R. 8.

FRANK ELMER FOX, B. S.,
Assistant in Poultry Husbandry (1916).
B. S., Iowa State College, 1915. Ag. 38; 1821 Poyntz.

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8. In coöperation with the U. S. Department of Agriculture.
14. Absent on leave, September 1, 1917, to February 1, 1918.

MARY MATTIE McDONALD, Ph. B.,
Assistant in Domestic Art (1916).
Ph. B., University of Chicago, 1916; Graduate, Eastern Illinois State Normal School, 1910; Graduate, Bradley Polytechnic Institute, 1912. L 64; 415 N. Sixteenth.

MYRA O'BRIEN, A. B., B. L. S.,
Reference Assistant in the Library (1916).
A. B., Knox College, 1906; B. L. S., University of Illinois, 1907. F 32; 1641 Fairchild.

JOSEPHINE CARRIER PERRY, B. S.,
Assistant in Domestic Science (1916).
B. S., Simmons College, 1914. L 34; 1314 Fremont.

LENORE RICHARDS, A. B.,
Assistant in Domestic Science (1916).
A. B., University of Illinois, 1915. L 42; 215 N. Fourteenth.

FRANK SIMON HAGY,[7] B. S.,
Specialist in Soils and Crops, Division of College Extension (Nov. 1, 1917 – Mar. 1, 1918).
B. S., Ohio Northern University, 1901; B. S. in Agr., 1916.

OSCAR WALLACE PARK,[1] B. S.,
Assistant in Zoölogy, and Assistant in Genetics in Agricultural Experiment Station (Jan. 1, 1917 – Jan. 20, 1918).
B. S., 1917.

JOSEPH PRESTWICH SCOTT, D. V. M.,
Assistant in Veterinary Medicine (1916; Jan. 1, 1917).
B. S., Scientific Gymnasium, Lausanne, Switzerland, 1910; D. V. M., Ohio State University, 1914. V 32; 343 N. Fifteenth.

FRANK WILLIAMSON KIRK,
Agent for Negro Farmers, Division of College Extension (Feb. 15, 1917).
Graduate, Langston (Okla.) University, 1913. A 1; 806 Yuma.

LOUISE FEWELL WIRT,[1]
Assistant in Domestic Art (1912, 1917 – Feb. 1, 1918).
L 65; 928 Leavenworth.

LUZERNE HALLECK FAIRCHILD, B. S.,
Assistant in Dairy Husbandry (1916, 1917).
B. S., 1916. D 28; 1031 Leavenworth.

SIDNEY JACK PEARCE, B. S.,
Field Dairy Bacteriologist, Agricultural Experiment Station (July 1, 1917).
B. S., University of Nebraska, 1917. V 26; 1623 Anderson.

LENA LETITIA PRICE,
Research Assistant to Dean of the Division of Agriculture (1912, 1917).
A 30; 1423 Fairchild.

WALTER JOHN DENMAN,
Assistant in Heat and Power (1912; Aug. 5, 1917).
E 3; 215 S. Twelfth.

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1. Resigned.
7. Temporary appointment.

HAROLD HARDESTY AMOS, B. S.,
Assistant in Poultry Husbandry (1917).
B. S., 1916. Ag 38; 319 Denison.

JOY ELLA ANDREWS, A. B.,
Assistant in Zoölogy (1917).
A. B., University of Wisconsin, 1917. F 55; 1628 Fairchild.

EDITH LORRAINE BOND, A. B.,
Assistant in Physical Training for Women (1917).
A. B., University of Wisconsin, 1917. N 3; 1628 Fairchild.

FRED CARP,[1]
Assistant Commandant (Sept. 1 to Nov. 27, 1917).

ELIZABETH HARLING,
Seed Analyst (1912, 1917).
Ag 77; 628 Fremont.

GRACE ROBERTA HESSE, A. B.,
Assistant in Modern Languages (1917).
A. B., University of Michigan, 1917. N 60; 1641 Fairchild.

PAUL EUGENE HOLMES,[1]
Assistant in Shop Practice (1917 – Mar. 1, 1918).
Graduate, Western State Normal School, Kalamazoo, Mich., 1916.
S 32; 925 Osage.

JANETTE ELIZA BELLE LONG,
Specialist in Project Reports and Assistant in Office of the Dean, Division of College Extension (1917).
A 33; 1743 Fairchild.

WILLIAM FRANCIS PICKETT,[1] B. S.,
Assistant in Plant Propagation and Foreman of Greenhouses (Sept. 1 to Oct. 19, 1917).

HENRY EDWIN SMITH,
Assistant in Feed Control (1917).
Ag 26; 1231 Vattier.

CURTIS WILLARD THING,[1] M. S.,
Assistant in Chemistry (Sept. 1 to Oct. 15, 1917).
B. S., Lenox College, 1914; M. S., University of Washington, 1917.

THOMAS KENNETH VINCENT,[10] B. S.,
Assistant in Physics (Sept. 1, Oct. 10 – Nov. 10, 1917).
B. S., 1916.

HARRIET WRIGHT ALLARD,
Assistant in Home Economics, Extension Schools, Division of College Extension (Sept. 15, 1917).
A 36; 510 N. Ninth.

HENRY JAMES ALLEN,
Assistant in Heat and Power (1914; Oct. 1, 1917).
E 27; 330 Vattier.

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1. Resigned.
10. Absent, in military service.

GRACE LUCILE CRAVEN, B. S.,
Assistant to the Registrar (Oct. 1, 1917).
B. S., 1914. A 29; 1642 Fairchild.

HILDA MARGUERITE LANCEFIELD, B. L. S.,
Reference Assistant in Library (Oct. 1, 1917).
A. B., Whitman College, 1913; B. L. S., New York State Library School, 1917.
F 32; 1725 Fairchild.

EDWARD STAUNTON WEST, A. B.,
Assistant in Chemistry (Sept. 1 to Oct. 15, 1917).
A. B., Randolph Macon College, 1917. C 3; 1621 Anderson.

GEORGE HERBERT PHINNEY,
Assistant in Agronomy and Foreman of Agronomy Farm (Nov. 12, 1917).
Graduate, Topeka Business College, 1903. Agronomy Farm.

ZADOCK RANDOLPH HOOK,[7]
Assistant in Physics (Nov. 21, 1917).
C 57; 123 Colorado.

CHESTER WILLIS OAKES,
Miller, Department of Milling Industry (Jan. 1, 1918).
Ag 26C; 303 N. Fourteenth.

HAROLD ARTHUR PRATT, B. S.,
Assistant in Horticulture and Foreman of Greenhouses (Jan. 1, 1918).
B. S., Massachusetts Agricultural College, 1917. College Greenhouses.

EMMETT J. O'NEILL, A. B.,
Assistant to the Commandant (Feb. 19, 1918).
A. B., Loyola University, Chicago, 1918. N 26; 1334 Fremont.

CLENNIE ELSIE BAILEY, A. B.,
Assistant in Zoölogy (March 9, 1918); Assistant in Genetics, Agricultural Experiment Station (March 9, 1918).
A. B., Indiana State Normal School, 1917.

LOUIS THEODORE ANDEREGG, A. M., M. S.,
Assistant Chemist, Agricultural Experiment Station (April 1, 1918).
A. B., Oberlin College, 1911; A. M., ibid., 1913; M. S., University of Michigan, 1915.
C 3; 1416 Laramie.

SUPERINTENDENTS

STANLEY PENRHYN CLARK,[1] B. S.,
Superintendent, Colby Branch Agricultural Experiment Station (1914 – March 15, 1918).
B. S., 1912. Colby, Kan.

GEORGE SELICK KNAPP, B. S.,
Superintendent, Garden City Branch Agricultural Experiment Station (1915, 1916).
B. S., 1914. Garden City, Kan.

1. Resigned.
7. Temporary appointment.

MARION W. KIRKPATRICK,
Superintendent, Tribune Branch Agricultural Experiment Station (1916, 1917).
Tribune, Kan.

A. P. DAVIDSON,
Superintendent, Colby Branch Agricultural Experiment Station (April 1, 1918).
Colby, Kan.

AGRICULTURAL AGENTS[15]

PLEASANT ELIJAH CRABTREE,
District Demonstration Agent, Western Kansas, Division of College Extension (1908, 1916).
Scott City, Kan.

WILLIAM ARMFIELD BOYS, B. S.,
District Demonstration Agent, West Central Kansas, Division of College Extension (1912).
B. S., 1904. Hays, Kan.

CHARLES HENRY TAYLOR,[1] B. S. A.,
Atchison County Agricultural Agent, Division of College Extension (1914, 1915 – Feb. 20, 1918).
B. S. A., University of Missouri, 1908. Effingham, Kan.

FRANK PALMER LANE,[1] B. S.,
Harvey County Agricultural Agent, Division of College Extension (1913 – Nov. 15, 1917).
B. S., Oklahoma College of Agriculture and Mechanic Arts, 1913; Graduate, Kansas State Normal School, 1904. Newton, Kan.

EVEREST JOHN MACY, B. S.,
Montgomery County Agricultural Agent, Division of College Extension (1913).
B. S., Earlham College, 1904. Independence, Kan.

AMBROSE DICKSON FOLKER, B. S.,
Shawnee County Agricultural Agent, Division of College Extension (1914; July 1, 1917).
B. S., Iowa State College, 1911. Topeka, Kan.

OTTO C. HAGANS, B. S.,
Miami County Agricultural Agent, Division of College Extension (1914 – March 6, 1918); Atchison County Agricultural Agent, Division of College Extension (March 7, 1918).
B. S., 1914. Effingham, Kan.

HUBERT LOWELL POPENOE, B. S.,
Marshall County Agricultural Agent, Division of College Extension (1914).
B. S., 1914. Emporia, Kan.

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1. Resigned.

15. All agricultural agents are employed coöperatively by the College and the U. S. Department of Agriculture, and in case of county agents in coöperation with the County Farm Bureaus.

VALENTINE MEACHAM EMMERT, B. S.,
McPherson County Agricultural Agent, Division of College Extension (April 1, 1916).
B. S., 1901. McPherson, Kan.

RAYMOND OLIVER SMITH, B. S.,
Wilson County Agricultural Agent, Division of College Extension (April 6, 1916).
B. S. in Agr., University of Nebraska, 1915. Fredonia, Kan.

JOHN D. LEWIS,[1] B. S.,
Nemaha County Agricultural Agent, Division of College Extension (June 1, 1916 – Nov. 15, 1917).
B. S., Pennsylvania State College, 1912. Seneca, Kan.

RALPH POWELL SCHNACKE, B. S.,
Pawnee County Agricultural Agent, Division of College Extension (June 20, 1916).
B. S. in Agr., 1916. Larned, Kan.

FRANCIS BUCKNER WILLIAMS,[1] B. S.,
Marshall County Agricultural Agent, Division of College Extension (June 20, 1916 – April 20, 1918).
B. S. in Agr., 1909. Marysville, Kan.

IRA NICHOLS CHAPMAN, B. S.,
Leavenworth County Agricultural Agent, Division of College Extension (1916).
B. S., 1916. Leavenworth, Kan.

PRESTON ORIN HALE, B. S.,
Chase County Agricultural Agent, Division of College Extension (Feb. 1, 1917).
B. S., 1916. Cottonwood Falls, Kan.

RAYMOND WALTER SCHAFER, M. S.,
Washington County Agricultural Agent, Division of College Extension (Feb. 1, 1917).
B. S., 1914; M. S., University of Wisconsin, 1917. Washington, Kan.

WILLIAM RENWICK CURRY,[1] B. S.,
Doniphan County Agricultural Agent, Division of College Extension (March 15 – Dec. 15, 1917).
B. S., 1914. Troy, Kan.

ALFRED LESTER CLAPP, B. S.,
Morris County Agricultural Agent, Division of College Extension (April 1, 1917).
B. S., 1914. Council Grove, Kan.

AMWEL EDWIN JONES, B. S.,
Jewell County Agricultural Agent, Division of College Extension (July 1, 1917).
B. S., 1915. Mankato, Kan.

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1. Resigned.

FLOYD JOE ROBBINS, B. S.,
Franklin County Agricultural Agent, Division of College Extension (July 1, 1917).
B. S., 1913. Ottawa, Kan.

ROY MALCOLM PHILLIPS,[1] B. S.,
Anderson County Agricultural Agent, Division of College Extension (July 6 – Oct. 6, 1917).
B. S., 1914.

ARCHIE GLENN VAN HORN, B. S.,
Wyandotte County Agricultural Agent, Division of College Extension (Nov. 1, 1917).
B. S., 1916. Kansas City, Kan.

FRANK SUMNER TURNER, B. S.,
Anderson County Agricultural Agent, Division of College Extension (Nov. 1, 1917).
B. S., 1917. Garnett, Kan.

CHARLES DAVID THOMAS, B. S.,
Cloud County Agricultural Agent, Division of College Extension (Dec. 1, 1917).
B. S., 1917. Concordia, Kan.

RALPH SAMS HAWKINS, B. S.,
Nemaha County Agricultural Agent, Division of College Extension (Jan. 15, 1918).
B. S., 1914. Seneca, Kan.

ORVILLE BROWN BURTIS, B. S.,
Clay County Agricultural Agent, Division of College Extension (Feb. 1, 1918).
B. S., 1916. Clay Center, Kan.

WILHELM ALEXANDER WUNSCH, B. S.,
Harvey County Agricultural Agent, Division of College Extension (1917; Feb. 15, 1918).
B. S., 1917. Newton, Kan.

ASSISTANT COUNTY AGRICULTURAL AGENTS[8]

HENRY JOSEPH ADAMS, B. S.,
Assistant Agricultural Agent for McPherson County, Division of College Extension (Aug. 15, 1917).
B. S., 1917. McPherson, Kan.

JOHN LAWRENCE LANTOW, B. S.,
Assistant Agricultural Agent for Miami County, Division of College Extension (Aug. 20, 1917).
B. S., 1917. Paola, Kan.

CLIFFORD LEVERN SWENSON, B. S.,
Assistant Agricultural Agent for Montgomery County, Division of College Extension (Aug. 20, 1917).
B. S., 1917. Independence, Kan.

1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.

WILBUR WILLIAM WRIGHT, B. S.,
Assistant County Agricultural Agent for Doniphan County, Division of College Extension (Sept. 6, 1917; Jan. 4, 1918 – Feb. 28, 1918); Greenwood County Agricultural Agent (Mar. 1, 1918).
B. S., 1917. Eureka, Kan.

CECIL LYMAN McFADDEN, B. S.,
Assistant District Agricultural Agent for Western Kansas, Division of College Extension (Oct. 15, 1917).
B. S., 1917. Scott City, Kan.

AARON ERNEST PEARSON,[1] B. S.,
Assistant Agricultural Agent for Marshall County, Division of College Extension (Nov. 15, 1917 – Mar. 15, 1918).
B. S., 1914. Marysville, Kan.

WILLIAM CECIL CALVERT, B. S.,
Assistant Agricultural Agent for Leavenworth County, Division of College Extension (Nov. 20, 1917).
B. S., 1916. Leavenworth, Kan.

EARL CHAPMAN THURBER, B. S.,
Assistant Agricultural Agent for Jewell County, Division of College Extension (Nov. 26, 1917).
B. S., 1917. Mankato, Kan.

FREDERICK HAROLD BAYER,[1]
Assistant Agricultural Agent for Shawnee County, Division of College Extension (Dec. 17, 1917 – Mch. 31, 1918).
Topeka, Kan.

HERMAN FREDERICK TAGGE, B. S.,
Assistant Agricultural Agent for Lyon County, Division of College Extension (Jan. 1, 1918 – Mar. 31, 1918); Doniphan County Agricultural Agent, Division of College Extension (Apr. 1, 1918).
B. S., 1914. Troy, Kan.

EMERGENCY DEMONSTRATION AGENTS[8]

CHARLES ELMER CASSEL, B. S.,
Emergency Demonstration Agent, Finney County (1912; Aug. 16, 1917).
B. S., 1910. Garden City, Kan.

EDWARD E. ISAAC, B. S.,
Emergency Demonstration Agent, Cowley County (Aug. 16, 1917).
B. S., 1912. Winfield, Kan.

NEIL LEWIS RUCKER, B. S.,
Emergency Demonstration Agent, Hodgeman County (Aug. 16, 1917).
B. S., 1913. Jetmore, Kan.

LUTHER EARLE WILLOUGHBY, B. S.,
Emergency Demonstration Agent, Rush County (Aug. 16, 1917).
B. S., 1916. La Crosse, Kan.

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1. Resigned.
8. In coöperation with the U. S. Department of Agriculture.

WILLIAM JAMES YEOMAN, B. S.,
Emergency Demonstration Agent, Ness County (Aug. 16, 1917).
B. S., 1893. Ness City, Kan.

JOHN VERN HEPLER, B. S.,
Emergency Demonstration Agent, Ford County (Aug. 20, 1917).
B. S., 1915. Dodge City, Kan.

ALBERT VICTOR NORLIN,[1] B. S.,
Emergency Demonstration Agent, Haskell County (Aug. 20 to Nov. 4, 1917).
B. S., 1913.

LEWIS CAIE CHRISTIE, B. S.,
Emergency Demonstration Agent, Seward County (Sept. 1, 1917).
B. S., 1913. Liberal, Kan.

HERBERT LYNNE HILDWEIN, B. S.,
Emergency Demonstration Agent, Lane County (Sept. 1, 1917).
B. S., 1914. Kingman, Kan.

ROY FRANK HAGANS, B. S.,
Emergency Demonstration Agent, Stevens County (Sept. 1, 1917).
B. S., 1915. Hugoton, Kan.

BLAINE CROW, B. S.,
Emergency Demonstration Agent, Pottawatomie and Wabaunsee Counties (Sept. 17, 1917).
B. S., 1917. Wamego, Kan.

JOHN MARTIN KESSLER, B. S.,
Emergency Demonstration Agent, at Large (Oct. 22, 1917).
B. S., 1899. Manhattan, Kan.

RALPH SNYDER, B. S.,
Emergency Demonstration Agent, Jackson and Jefferson Counties (Nov. 1, 1917).
B. S., 1900. Valley Falls, Kan.

H. S. WILSON,
Emergency Demonstration Agent, Johnson County (Nov. 5, 1917).
Olathe, Kan.

JOHN ALFRED SCHEEL, B. S.,
Emergency Demonstration Agent, Osage and Coffey Counties (Nov. 15, 1917).
B. S., 1894. Melvern, Kan.

THOMAS WALTER ALLISON, B. S.,
Emergency Demonstration Agent, Elk and Chautauqua Counties (Nov. 16, 1917).
B. S., 1898. Moline, Kan.

CHARLES A. GILKISON, B. S.,
Emergency Demonstration Agent, Barton and Rice Counties (Nov. 16, 1917).
B. S., 1906. Ellinwood, Kan.

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1. Resigned.

DAVID H. GRIPTON, B. S.,
Emergency Demonstration Agent, Osborne and Mitchell Counties (Nov. 20, 1917).
B. S., 1906. Downs, Kan.

FRANK ANDREW DAWLEY, B. S.,
Emergency Demonstration Agent, at Large (Dec. 1, 1917).
B. S., 1895. Manhattan, Kan.

RALPH KENNEY, B. S. A.,
Emergency Demonstration Agent, Riley and Geary Counties (Dec. 15, 1917).
B. S. A., Ohio State University, 1912. Manhattan, Kan.

EDWARD LARSON, B. S.,
Emergency Demonstration Agent, Pratt County (Dec. 15, 1917).
B. S., 1911. Pratt, Kan.

CHARLES ANDERSON SCOTT,[7] B. S.,
Emergency Demonstration Agent, at Large (Dec. 17, 1917 – Mch. 31, 1918).
B. S., 1901. Manhattan, Kan.

HENRY BENJAMIN BAYER, B. S.,
Emergency Demonstration Agent, Sherman and Decatur Counties (Jan. 1, 1918).
B. S., 1916. Oberlin, Kan.

EDWIN ISAAC MARIS, B. S.,
Emergency Demonstration Agent, Cheyenne and Rawlins Counties (Jan. 1, 1918).
B. S., 1916. Atwood, Kan.

FREDERICK THOMAS REES, B. S.,
Emergency Demonstration Agent, Neosho and Labette Counties (Jan. 1, 1918).
B. S., 1913. Parsons, Kan.

GEORGE W. SIDWELL,
Emergency Demonstration Agent, Greeley and Wichita Counties (Jan. 1, 1918).
Leoti, Kan.

PRICE HARLAN WHEELER, B. S.,
Emergency Demonstration Agent, Kearny and Hamilton Counties (Jan. 1, 1918).
B. S., 1916. Lincoln, Kan.

EARL J. WILLIS,
Emergency Demonstration Agent, Crawford and Cherokee Counties (Jan. 7, 1918).
Pittsburg, Kan.

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7. Temporary appointment.

EMERGENCY HOME DEMONSTRATION AGENTS[8]

MARION PERCIVAL BROUGHTEN, A. B., B. S.,
Kansas City, Kansas, Emergency Home Demonstration Agent, Division of College Extension (1914; July 2, 1917).
A. B., Leland Stanford University, 1900; B. S., 1914. Kansas City, Kan.

MARY WINONA WARD,
Topeka, Kansas, Emergency Home Demonstration Agent, Division of College Extension (Aug. 17, 1917).
Topeka, Kan.

ELSIE LORETTA BAIRD, B. S.,
Anderson County Home Demonstration Agent, Division of College Extension (Sept. 5, 1917).
B. S., 1915. Garnett, Kan.

MOLLIE LINDSEY,
Ness County Emergency Home Demonstration Agent, Division of College Extension (Sept. 5, 1917).
Ness City, Kan.

ELLEN EUSTINA NELSON, B. S.,
Seward County Emergency Home Demonstration Agent, Division of College Extension (Sept. 5, 1917).
B. S., 1911. Liberal, Kan.

LEORA JUANITA SUTCLIFF, B. S.,
Cowley County Emergency Home Demonstration Agent, Division of College Extension (Sept. 5, 1917).
B. S., 1909. Winfield, Kan.

MAUDE MILDRED COE, B. S.,
McPherson County Emergency Home Demonstration Agent, Division of College Extension (Sept. 22, 1917).
B. S., 1902. McPherson, Kan.

ELLEN MARGARET BATCHELOR, B. S.,
Wyandotte County Emergency Home Demonstration Agent, Division of College Extension (Sept. 24, 1917).
B. S., 1911. Kansas City, Kan.

BERTHA JANE BOYD,
Stevens County Emergency Home Demonstration Agent, Division of College Extension (Sept. 25, 1917).
Hugoton, Kan.

MYRTLE BLYTHE, B. S.,
Washington County Emergency Home Demonstration Agent, Division of College Extension (Oct. 4, 1917).
B. S., 1915. Washington, Kan.

EDNA MAY DANNER, B. S.,
Marshall County Emergency Home Demonstration Agent, Division of College Extension (Oct. 5, 1917).
B. S., 1914. Marysville, Kan.

8. In coöperation with the U. S. Department of Agriculture.

AVIS TALCOTT, A. B.,
Atchison County Emergency Home Demonstration Agent, Division of College Extension (Oct. 15, 1917).
A. B., Rockford College, 1906. Effingham, Kan.

(Mrs.) CLYDA GREENE,
Shawnee County Emergency Home Demonstration Agent, Division of College Extension (Nov. 3, 1917).
Topeka, Kan.

RUTH ELLEN WOOSTER, A. B.,
Morris County Emergency Home Demonstration Agent, Division of College Extension (Dec. 1, 1917).
Council Grove, Kan.

(Mrs.) MARJORIE RUSSELL KIMBALL,
Manhattan and Riley County Emergency Home Demonstration Agent, Division of College Extension (Jan. 1, 1918).
Manhattan, Kan.

ISA ALLENE GREENE, B. S.,
Fort Scott Emergency Home Demonstration Agent, Division of College Extension (Feb. 1, 1918).
B. S., Kansas State Manual Training Normal School, 1917. Fort Scott, Kan.

MARTHA MAE McLEOD, B. S.,
Hutchinson Emergency Home Demonstration Agent, Division of College Extension (Feb. 1, 1918).
B. S., 1910. Hutchinson, Kan.

FLORINE FATE, B. S.,
Chase County Emergency Home Demonstration Agent, Division of College Extension (Feb. 9, 1918).
B. S., 1911. Cottonwood Falls, Kan.

COUNTY LEADERS IN BOYS' AND GIRLS' CLUB WORK

ELIZABETH SPENCER,
Temporary Woodson County Club Leader, Division of College Extension (Oct. 16, 1917).
Graduate, Kansas State Normal School, 1894. Yates Center, Kan.

CHARLES A. BOYLE,
Temporary Lyon County Club Leader, Division of College Extension (Dec. 17, 1917).
Emporia, Kan.

HUGH PAYSON ALEXANDER, A. B.,
Temporary Leavenworth County Club Leader, Division of College Extension (Jan. 1, 1918).
A. B., Park College, 1897. Kipp, Kan.

GEORGE RIGG CAMPBELL, B. S.,
Temporary Bourbon County Club Leader, Division of College Extension (Jan. 1, 1918).
B. S., 1916. Fulton, Kan.

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8. In coöperation with the U. S. Department of Agriculture.

FLOYD HAWKINS,
Temporary Republic County Club Leader, Division of College Extension (Jan. 1, 1918).
Belleville, Kan.

JESSE STEVENS McCAFFERTY,
Temporary Jefferson County Club Leader, Division of College Extension (Jan. 1, 1918).
Oskaloosa, Kan.

(Mrs.) W. LEONARD RAMSEY,
Temporary Leavenworth County Club Leader, Division of College Extension (Jan. 1, 1918).
Leavenworth, Kan.

AVA LUCILE SELLS,
Temporary Wabaunsee County Club Leader, Division of College Extension (Jan. 1, 1918).
Maple Hill, Kan.

MABEL BROBERG TOWNLEY, B. S.,
Temporary Rice County Club Leader, Division of College Extension (Jan. 1, 1918).
B. S., 1912. Lyons, Kan.

JESSIE BANGS CAUTHORN,
Temporary Jewell County Club Leader, Division of College Extension (Feb. 1, 1918).
Mankato, Kan.

WILLIAM ASA BAKER, A. B.,
Temporary Sumner County Club Leader, Division of College Extension (March 1, 1918).
A. B., Southwestern College, 1910. Argonia, Kan.

CHARLES L. CASTENEAU, B. S.,
Temporary Labette County Director of Garden Clubs, Division of College Extension (April 1, 1918).
B. S., Pittsburg State Normal Training School, 1917. Parsons, Kan.

FELLOWS

STELLA MAUDE HARRISS, B. S.,
Fellow in Chemistry (1917).
B. S., 1917; Graduate, (Peru) Nebraska State Normal School, 1908.
C 56; 830 Moro.

LEVI JACKSON HORLACHER, B. S. A.,
Fellow in Animal Husbandry (1917).
B. S. A., Purdue University, 1917. Ag 7; 1503 Fairchild.

JAY LAWRENCE LUSH, B. S.,
Fellow in Animal Husbandry (1917).
B. S., 1916. Ag 15A; 1621 Anderson.

GEORGE LAWRENCE REISNER,[1] B. S.,
Fellow in Crops (1917 – March 31, 1918).
B. S., Pennsylvania State College, 1917. Ag 79; 1621 Anderson.

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1. Resigned.

WILLIAM PRESTON TUTTLE, B. S. A.,
Fellow in Soils (1917).
B. S. A., University of Kentucky, 1915. Ag 55; 1621 Anderson.

LOIS EMILY WITHAM, B. S.,
Fellow in Chemistry (1917).
B. S., 1916. C 56; 923 Vattier.

OTHER OFFICERS

JACOB LUND, M. S.,
Superintendent of Heat and Power (1893, 1901); Custodian of Buildings and Grounds (1893, 1917).
B. S., 1883; M. S., 1886. E 26B; 1414 Fairchild.

JAMES THOMAS LARDNER,
Assistant to Business Manager of Board of Administration (1913, 1917).
Topeka, Kan.

JESSIE McDOWELL MACHIR,
Registrar (1913).
A 29; 1641 Fairchild.

GEORGE RICHARD PAULING,
Engineer of Power Plant (1913); Superintendent of Buildings and Repairs (1916).

THOMAS BARTLETT ROBBINS,[1]
Head Janitor (Aug. 15, 1917 – Jan. 8, 1918).

STEPHEN ARNOLD GEAUQUE,
Head Janitor (Jan. 9, 1918).
G 33; 420 Humboldt.

1. Resigned.

Agricultural Experiment Station

Officers of the Station

H. J. WATERS, President of the College (till Dec. 31, 1917).
J. T. WILLARD, Acting President of the College (Jan. 1 to Feb. 28, 1918).
W. M. JARDINE, President of the College (since March 1, 1918).

ADMINISTRATION—
W. M. JARDINE, Director (till March 28, 1918).
L. E. CALL, Acting Director (since May 1, 1918).
J. T. WILLARD, Vice Director.
J. W. KIMBALL, Business Manager.
LENA L. PRICE, Research Assistant.

AGRONOMY—
L. E. CALL, in Charge.
S. C. SALMON, Crops.
C. C. Cunningham, Coöperative Experiments.
B. S. WILSON, Coöperative Experiments.
R. I. THROCKMORTON, Soils.
W. E. GRIMES, Farm Management.
J. H. PARKER, Plant Breeding.
M. C. SEWELL, Soils.
R. K. BONNETT, Crops.
G. H. PHINNEY, Farm Foreman.
MRS. E. HARLING, Seed Analyst.

ANIMAL HUSBANDRY—
W. A. COCHEL, Beef Cattle, in Charge.
E. N. WENTWORTH, Animal Breeding (Absent on leave, in military service).
C. W. MCCAMPBELL, Horse Feeding Investigations.
C. M. VESTAL, Animal Nutrition (Absent on leave, 1917-'18).
J. I. THOMPSON, Animal Nutrition (Exchange Professor).
A. M. PATERSON, Sheep.
RAY GATEWOOD, Swine.
E. VANDERWILT, Experimental Records.
J. W. CRUMBAKER, Superintendent of Land and Livestock.

BACTERIOLOGY—
L. D. BUSHNELL, in Charge.
O. W. HUNTER, Dairy Bacteriology.
H. F. LIENHARDT, Poultry Disease Investigations.
P. L. GAINEY, Soil Bacteriology.
S. J. PEARCE, Field Dairy Bacteriologist.

BOTANY—
H. F. ROBERTS (Absent on leave, 1917-'18), in Charge.
L. E. MELCHERS, Plant Pathology, in Charge, 1917-'18.
E. C. MILLER, Plant Physiology.

CHEMISTRY—
J. T. WILLARD, in Charge.
C. O. SWANSON, General Investigations.
W. L. LATSHAW, Soil, Feeding Stuffs, and Fertilizer Analysis.

CHEMISTRY—*Continued*—
E. L. TAGUE, Protein Investigations.
A. G. HOGAN, Animal Nutrition (Absent on leave).
J. S. HUGHES, Animal Nutrition.
R. W. TITUS, Animal Nutrition.
W. S. STEVENS, Analyst Proprietary Stock Remedies.

DAIRY HUSBANDRY—
O. E. REED, in Charge.
J. B. FITCH, Dairy Production.
W. E. TOMSON, Dairy Manufactures.
W. R. DAVIS, Dairy Manufactures.
G. S. HINE, State Dairy Commissioner.
H. M. JONES, Deputy State Dairy Commissioner.
L. H. FAIRCHILD, Field Dairy Inspector.
CHARLES WILSON, Herdsman.

ECONOMICS—
THEODORE MACKLIN, Agricultural Economics (Absent on leave, 1917-'18).

ENTOMOLOGY—
G. A. DEAN, in Charge.
J. H. MERRILL, Fruit Insect Investigations.
J. W. MCCOLLOCH, Staple Crop Insect Investigations.
W. P. HAYES, Staple Crop Insect Investigations.
M. C. TANQUARY, Staple Crop Insect Investigations.

HORTICULTURE—
ALBERT DICKENS, in Charge.
M. F. AHEARN, Vegetables and Forcing Crops.
F. S. MERRILL,[1] Cultural Methods and Fertilizer Investigations.

MILLING INDUSTRY—
L. A. FITZ, in Charge.
LEILA DUNTON, Wheat and Flour Investigations.
C. W. OAKES, Miller.
A. E. LANGWORTHY, Feed Control.
H. E. SMITH, Feed Control.

POULTRY HUSBANDRY—
W. A. LIPPINCOTT, in Charge.
F. E. FOX, General Investigations.
H. H. AMOS, Superintendent of Poultry Plant.

VETERINARY MEDICINE—
L. W. GOSS, in Charge.
C. W. HOBBS, Field Veterinarian.

ZOOLOGY—
R. K. NABOURS, in Charge.
J. E. ACKERT, Parasitology.
R. A. MUTTKOWSKI, Injurious Mammals.

Branch Experiment Stations

FORT HAYS—
C. R. WEEKS, Superintendent.
A. L. HALLSTED, Dry Farming Investigations.[1]
F. A. KIENE, Cereal Crop Investigations.[1]
R. E. GETTY, Forage Crop Investigations.[1]
E. J. MONTAGUE, Assistant to the Superintendent.
I. T. BODE, Forest Nurseryman.

1. In coöperation with the U. S. Department of Agriculture.

GARDEN CITY—
G. S. KNAPP, Superintendent.
C. B. BROWN, Dry-land Agriculture Investigations.[1]

COLBY—
S. P. CLARK, Superintendent.
J. B. KUSKA, Dry-land Agriculture Investigations.[1]

TRIBUNE—
M. W. KIRKPATRICK, Superintendent.

1. In coöperation with the U. S. Department of Agriculture.

Engineering Experiment Station

Officers of the Station

H. J. WATERS, President of the College (till Dec. 31, 1917).
J. T. WILLARD, Acting President (Jan. 1 to Feb. 28, 1918).
W. M. JARDINE, President of the College (since March 1, 1918).

ADMINISTRATION—
A. A. POTTER, Director.
LOUISE SCHWENSEN, Secretary.

APPLIED MECHANICS AND MACHINE DESIGN—
R. A. SEATON, in Charge (Absent on leave, in military service).
W. B. WENDT, Strength of Materials.
C. E. PEARCE, Machine Design.
J. H. ROBERT, General Investigations.
———, Fellow.

ARCHITECTURE—
C. F. BAKER, in Charge.
J. D. WALTERS, General Investigations.
K. J. T. EKBLAW, Rural Architecture.
F. C. HARRIS, Architectural Construction.
STANLEY A. SMITH, Assistant.

CHEMISTRY—
J. T. WILLARD, in Charge.
H. H. KING, General Investigations (Absent on leave, 1917-'18).

CIVIL ENGINEERING—
L. E. CONRAD, in Charge.
F. F. FRAZIER, General Investigations.
M. W. FURR, Assistant.

ELECTRICAL ENGINEERING—
C. E. REID, in Charge.
R. G. KLOEFFLER, General Investigations.
———, Fellow.

FARM ENGINEERING—
K. J. T. EKBLAW, in Charge.
W. H. SANDERS, Tractors.
E. V. COLLINS, Farm Machinery.

PHYSICS—
J. O. HAMILTON, in Charge.
G. E. RABURN, General Investigations (Absent on leave, 1917-'18).

SHOP PRACTICE—
W. W. CARLSON, in Charge.
E. C. JONES, General Investigations.

STEAM AND GAS ENGINEERING—
A. A. POTTER, in Charge.
S. L. SIMMERING, General Investigations.
A. J. MACK, Assistant.
———, Assistant.
———, Fellow.

History of the College

The Kansas State Agricultural College had its origin in the Bluemont Central College, an institution established at Manhattan under the control of the Methodist Episcopal Church of Kansas. The charter for this sectarian institution, approved February 9, 1858, provided for the establishment of a classical college, but contained the following interesting section:

"The said association shall have power and authority to establish, in addition to the literary departments of arts and sciences, an agricultural department, with separate professors, to test soils, experiment in the raising of crops, the cultivation of trees, etc., upon a farm set apart for the purpose, so as to bring out to the utmost practical results the agricultural advantages of Kansas, especially the capabilities of the high prairie lands."

The corner-stone of the new College was laid on May 10, 1859, and instruction began about a year later. On March 1, 1861, a bill passed the legislature establishing a State university at Manhattan, the Bluemont Central College building to be donated for the purpose. This measure, however, was vetoed by Governor Robinson.

On July 2, 1862, President Lincoln signed the Morrill Act, "An act donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts." Section 1 of this act provides—

"That there be granted to the several states, for the purposes hereinafter mentioned, an amount of public lands to be appropriated to each state a quantity equal to 30,000 acres for each senator and representative in Congress to which the states are respectively entitled by the apportionment under the census of 1860."

Section 4 requires that the money from the sale of these lands—

"Shall constitute a perpetual fund, the capital of which shall remain forever undiminished, and the interest of which shall be inviolably appropriated by each state which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

Because of the nature of the endowment made by Congress, the institutions founded in accordance with this act are generally known as the "land-grant" colleges. It may well be said that this was the most far-reaching and statesmanlike stroke of educational policy that any government has ever initiated.

On February 3, 1863, Governor Carney signed a joint resolution passed by the Kansas legislature, in accordance with which the pro-

visions of the Morrill Act "are hereby accepted by the State of Kansas; and the State hereby agrees and obligates itself to comply with all the provisions of said act." On February 16 of the same year the governor signed an act which permanently located the College at Manhattan, and provided—

"That the location of the said college is upon this express condition, that the Bluemont Central College Association . . . shall . . . cede to the State of Kansas, in fee simple, the real estate, . . . together with all buildings and appurtenances thereunto belonging; and shall . . . transfer and deliver to said State the apparatus and library belonging to said Bluemont Central College Association."

The three commissioners appointed by the governor selected 82,313.52 acres of the 90,000 granted by Congress. The deficiency of 7,686.48 acres —an amount selected and found to lie within a railroad grant—was not made up by Congress till 1907.

After the passage of the creative act, no subsequent legislation was enacted by the federal government with reference to the "land-grant" colleges until the second Morrill Act, for the further endowment of agricultural colleges, was passed. This bill received the signature of President Harrison on August 30, 1890. This act applied—

"A portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two."

It provided—

"That there shall be and hereby is annually appropriated, out of any money in the treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided, to each state and territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established or which may be hereafter established, in accordance with an act of Congress approved July 2, 1862, the sum of $15,000 for the year ending June 30, 1890, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of $1,000 over the preceding year, and the average amount to be paid thereafter to each state and territory shall be $25,000, to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematics, physical, natural and economic science, with special reference to the industries of life and to the facilities for such instruction."

The third and last act of Congress increasing the income of agricultural colleges is the Nelson amendment to the agricultural appropriation bill, which was approved March 4, 1907. In addition, however, to providing for an increase in the support of these institutions from federal funds, the law contains the very significant provision specially authorizing the agricultural colleges to use a portion of this federal appropriation for the special preparation of instructors for teaching agriculture and mechanic arts. The essential features of the Nelson amendment are embodied in the following quotation from the bill:

"That there shall be and hereby is annually appropriated out of any money in the treasury not otherwise appropriated, to be paid as hereinafter provided, to each state and territory for the more complete endowment and maintenance of agricultural colleges now established, or

which may hereafter be established, in accordance with the act of Congress approved July 2, 1862, and the act of Congress approved August 30, 1890, the sum of $5,000, in addition to the sums named in the said act, for the fiscal year ending June 30, 1908, and an annual increase of the amount of such appropriation thereafter for four years by an additional sum of $5,000 over the preceding year, and the annual sum to be paid thereafter to each state and territory shall be $50,000, to be applied only for the purposes of the agricultural colleges as defined and limited in the act of Congress approved July 2, 1862, and the act of Congress approved August 30, 1890; provided, that said colleges may use a portion of this money for providing courses for the special preparation of instructors for teaching the elements for agriculture and the mechanic arts."

The Development of the Kansas Agricultural College

The President and Faculty of the Bluemont Central College became the first board of instruction of the Kansas State Agricultural College, when the former institution was transferred to the State and assumed its present name. The Bluemont Central College was a small institution of the older American classical type, the curriculum resting upon Greek, Latin, and mathematics as the chief of fundamentals. Its transfer to the State, and its conversion into the State Agricultural College, involved at the time merely a change in name. The President and Faculty, and the curriculum remained unchanged. The second catalogue, that of 1864-'65, mentions an "agricultural" course, comprising one preparatory and two collegiate years; but, although this course was strengthened from time to time, the classical studies nevertheless remained until the year 1873, when the character of the institution was radically changed. Intensely practical courses replaced the then existing ones. The new scheme of instruction involved the abolition of the classical course, and the introduction of a practical scheme of industrial education, which comprised a farmer's course of six years, a mechanic's course covering four years, and a woman's course requiring six years. Strong opposition to the new educational policies was encountered, but the authorities of the institution adhered to them unswervingly, until the complete success of the new method silenced criticism. Thus the institution became in fact what it had hitherto been only in name—an agricultural college. In 1879 the Faculty consisted of the President, five professors, and six instructors of lesser rank, with a student body of 207. During this period of development the College was removed from the original Bluemont College site to its present campus, two miles nearer Manhattan.

From 1879 to 1897 no great changes were made in the courses of study, but the work was systematized and strengthened in many directions, retaining, however, the distinctive stamp of a college related to the industries. In 1897 the student enrollment was 734. The Faculty had grown in numbers, and the activities of the institution along investigative lines had been well begun through the organization of the Agricultural Experiment Station. Beginning with 1897, greater stress was laid upon the study of financial, economic, and social problems. Several men of considerable note were added to the Faculty for the purpose of strengthening these phases of educational work. In 1897 four pro-

fessional courses, each four years in length, were organized—in agriculture, in mechanical engineering, in domestic science, and in general science. These years, therefore, mark the beginning of an era of broadening and diversification of the lines of instruction.

In 1899 the administration of the institution changed, and during the years that have followed the institution has experienced an era of solid, substantial, and uninterrupted growth, gaining steadily in recognition and in influence over the State. The number of professors and other instructors and the student enrollment grew steadily throughout this period up to the time of the outbreak of the war, when this college, along with all others, suffered heavily. Since 1899 additional buildings to the value of about $500,000 have been erected on the campus.

The history of the Kansas State Agricultural College may well be divided into five epochs. The first ten years, from 1863 to 1873, may be called the classical period of the College. The succeeding period, from 1873 to 1879, was the formative stage, the years of the foundation of the Agricultural College properly so called, and bore the stamp of a spirit of pure industrialism of the most intensely "practical" type.

The next eighteen years, from 1879 to 1898, may be called the scientific culture period—a period in which, under modified ideals, the institution was sought to be used not so much as a tool to teach young men and women how to make a living as to teach them *how to live*, and strove to accomplish the end of character building by means of scientific and technical training having especial reference to agriculture.

Expansion of courses, with consequent increased flexibility, plasticity, and adaptability of the means of instruction to the various ends of industrial life, marked the following epoch of twelve years. In this period we see a rising tendency toward an increased acknowledgment of the Agricultural College as the guardian and custodian of the State's industrial interests, and a steady growth of settled confidence over the State in its ability to solve the State's industrial problems.

The present time, therefore, finds the College and its inseparable coadjutor, the Experiment Station, occupying a position of far-reaching power and influence in connection with the most vital interests of the State of Kansas.

The Agricultural College accomplishes the objects of its endowment in several ways. It offers a substantial training in mathematics, in the fundamental sciences, in language, in history and civics, and in such other branches of human knowledge as experience has shown to be best adapted to give mental discipline, to develop good citizenship, and to furnish a proper equipment for entering upon active life. The combination of industrial training with the usual class and laboratory work has a special educational value. By the training of the hands the student is made more efficient in every way, is brought into contact with practical things, and is educated toward, rather than away from, an interest in industry and manual exertion. The general training which the College offers aims, therefore, at an equally efficient development of the physical and the mental powers. The greatest immediate aid to improvement in

social well-being and to betterment of the conditions of life is a thorough knowledge of science as applied to daily existence. In chemistry and physics, in geology, in botany, in bacteriology, in entomology, in mechanics, the student is brought to an understanding of the relation of man to the world around him, and to a knowledge of how to utilize natural forces for the protection and improvement of his own life.

The College trains directly toward the productive occupations in a considerable number of specialized branches. For example: In agriculture, the student may specialize in agronomy, horticulture, forestry, animal husbandry, dairying, poultry husbandry, or veterinary science. In engineering, the student may take work in mechanical, electrical, or civil engineering, architecture, or printing. For the young women, training in domestic science, domestic art, home furnishing, home decoration, etc., is offered.

A second large object of the College, made effective through the Agricultural Experiment Station, is to investigate the problems of agriculture in the widest sense. By conducting the researches of the Experiment Station in close connection with the educational work of the College, opportunity is afforded students to gain an understanding and an appreciation of the work of scientific investigation, and to become better able to appreciate the relation of science to agriculture. Opportunity is thus also offered to obtain such training as will fit competent students to become investigators, and to enter fields of agricultural leadership in the experiment stations, in the United States Department of Agriculture, as heads of private agricultural enterprises, or in the capacity of superintendents and managers of such undertakings.

In addition to the regular educational work, the College now maintains, through the Division of College Extension, a highly organized system of agricultural education among the farmers themselves. A corps of trained and efficient institute lecturers hold meetings in every county in the State, conduct seed trains, dairy trains, corn trains, alfalfa trains, and poultry trains, and publish two series of pamphlets of information and instruction—one for rural teachers, the other for members of farmers' institutes. In addition to the regular staff of the Division of College Extension, many members of the College Board of Instruction, and of the staff of the Experiment Station, give several weeks of each year to the public work of the farmers' institutes.

Finally, the College and the Station together are being increasingly charged by the State Government with State industrial and police duties, such as pure food investigations, control of feeding stuffs and fertilizers, State forestry work, and other similar duties.

The Experiment Stations

The Agricultural Experiment Station

The Kansas Agricultural Experiment Station was organized under the provisions of an act of Congress, approved March 2, 1887, which is commonly known as the "Hatch Act," and is officially designated as—

"An act to establish agricultural experiment stations in connection with the colleges established in the several states under the provisions of an act approved July 2, 1862, and the acts supplementary thereto."

The wide scope and far-reaching purposes of this act are best comprehended by an extract from the body of the measure itself, in which the objects of its enactment are stated as being—

"To aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and practice of agricultural science."

The law specifies in detail—

"That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and waters; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses for forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable."

On the day after the Hatch Act had received the signature of the President, the legislature of Kansas, being then in session, passed a resolution, dated March 3, 1887, accepting the conditions of the measure, and vesting the responsibility for carrying out its provisions in the Board of Regents of the Kansas State Agricultural College.

Until 1908 the expenses of the Experiment Station were provided for entirely by the federal government. The original creative act (the Hatch Act) carried an annual congressional appropriation of $15,000. No further addition to this amount was made until the passage of the Adams Act, which was approved by the President March 16, 1906. This measure provided, "for the more complete endowment and maintenance of agricultural experiment stations," a sum beginning with $5,000, and increasing each year by $2,000 over the preceding year for five years, after which time the annual appropriation was to be $15,000—

"To be applied to paying the necessary expenses of conducting original researches or experiments bearing directly on the agricultural industry of the United States, having due regard to the varying conditions and needs of the respective states or territories."

It is further provided that—

"No portion of said moneys exceeding five percentum of each annual appropriation shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings, or to the purchase or rental of land."

The Adams Act, providing as it does for original investigations, supplied the greatest need of the Experiment Station—the means of providing men and equipment for advanced research. Only such experiments may be entered upon, under the provisions of this act, as have first been passed upon and approved by the Office of Experiment Stations of the United States Department of Agriculture.

In the neighborhood of sixty projects, covering practically all phases of agricultural investigation, are being studied by the members of the Experiment Station staff.

The farms, livestock, laboratories, and general equipment of the College are all directly available for the use of the Experiment Station.

In 1915 the legislature of Kansas appropriated the sum of $80,000 for the support of the Experiment Station for the biennium 1915-1917. The income of the Experiment Station for the year 1916-1917, is, therefore, derived as follows:

Hatch fund (federal)	$15,000
Adams fund (federal)	15,000
State funds	40,000
State appropriation (special):	
For the purchase of land	80,000
Total	$150,000

The land for which the appropriation of $80,000 is to be expended, has been selected and purchased. This land will be used by the departments of Animal Husbandry and Dairy Husbandry.

The results of the work of the Experiment Station are published in the form of bulletins, circulars, and scientific papers other than bulletins and circulars. These bulletins are of two classes—those which record the results of research work of a purely scientific character and those which present technical information in a simplified form, suitable for the general reader. The circulars are brief and condensed popular presentations of data which call for immediate application, as well as timely and useful information not necessarily new or original. The scientific papers are usually published as reprints or addresses given before scientific bodies. These reprints contain original information or report definite steps in the progress of investigations under way.

All bulletins and other publications from the Experiment Station are sent without charge to citizens of the State. Any person in the State who so desires may have his name placed on the permanent mailing list of the Station.

Letters of inquiry and general correspondence should be addressed: "Agricultural Experiment Station, Manhattan, Kan." Special inquiries should be directed, so far as possible, to the heads of departments having in charge the matters concerning which information is desired.

PUBLIC WORK OF THE STATION

In addition to the work of agricultural investigation and research, the State has enlarged the activities of the Station along various lines of the State executive or control work.

One of the most important of these adjunct offices is that of State Dairy Commissioner, for which an appropriation of $7,500 a year was made for 1918 and 1919. This official, appointed by the Board of Administration, and having his office at the seat of the Agricultural College, is required (Laws of 1909, ch. 237)—

"To inspect or cause to be inspected all the creameries, public dairies, butter, cheese and ice-cream factories, or any place where milk or cream or their products are handled or stored within the State, at least once a year, or oftener if possible."

He may in connection with the Board of Administration of the College—

"Formulate and prescribe such reasonable rules and regulations for the operation of creameries, butter, cheese and ice-cream factories and public dairies as shall be deemed necessary by such board to fully carry out the provisions of this act."

He may act on complaints regarding the sale of unwholesome or unclean dairy products, and may prohibit their sale. He may—

"Condemn for food purposes all unclean or unwholesome milk, cream, butter, cheese or ice-cream, wherever he may find them."

Another important State function is that of the State Entomological Commission. (Laws of 1907, ch. 386; 1909, ch. 27.) This commission, created in 1907, was established—

"To suppress and eradicate San José scale and other dangerous insect pests and plant diseases throughout the State of Kansas."

The professors of entomology at the Agricultural College and at the University of Kansas are by law designated as two of the five members of the above commission. Acting under the title of State entomologist, they divide between them the territory of the State, for the purpose of inspection.

They are empowered—

"To enter upon any public premises . . . or upon any land of any firm, corporation or private individual within the State of Kansas, for the purpose of inspection, destroying, treating, or experiment upon the insects or diseases aforesaid."

They may treat or cause to be treated "any and all suspicious trees, vines, shrubs, plants, and grains," or, under certain conditions, may destroy them. They must annually inspect all nursery stock, and no nursery stock is to be admitted within the State without such inspection. For the expenses of the work of the commission, $3,000 was appropriated in 1917 for each of the following two years.

Concerned with the livestock interests of the State is the State Live Stock Registry Board, with regard to which there is the following provision (Laws of 1913):

"Every person, persons, firm, corporation, company or association that shall stand, travel, advertise or offer for public service in any manner any stallion in the State of Kansas, shall secure a license certificate for such stallion from the Kansas State Live Stock Registry Board, as herein provided. Said board shall consist of the dean of the Division of Agriculture, head of the Animal Husbandry Department, and the head of the Veterinary Department of the Kansas State Agricultural College."

To this board is assigned the duty of licensing stallions used for breeding purposes within the State, and authority to verify their breeding and to classify them under the following heads: Pure-bred, grade, cross-bred, and scrub. No animal not thus approved and licensed with the board is permitted to be used for public breeding purposes.

The suppression of tuberculosis in cattle is also delegated by the State to the Agricultural College. (Laws of 1909, ch. 160.)

By legislative act (Laws of 1909, ch. 49), a "division of forestry" at the Agricultural College is also provided for in the following terms:

"For the promotion of forestry in Kansas there shall be established at the Kansas State Agricultural College, under the direction of the Board of Regents, a division of forestry. The Board of Regents of the Kansas State Agricultural College shall appoint a State forester, who shall have general supervision of all experimental and demonstration work in forestry conducted by the Experiment Station. He shall promote practical forestry in every possible way, compile and disseminate information relative to forestry, and publish the results of such work through bulletins, press notices, and in such other ways as may be most practicable to reach the public, and by lecturing before farmers' institutes, associations, and other organizations interested in forestry."

The State has also placed the Experiment Station in charge of the execution of the acts concerning the manufacture and sale of livestock remedies and commercial feeding-stuffs (Laws of 1913), and also of commercial fertilizers (Laws of 1907, chapter 217). It is provided by the statutes that every brand of livestock remedy and every brand of commercial feeding-stuff offered or held for sale or sold within the State of Kansas shall be registered in the office of the Director of the Agricultural Experiment Station of the Kansas State Agricultural College, and each sale of any such brand not so registered shall constitute a separate violation of this act.

And—

"Except as herein provided, it shall be unlawful within the State of Kansas to sell, offer for sale, or expose for sale any commercial fertilizer which has not been officially registered by the Director of the Agricultural Experiment Station of the Kansas State Agricultural College."

These general provisions are limited in their application by important exceptions stated in the laws. The fees collected under these acts are used to defray the necessary expenses incurred in carrying out the provisions of the act.

It will thus be seen that the State of Kansas is making increasing use of the scientific staff of the Experiment Station in matters of State importance requiring the application of technical knowledge.

Branch Agricultural Experiment Stations

FORT HAYS BRANCH STATION

The land occupied by this Station is a part of what was originally the Fort Hays military reservation. Being no longer required for military purposes, it was turned over to the Department of the Interior, October 22, 1899, for disposal under the act of Congress of July 5, 1884. Before final disposition of this land was made, however, the Kansas legislature, in February, 1895, passed a resolution requesting the Congress of the United States to donate the entire reservation of 7,200 acres to the State of Kansas for the purposes of agricultural education and research, for the training of teachers, and for the establishment of a public park. Bills giving effect to this request were introduced into Congress without avail, until the fifty-sixth Congress, when, through the influence of Senator, later Regent, W. A. Harris, and of Congressman Reeder, a bill was passed, setting aside this reservation "for the purpose of establishing an experimental station of the Kansas Agricultural College and a western branch of the Kansas State Normal School thereon and a public park." This bill was approved by the President on March 28, 1900. By act of the State legislature, approved on February 7, 1901, the act of Congress donating this land and imposing the burden of the support of these institutions was accepted. The same session of the legislature passed an act providing for the organization of a branch experiment station and appropriating a small fund for preliminary work.

The land at the Fort Hays Branch Station consists mainly of high rolling prairie, with a limited area of rich alluvium bordering on a creek, and is situated on the edge of the semi-arid plains region. It is well suited for experimental and demonstration work in dry farming, in irrigation, and in crop, forestry, and orchard tests, under conditions of limited rainfall and high evaporation.

The work of this Station may be divided into two divisions: (A) experimental projects, (B) general farm and livestock work. The experimental projects are as follows: Dry farming investigations, forage crop investigations, cereal crop investigations, forest, nursery and park demonstrations and investigations, farm dairying, and feeding and breeding livestock experiments. All this work is confined to the study of the problems peculiar to the western half of the State, and relates especially to crop production under limited rainfall, to the origination of varieties better adapted to the climatic conditions there prevailing, and to studies of the systems of animal husbandry and dairy husbandry suited to this region. A systematic study of the value of trees as preventives of soil drifting is made on a scale sufficiently large to bring definite conclusions. The facilities of this Station are being used for the growing of large quantities of pure seed of the strains and varieties which have

proved in actual test to be most productive in the western part of the State.

This Station is supported entirely by State funds and by the sale of farm products. Under the terms of the acts of Congress establishing and supporting agricultural experiment stations, and under the rulings of the United States Department of Agriculture, none of the funds appropriated by the federal government may be used for the support of branch experiment stations.

The State appropriation for the maintenance of the Fort Hays Branch Experiment Station is $10,000 for 1918 and $10,000 for 1919.

GARDEN CITY BRANCH STATION

In 1906 the county commissioners of Finney county purchased, for purposes of agricultural experimentation, a tract of land amounting to 320 acres, situated four and one-half miles from Garden City, on the unirrigated upland.

The land has been leased for a term of ninety-nine years to the Kansas Agricultural Experiment Station as an "experimental and demonstration farm," for the purpose of determining the methods of culture, crop varieties, and crop rotations best suited to the southwestern portion of the State, under dry-land farming conditions. A pumping plant irrigating from eighty to one hundred acres has been installed for the purpose of investigating the expenses of pumping and the cost of equipment necessary for plants of this type, which are common in the shallow-water districts between Garden City and Scott City and along the Arkansas valley. The "duty of water" and the method of applying water are objects of investigation. For improvements and maintenance of this Station the sum of $5,000 was appropriated for the year 1917-'18 and $5,000 for the year 1918-'19.

COLBY BRANCH STATION

The legislature of 1913 provided for the establishment of a branch experiment and demonstration station near Colby, in northwestern Kansas, "for the purpose of advancing and developing the agricultural, horticultural, and irrigation interests of this State and western Kansas." Fifteen thousand dollars was appropriated for the establishment and maintenance of the Colby Station for the biennium 1913-'15. The Station was located upon a tract of three hundred and fourteen acres of land bordering upon the town site of Colby. This land was purchased by the county and deeded to the State for the purposes named above. Operations were begun in March, 1914. Cropping experiments are being conducted under dry-land conditions and under irrigation. Water is being lifted one hundred and fifty feet for irrigating a garden, fruit trees, and a few desirable crops, such as alfalfa, that could not be grown successfully in western Kansas with the natural rainfall. The primary purpose of the Colby Station is to determine the best methods of developing the agriculture of northwestern Kansas and to make it a still more desirable place to live.

The 1915 legislature appropriated for the erection of a dairy barn and silos, for the purchase of a dairy herd, and for the maintenance of the Colby Station, $4,000 for 1915-'16 and $3,000 for 1916-'17.

The 1917 legislature appropriated $2,500 for 1917-'18 and $2,500 for 1918-'19 for the maintenance and experimental work of this Station.

TRIBUNE BRANCH STATION

At the Tribune Station experimental and demonstration work is conducted for the benefit of the surrounding territory. The legislature of 1917 appropriated $2,000 for the maintenance of this station for the year 1917-'18 and $2,000 for 1918-'19.

The Engineering Experiment Station

The Engineering Experiment Station was established for the purpose of carrying on tests and research work of engineering and manufacturing value to the State of Kansas, and of collecting, preparing, and presenting technical information in a form readily available for the use of the various industries within the State. It is the intention to make all the work of the Experiment Station of direct importance to Kansas.

All of the equipment of the various engineering and scientific laboratories and shops and of the College power plant are available for this work, while the personnel of the Station staff is made up of professors and instructors from the various departments of the Division of Engineering and from other scientific departments whose work is directly related to the work of this division.

Among the tests now being carried on are investigations of the effect of freezing, before it has hardened, on the strength of concrete, the macadam-making properties of various Kansas stones, the relative costs of concrete of a given quality when made with and without coarse aggregates, the relative economy of gasoline and cheaper fuels in internal-combustion engines, the comparative advantage of steam and oil traction engines, power-plant economics, the use of gasoline-electric generating sets for isolated plants, the use of the windmill for driving electric generators for farm lighting, the losses in electric transmission lines, and in town and city distribution systems, the mechanical and electrical properties of commercial copper wire used in pole-line construction, the economy of electric cooking and heating devices, and the effect of chemical composition on the durability and protective power of paints.

Various other investigations are being carried on upon brick, concrete, fuels, pipe coverings, belt lacings, glued joints, blacksmith coals, foundry sands, centrifugal pumps, farm water supply, sewage disposal, and problems in farm architecture.

The results of the investigations are published as bulletins and circulars of the Engineering Experiment Station, which are sent free to any citizen of the State upon request. Besides issuing these bulletins, the Station answers yearly many hundreds of requests for information upon matters coming within its field.

Requests for bulletins and general correspondence should be addressed to Engineering Experiment Station, Manhattan, Kan. Requests for information in specific matters should be addressed, so far as it is possible, to the heads of departments in whose fields the particular matters lie.

Grounds, Buildings, and Equipment

The College campus occupies a commanding and attractive site upon an elevation adjoining the western limits of the city of Manhattan, with electric-car service into town and to the railway stations. The grounds are tastefully laid out according to the designs of a landscape architect, and are extensively planted with a great variety of beautiful and interesting trees, arranged in picturesque groups, masses, and border plantings varied by banks of shrubbery and interspersed with extensive lawns, gardens, and experimental fields. Broad, well-shaded macadamized avenues lead to all parts of the grounds. Cement walks connect the buildings with one another and with the entrances. Including the campus of 160 acres, the College owns 1,116 acres of land at Manhattan, valued at $258,000. Outside the campus proper, all of the land is devoted to educational and experimental work in agriculture. Within the College grounds, most of the space not occupied by buildings and needed for drives and ornamental plantings is devoted to orchards, forest and fruit nurseries, vineyards, and gardens. A number of fields in the northern and western portions of the campus are used for general experimental work by various departments.

The College buildings, twenty-one in number, are harmoniously grouped, and are uniformly constructed of limestone obtained from the College quarries. A central power plant furnishes steam heat and electric light and power to the buildings, and a plant for the manufacture of producer gas supplies some of the laboratories and shops. The College owns and operates its own system of waterworks and is provided with a complete sewerage system.

AGRICULTURAL HALL (NEW). Erected 1912; cost of portions now completed, $125,000; cost of building when developed and completed as planned, $500,000. The completed building will consist of a central portion (130 x 80 feet), with basement and three stories; of two wings (each 80 x 169 feet), with basement and three stories, and with a sub-basement under half of the east wing; and of a stock-judging pavilion placed back of the central portion and between the wings. This pavilion is now completed, and contains tie and box stalls and two large stock-judging rooms (45 x 100 feet), each having a seating capacity of 475. Each of these rooms may be divided into two, with a passage between, by the use of curtains. The east wing of the building is used by the Departments of Agronomy, Animal Husbandry, Milling Industry, and Poultry Husbandry. This wing contains, besides offices and recitation rooms of these departments and the general offices of the Agricultural Experiment Station, a complete small flour mill, and laboratories for grain judging. Value of equipment: *Agronomy, 15,798; Animal Husbandry, $8,754;

* The figures for equipment are taken from the reports of June 30, 1917.

Dean's Offices, $1,702; Experiment Station, $1,522; Milling Industry, $14,278; Poultry Husbandry, $837.

ANDERSON HALL. Erected, 1879; cost, $79,000; dimensions, 152 x 250 feet; two stories and basement. Contains the offices of administration of the College, a lecture hall, the College post office, offices of the Division of College Extension and of the Department of Student Health, and offices and classrooms of the Departments of Architecture, Economics, Education, English Language, English Literature, Home Art, and Mathematics. Value of equipment, $27,172.

AUDITORIUM. Erected, 1904; cost, $40,000; dimensions, 113 x 125 feet. Has a large stage with drop curtain and scenery. Seating capacity, 2,300. Contains also the offices and music rooms of the Department of Music. Value of equipment, $3,197.

CHEMISTRY ANNEX. Erected, 1876; cost, $8,000; dimensions, 35 x 110 and 46 x 175 feet, in the form of a cross. Originally erected as a chemical laboratory. Reconstructed at a cost of $5,000 after a fire in 1900, the building was used from 1902 to 1911 as a women's gymnasium; since 1911, used by the Department of Chemistry. Value of equipment, $12,000.

DAIRY BARN. Erected 1900; cost, $5,000; dimensions, 40 x 175 feet. Fitted with modern swinging stalls for eighty head of cows, and arranged in two rows with driveway between. Value of equipment, $1,686.

DAIRY COMMISSION HALL. Erected, 1888; cost, $5,000; dimensions, 30 x 30 feet; one story and basement. Used for many years by the Department of Horticulture and Entomology, then for horticultural work when that was made a separate department. Contains offices occupied by the State Dairy Commissioner. Value of equipment, $987.

DAIRY HALL. Erected, 1904; cost, $15,000; dimensions, 72 x 103 feet; one story and basement. Contains butter-manufacturing rooms, hand-separator room, laboratory, classroom, three offices, and two refrigerating rooms. Occupied entirely by the Department of Dairy Husbandry. Value of equipment, $5,299.

DENISON HALL. Erected, 1902; cost, $70,000; dimensions, 96 x 166 feet; two stories and basement. The east wing is occupied throughout by the laboratories, classrooms and offices of the Department of Chemistry. The west wing is occupied by the Department of Electrical Engineering and by the Department of Physics. Value of equipment: Chemistry, $31,488; Electrical Engineering, $24,575; Physics, $12,007.

DOMESTIC SCIENCE AND ART HALL. Erected, 1908; cost, $70,000; dimensions, 92 x 175 feet; two stories and basement. The first floor and basement are occupied by the laboratories, classrooms and offices of the Department of Domestic Science; the second floor is occupied by the laboratories, classrooms and offices of the Department of Domestic Art. Value of equipment: Domestic Science, $13,161; Domestic Art, $6,440; Dean's Offices, $2,017.

ENGINEERING SHOPS. These consist of several connected structures, erected at different times. The original building, now used as the woodworking shop, was erected in 1876; a series of additions having later been successively made, the present group is the result. The cost of the

whole amounts to $35,000. A portion of the building is two stories high. On the upper floor, which has a floor area of 9,260 square feet, are classrooms, drafting rooms, pattern storage room, and offices of the Department of Steam and Gas Engineering, Applied Mechanics and Machine Design, and Shop Practice. The woodworking shop (35 x 219 feet) is equipped with the necessary bench tools and woodworking machinery. Adjoining is the machine shop (40 x 170 feet), supplied with benches and tools and amply equipped with the necessary machine tools. The blacksmith shop (50 x 100 feet) contains 35 forges of modern type, connected with power blast and down-draft exhaust. Adjoining is the lecture hall, with demonstration forge and equipment. The iron foundry (27 x 100 feet) and brass foundry (24 x 34 feet) are well supplied with the necessary equipments. The wash and locker room (36 x 40 feet) contains 250 steel lockers. A general supply room (22 x 24 feet) is conveniently located for storing the necessary small supplies. Value of equipment, $46,677.

FAIRCHILD HALL. Erected, 1894; cost, $67,750; dimensions, 100 x 140 feet; two stories, basement, and attic. On the first floor are the College library and reading rooms, a newspaper reading room, offices of the librarian and his assistants, and the general museum. On the second floor are the offices, classrooms and laboratories of the Departments of Zoölogy, Entomology, and Geology, and of History and Civics. The museums of natural history are placed here also. The basement is occupied largely by recitation rooms and offices of the Department of History and Civics and the Department of Public Speaking. Value of equipment: Entomology, $14,236; Zoölogy, $18,663; History and Civics, $708; Library, $133,192.

FARM BARN. Erected, 1913; cost, $17,000; a stone structure, dimensions, 80 x 160 feet. The west wing contains nine box stalls and twenty-six single stalls, equipped with sanitary feed mangers and racks and designed especially for the housing of horses. The east wing contains twelve box stalls and thirty single stalls for the breeding cattle and show herd. Center section, office and carriage rooms, with basement for heating apparatus.

FARM MACHINERY HALL. Erected, 1870; cost, $11,250; dimensions, 46 x 95 feet; two stories. The first building erected on the present campus. Originally designed as a College barn, and first used for that purpose. Later used as a general College building, then by the Department of Botany, and afterwards by the Department of Veterinary Medicine. The first floor, a large hall, was used by the Department of Military Science for many years as an armory. The entire building has been given over for the use of the Department of Farm Machinery, and is filled with all types of farm machinery. Value of equipment, $1,949.

HORTICULTURAL BARN. Erected, 1889; cost, $1,000. Contains storeroom, granary, and stable room for several horses.

HORTICULTURAL HALL. Erected, 1907; cost, $50,000; dimensions, 72 x 116 feet. This building, one of the best and most commodious on the campus, is now used by the Departments of Botany, Horticulture, and

Forestry. Its classrooms, laboratories, museums, and equipment are modern and ample. Value of equipment: Botany, $17,865; Forestry, $1,229; Horticulture, $10,977.

KEDZIE HALL. Erected, 1897; cost, $16,000; dimensions, 70 x 84 feet; two stories and basement. Used from its erection till 1908 by the Departments of Domestic Science and Domestic Art. Basement occupied by the printing plant; first floor taken up by the cafeteria since the summer of 1915, and by offices of the Department of the English Language; second floor divided into general classrooms and offices used by the Departments of Industrial Journalism and Printing, and English. Value of equipment: Cafeteria, $3,326; English, $500; Industrial Journalism and Printing, $7,919.

MECHANICAL ENGINEERING HALL. Erected, 1909; cost $80,000; dimensions, 113 x 200 feet; three stories in height, but much of it built on the gallery plan rather than by complete floor separation into different stories. This building contains the general offices of the Division of Mechanic Arts, the offices and drafting rooms of the Departments of Civil Engineering, Steam and Gas Engineering, and Architecture, a reading room, an amphitheater for lectures and demonstrations, and the experimental laboratories for applied mechanics, hydraulics, road materials, steam and gas engineering. The engines, turbines, generators, and boilers that furnish power and light for the College are installed in this building. Value of equipment, $117,981.

NICHOLS GYMNASIUM. Erected, 1911; cost, $122,000; dimensions 102 x 221 feet; three stories and basement. The building consists of a main section and two wings. The main section (85 x 141 feet), consisting of two stories and a basement, is used as a men's gymnasium and armory, and contains a running track, sixteen laps to the mile. The east half of the basement of the main section contains a swimming pool, baths, rest room, etc., for women; the west half contains a swimming pool and baths for men. The east wing (40 x 102 feet) contains the women's gymnasium, classrooms and offices of the Department of Military Training, and several literary society halls. The west wing (40 x 102 feet) contains the offices of the Directors of Athletics and Physical Education, a large locker room for men, classrooms and offices of the Department of German, and several literary society halls. This building is constructed on the old armory-castle type and is modern in every respect. Value of equipment, $5,493.

REPAIR SHOP. Erected, 1877; cost $4,000; dimensions, 32 x 80 feet; one story and basement. At an early period used as a horticultural hall; now the headquarters for general College repairs. Value of equipment, $777.

SCHOOL OF AGRICULTURE HALL. Erected, 1900; cost, $25,000; dimensions, 90 x 95 feet; two stories and basement. Occupies the original site of the President's house, destroyed by lightning in 1896. Contains classrooms and offices of the School of Agriculture. Value of equipment, $545.

VETERINARY HALL. Erected, 1908; cost, $70,000; dimensions, 133 x 155 feet; two stories and basement. Occupied by the laboratories, demonstration and dissecting rooms, classrooms, and offices of the Department of Veterinary Medicine and Bacteriology. Value of equipment and apparatus: Veterinary Medicine, $26,869; Bacteriology, $7,657.

In addition to the substantial stone buildings mentioned above the College has a number of other buildings, among them the following:

SERUM BARN. Erected, 1914; cost $3,000; dimensions, 92 x 96 feet; contains thirty pens, each 8 x 12 feet, and two feed rooms of the same dimensions. This is a frame and cement building situated three-quarters of a mile north of the College campus.

SERUM BUILDING. Erected, 1914; cost, $7,000; constructed of brick; dimensions, 24 x 60 feet; two stories.

In addition to the equipment listed in the preceding paragraphs, several other important items might well be mentioned, *e. g.*, livestock, valued at $99,601, and the water tower, heat tunnels, etc., valued at $60,350.

Library

The general College Library consists of all books belonging to the College, including the library of the Experiment Station, which is incorporated with it. On January 1, 1918, the Library contained 58,920 bound volumes, besides much unbound material. It receives currently about four hundred serial publications. As a depository the Library receives the documents and other publications of the United States government. The books are classified according to the Dewey system and are indexed in a dictionary card catalogue.

All students, as well as all officers of administration and instruction, have the privilege of direct access to the book stacks. The Library is primarily for free reference use, but the privilege of drawing books is accorded to all those connected with the College as registered students or as members of the Faculty. Books not specially reserved may be drawn for home use for two weeks. All books are subject to recall at any time.

General reference books, books reserved for classes, general periodicals, and certain other groups of books are to be consulted only in the reading rooms. They may not be loaned from the Library except when the reading rooms are closed. They must then be returned to the Library by the time it next reopens. Any violation of the regulations of the Library subjects the offender to a fine, or to a withdrawal of library privileges, or to both, according to the gravity of the offense. More serious offenses, such as mutilation or theft of books or periodicals, are considered just causes for suspension or expulsion of the offender, who is also required to make good the loss incurred.

Reading Rooms.—Three reading rooms are maintained in connection with the Library: the general reference room, containing encyclopedias, dictionaries, atlases, bibliographies, and general reference books; the special reference room, containing books reserved for classes; and the periodical room, containing current magazines and the important daily and weekly Kansas newspapers. These rooms are freely open to the students and to the public for purposes of reading and study.

Divisional Libraries.—Divisional and departmental collections are deposited in certain College buildings apart from the main Library. These collections are for the special convenience of the instructors and students of the departments concerned. They are under the direction of the Librarian and are accessible to all students at regular hours.

Requirements for Admission

The entrance requirements to the College are made broad and flexible, only fundamental subjects being definitely required. These requirements are made upon the supposition that high schools are local institutions in which the courses should be adapted to the needs of the individual localities, and that college entrance requirements should be such as to take the output of the high schools, rather than to determine the nature of the work offered in them.

Persons to be admitted to any department of the College must be at least fourteen years of age. Fifteen units of high-school work are required for admission to the freshman class. A unit is defined to be the work done in an accredited high school or academy in five recitation periods a week for one school year. All persons who offer fifteen units of work done in an accredited high school, and accepted by such high school for graduation, will be admitted to the freshman class. One who offers fourteen such units will also be admitted as a freshman, but will be conditioned in one unit. Such deficiency must be made up the first year that the student is in attendance. If not made up within that time College credits are taken in its place.

REQUIRED ENTRANCE SUBJECTS

The high-school work offered for entrance must include three units of English and one unit of physics for all curricula. The entrance requirements in mathematics are as follows: For the curricula in agriculture, veterinary medicine, industrial journalism, and home economics two entrance units, algebra and geometry; for the curriculum in general science two and one-half units of mathematics, one and one-half of algebra and one of geometry; for the curriculum in architecture and all engineering curricula three units of mathematics, one and one-half in algebra and one and one-half in geometry. The remainder of the fifteen units required for unconditional entrance to the freshman class in any curriculum in the College are optional.

ACCEPTABLE ENTRANCE SUBJECTS

The subjects from which entrance credit may be offered, together with the number of units, are arranged in eight groups, as follows:

GROUP I English	Three or four units
GROUP II Foreign Languages	Latin, one, two, three, or four units Greek, one, two, three, or four units German, one, two, three, or four units French, one, two, three, or four units Spanish, one, two, three, or four units

GROUP III Mathematics	Elementary algebra, one or one and one-half units Plane geometry, one unit Solid geometry, one-half unit Plane trigonometry, one-half unit Advanced algebra, one-half unit
GROUP IV Natural Sciences	Physical geography, one-half or one unit *Physics, one unit *Chemistry, one unit *Botany, one-half or one unit *Zoölogy, one-half or one unit *Physiology, one-half or one unit *General biology, one-half or one unit *General science, one-half or one unit
GROUP V History and Social Sciences	Greek and Roman history, one unit Medieval and modern history, one unit English history, one unit American history, one unit Economics, one-half or one unit Sociology, one-half unit Civics, one-half or one unit
GROUP VI Normal Training Subjects	Psychology, one-half unit Methods and management, one-half unit Higher arithmetic, one-half unit Reviews Grammar, twelve weeks } one unit Geography, twelve weeks } one unit Reading, twelve weeks } one unit *Music, one unit
GROUP VII Industrial Subjects	*Agriculture, one-half or one, two, three, or four units *Drawing, one-half or one unit *Woodwork, one-half, one or two units *Forging, one-half or one unit *Domestic science, one-half, one or two units *Domestic art, one-half, one or two units
GROUP VIII Commercial Subjects	Commercial law, one-half unit Commercial geography, one-half unit Bookkeeping, one-half or one unit *Stenography and typewriting, one-half or one unit

DEFICIENCIES

The courses in the School of Agriculture offered in connection with the College give every needed opportunity for students of the College to make up anything lacking in their preparation for entrance. All such entrance deficiencies must be made up before the beginning of the sophomore year. No student is registered in the senior class unless all deficiencies of the preceding years have been provided for. Candidates for graduation must make up all deficient subjects before the beginning of the spring term of the senior year. No student is considered a candidate for graduation the next spring who is deficient more than three full subjects in addition to his regular assignment at the beginning of the first semester. No student who fails or is conditioned or found deficient in any subject, or whose grade in more than one subject falls below G in any term, is allowed to carry extra work during the succeeding term.

* In courses consisting of laboratory work wholly or in part, two periods of laboratory work are to be considered the equivalent of one recitation period.

ADVANCED CREDIT

At the discretion of the President, students who present certificates showing credits for college work done in other institutions are allowed hour-for-hour credit on courses in this College in so far as they may be directly applied, or can be accepted as substitutions or electives. Candidates must present to the Committee on Advanced Standing their high-school and college credits certified to by the proper authorities. It is requested also that a college catalogue covering the period of attendance be furnished with the above credentials. In cases in which it is impossible for one to furnish an acceptable certificate concerning work upon which advanced credit is asked, examinations are given, if the subject has been studied under competent instruction.

ADMISSION

ADMISSION BY EXAMINATION. Examinations for admission will be held at the College on Monday, September 9, 1918; Tuesday, January 28, 1919; and Saturday, May 31, 1919.

ADMISSION BY CERTIFICATE. The applicant is required to submit to the Committee on Admission a certificate of the high-school or academy credit properly certified to by the authorities of the institution in which the work was done. Blanks will be furnished by the College for this purpose. It is requested that all work done in such school or academy be presented upon these blanks, in order to expedite the granting of credit to such applicants as are entitled to it.

It is greatly to the advantage of the prospective student to see to it that this blank, properly filled out and indicating the course he wishes to take here, be sent to the College as soon as possible after graduation. A permit to register will then be sent him by the Registrar in advance of his coming in September. This will greatly facilitate the work of entrance. The student will present this permit at the registration room in Nichols Gymnasium, and will not be compelled to wait his turn to meet the Committee on Admission.

LATE REGISTRATION

A considerable amount of extra work and a great deal of confusion is caused by the neglect of students to enroll at the time set for that purpose, and a fee of $1 will be charged those who enroll after the time fixed for the close of registration unless they present a good excuse for their delay.

SPECIAL STUDENTS

In recognition of the fact that experience and maturity tend to compensate, in a measure at least, for lack of scholastic attainment, the College admits as special students those who are twenty-one years of age or older, without requiring them to pass the regular examinations, provided (1) they show good reason for not taking a regular course; (2) they be assigned only to such work as they are qualified to carry successfully; (3) they do superior work in the subjects assigned.

A special student is assigned by the dean of the division in which occur the major subjects to be pursued.

KANSAS HIGH SCHOOLS AND ACADEMIES IN ACCREDITED RELATIONS WITH THE COLLEGE

(Graduates admitted without examination)

Abilene
Admire
Agra
Alden
Allen
Alma
Almena
Altamont
(Labette County)
Alta Vista
Alton
Altoona
Americus
Andover
Anthony
Anthony
(Spring Township)
Argonia
Arkansas City
Arlington
Ashland
Assaria
Atchison
Atlanta
Attica
Atwood
(Rawlins County)
Auburn
Augusta
Axtell
Baldwin
Baldwin
(Baker Academy)
Barnard
Barnes
Basehor
Bazine
Beattie
Belle Plaine
Belleville
Beloit
Belpre
Benedict
Bennington
Benton
Beverly
Blue Rapids
Bonner Springs
Bronson
Brookville
Brownell
Bucklin
Buffalo
Bunkerhill
Burden
Burlingame
Burlington
Burns
Burr Oak
Burrton
Bushong
Caldwell
Caney
Canton
Carbondale
Cassoday
Cawker City
Cedar Vale
Centralia
Chase
Chanute
Chapman
(Dickinson County)
Cheney
Chetopa
Cherokee
(Crawford County)
Cherryvale
Cimarron
Circleville
Claflin
Clay Center
(Clay County)
Clayton
Clearwater
Clifton
Clyde
Coats
Codell
Colby
(Thomas County)
Coldwater
Colony
Columbus
(Cherokee County)
Concordia
Concordia
(Nazareth Academia)
Conway Springs
Corning
Cottonwood Falls
(Chase County)
Council Grove
Courtland
Covert
Culver
Cunningham
Delia
Delphos
Denton
Derby
De Soto
Dexter
Dighton
(Lane County)
Dodge City
Dodge City
(St. Mary of the Plains Academy)
Douglass
Downs
Dunlap
Easton
Edna
Edwardsville
Effingham
(Atchison County)
El Dorado
Elkhart
Ellinwood
Ellis
Ellsworth
Elsmore
Elwood
Emporia
Emporia
(Normal High School)
Englewood
Enterprise
Enterprise
(Normal Academy)
Erie
Esbon
Eskridge
Eudora
Eureka
Everest
Fairview
Florence
Ford
Formoso
Fort Scott
Fowler
Frankfort
Fredonia
Galena
Garden City
Garden Plain
Gardner
Garfield
Garnett
Geneseo
Girard
Glasco
Glen Elder
Goddard
Goff
Goodland
(Sherman County)
Gove
Great Bend
Greeley
Greenleaf
Greensburg
(Kiowa County)
Grenola
Grinnell
Gypsum
Halstead
Hamilton
Hanover
Harper
Hartford
Harveyville
Haven
Havensville
Haviland
Hays
Hazelton
Healy
Herington
Hesston
(Hesston Academy)
Hiawatha
Highland
Hill City
Hillsboro
(Tabor College)
Hoisington
Holton
Hope
Horton
Howard
Hoxie
(Sheridan County)
Hugoton
Humboldt
Hutchinson
Independence
(Montgomery County)
Ingalls
Iola
Irving
Isabel
Jamestown
Jetmore
(Hodgeman County)
Jewell City
Junction City
Kansas City
(Argentine)
(Catholic)
(Central)
(Sumner)
(Wilson)
Kensington
Kincaid
Kingman
Kinsley
Kiowa
Kipp

Kirwin
La Crosse
La Cygne
Lakin
La Harpe
Lane
Lansing
Larned
Latham
Lawrence
Lawrence
(Oread)
Leavenworth
Leavenworth
(Catholic)
Lebanon
Lebo
Lecompton
Lenora
Leon
Leoti
Le Roy
Lewis
Liberal
Lincoln
Lindsborg
Lindsborg
(Bethany Academy)
Linwood
Little River
Logan
Longton
Louisville
Lovewell
Lucas
Luray
Lyndon
Lyons
Macksville
Madison
Maize
Manhattan
Manhattan
(Sacred Heart Academy)
Mankato
Maple Hill
Marion
Marquette
Marysville
McCracken
McCune
McLouth
McPherson
McPherson
(Central College Academy)
(McPherson College Academy)
Meade
Medicine Lodge
Melvern
Meriden
Merriam
Mildred
Milton
Miltonvale
(Wesleyan College Academy)
Minneapolis
Minneola
Moline
Montezuma
Morehead
Morrill
Mound City
Moundridge
Mound Valley
Mount Hope
Mulberry
Mulvane
Muscotah
Narka
Natoma
Neodesha
Neosho Falls
Neosho Rapids
Ness City
Netawaka
Newton
Newton
(Bethel Academy)
New Ulysses
(Grant County)
Nickerson
(Reno County)
Norton
(Norton County)
Nortonville
Norway
Norwich
Oakland
Oakley
Oberlin
(Decatur County)
Oketo
Olathe
Onaga
Osage City
Osawatomie
Osborne
Oskaloosa
Oswego
Ottawa
Ottawa
(Ottawa University Academy)
Overbrook
Oxford
Ozawkie
Palco
Paola
Paola
(Ursuline Academy)
Parsons
Pawnee Rock
Peabody
Perry
Phillipsburg
Pittsburg
Plainville
Pleasanton
Plevna
Pomona
Portis
Potwin
Pratt
Preston
Pretty Prairie
Protection
Quenemo
Quinter
Randall
Randolph
Ransom
Reading
Republic
Robinson
Rock Creek
Rosalia
Rosedale
Rose Hill
Rossville
Rozel
Russell
Russell Springs
Sabetha
Salina
Salina
(Sacred Heart Academy)
Santa Fe
(Haskell County)
Savonburg
Sawyer
Scandia
Scott City
(Scott County)
Sedan
Sedgwick
Seneca
Severance
Severy
Sharon
Sharon Springs
Silver Lake
Smith Center
Solomon
Spearville
Spivey
Spring Hill
Stafford
Stark
Sterling
St. Francis
(Cheyenne County)
St. John
St. John
(Antrim)
St. Marys
Stockton
Summerfield
Sylvan Grove
Sylvia
Syracuse
Tescott
Thayer
Tonganoxie
Topeka
Topeka
(Highland Park)
(College of the Sisters of Bethany)
(Washburn College Academy)
Toronto
Towanda
Tribune
(Greeley County)
Troy
Turon
Udall
Utica
Valley Center
Valley Falls
Vermillion
Viola
Wa Keeney
(Trego County)
Wakefield
Waldo
Walnut
Walton
Wamego
Washington
Waterville
Wathena
Waverly
Welda
Wellington
(Sumner County)
Wellsville
Westmoreland
Westphalia
Wetmore
White City
White Cloud
Whitewater
Whiting
Wichita
Wichita
(Friends Academy)
Williamsburg
Wilsey
Wilson
Winchester
Windom
Winfield
Winona
Woodston
Yates Center

Requirements for Graduation

For graduation, one must complete one of the four-year courses as shown elsewhere. These are believed to provide for the necessities of most students who seek an institution of this kind, and departures from the specified work are not encouraged. Under special conditions, however, such College substitutions are allowed as the interests of the student demand. The total requirement, including military science or physical training, is about 134 hours, or semester credits, a semester credit being one hour of recitation or lecture work, or three hours of laboratory work a week, for one semester of eighteen weeks. A student, to be considered as a candidate for graduation, must have done his last year's work in residence. In special cases, candidates would be considered who have done three full years of work here and have done their last in an institution approved by the faculty.

DEGREES

The degree of bachelor of science (B. S.) is conferred upon those completing the four-year course in agriculture, mechanical engineering, electrical engineering, civil engineering, flour-mill engineering, architecture, industrial journalism, home economics, or general science.

The degree of doctor of veterinary medicine (D. V. M.) is conferred upon those completing the four-year course in veterinary medicine.

The degree of bachelor of agriculture is conferred upon students who have completed the freshman and sophomore work of the four-year course in agriculture, who have been conspicuously successful in farming for a period of five years under the supervision of the faculty of the College, and who have furnished the faculty, through the Dean of the Division of Agriculture, acceptable reports of their work and progress.

CERTIFICATES

A certificate is granted a student finishing the three-year curriculum in music.

A certificate is granted a student completing the first two years of the four-year course in agriculture.*

A certificate is granted upon completion of the two-year short course in agriculture.

A certificate is granted upon completion of the two-year curriculum in public-school music.

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* Under certain conditions and restrictions, students of mature years who cannot spend four years in college, and who may be applicants for the degree of bachelor of agriculture or for the certificate in agriculture, may, on the completion of all of the work required in the freshman year, have the privilege of selecting such courses in advance of the sophomore year, under the advice and with the approval of the Dean of the Division of Agriculture, as may be especially adapted to their needs; but in no case can courses based on prerequisites not yet completed be undertaken.

A certificate is granted a student completing the one-year course in lunch-room management.

A certificate is granted a student upon finishing the housekeepers' course, which lasts fifteen weeks.

A certificate is granted upon completion of the eight-weeks creamery short course.

A certificate is granted upon completion of any one of the short courses in engineering.

ADVANCED DEGREES

The degree of master of science is conferred upon graduates of this College and upon those of other institutions, upon complying with conditions, the details of which vary with the undergraduate course of study pursued by the student, and the lines in which the graduate study is taken.

From graduates of standard institutions, including graduates of this College of the class of 1917 or later, nine months of residence and at least thirty-two semester hours of work are required. In case the undergraduate work previously taken does not prepare adequately for the graduate work proposed, deficiencies must be made up by study of any necessary undergraduate subjects; for these credit is not allowed on the graduate work proper.

Approximately two-thirds of the graduate work is given to a major subject and one-third to one or more minors. The nature and the distribution of the major and the minors is determined in each individual case by a committee consisting of the dean of the division and the head of the department in which the major is to be taken. The minor or minors must be taken in departments other than that in which the major work is done. Two-thirds of the total graduate credits may be allowed on account of original research, and four credits on the major or minors may be granted for research conducted in connection with instructional duties or departmental investigations in this institution or elsewhere. A reading knowledge of German is required.

A candidate for the master's degree must present a thesis consisting of a clear statement of the investigation of some worthy original problem. This is in the field of the student's major line of study, and is evaluated for credit against the major requirements. The preliminary copy of the thesis must be submitted for approval previous to April 1 of the year in which the degree is to be conferred. Two complete copies of the thesis, as approved, must be prepared, one for deposition in the College library, the other for the department in charge of the investigation recorded. These copies must be in hand in satisfactory form before May 15 of the year in which the degree is to be conferred.

A candidate for the master's degree is subject to a rigid oral examination, covering both the general and special fields of his preparation, and including his thesis, by a committee consisting of his dean and the heads of the departments in which his major and regular minors have been taken.

Immediate supervision of the assignment of a graduate student is in

charge of the dean of the division in which the major work is done, but the full responsibility for the successful conduct of the graduate work is lodged in a representative standing committee of the Faculty, and this committee has the right to pass on all courses offered, on all assignments taken out, and on the standing of all graduate students.

A senior student whose time is not fully occupied may, by arrangement with the dean of the division and the head of the department in which he expects to do his major work, be assigned to subjects that will count toward the degree of master of science.

For graduates of this institution, up to and including the class of 1916, in addition to the requirements as stated in the foregoing, thirty-two semester hours, or their equivalent, are required. These additional credits are designed as supplementary minors, and are derived from studies that are intended to strengthen the student's general preparation. The supplementary minors must be in subjects of College grade, and may be obtained in residence, by correspondence, or at other approved institutions. Credits due a student on account of junior or senior honors are applied against supplementary minors.

PROFESSIONAL DEGREES IN ENGINEERING AND ARCHITECTURE

Graduates in engineering or in architecture from this College previous to 1917 who have been engaged in engineering or architectural practice for a period of five years or more, and graduates in 1917 or later who have been engaged in engineering or architectural practice for a period of three years or more, will be granted the professional degrees of M. E., C. E., E. E., Agr. E., F. M. E., or Architect under the following conditions:

The graduate to be eligible to a degree must submit a statement of his experience and a thesis covering some phase of his practice. This thesis and experience must be approved by the head of the department in which the degree is requested, by the Dean of the Division of Mechanic Arts, and by the College Committee on Graduate Study, before the granting of such a degree will be recommended to the College Faculty and to the Board of Administration.

FELLOWSHIPS

Fellowships have been established for some years by action of the Board, and are available in several departments of the College. Fellowships are granted to graduate students, who are to devote one-half of their time during the nine months of the regular school year to such work as may be laid out for them by the head of the department in which the fellowship is held. The remaining half-time is to be devoted to graduate study. These fellowships each yield $400 annually. Applications for such fellowships should be made to the dean of the division in which the applicant expects to do his major work.

Two fellowships, each two years in duration, are established in engineering. The holder is expected to devote eleven months of the year to the work laid out, and receives from the College $500 annually.

To be eligible for appointment, the applicant must be a graduate of a technical course of a school or college of recognized standing. Preference will be given to those who have had some commercial experience along the lines of research to be followed. Applications for engineering fellowships should be made to the Dean of the Division of Engineering, and should state the lines of work that the applicant particularly desires to follow.

STUDENT LOAN FUNDS

THE ALUMNI LOAN FUND. The Alumni Association of the Kansas State Agricultural College has created a loan fund, chiefly by means of payments by which the alumnus is relieved from further regular dues in the association. Members are due to pay the association $1 a year, and on payment of $20 in one sum they are relieved from such dues. The fund so created is lent to students at 5 per cent per annum. The fund is administered by a committee appointed by the directors of the Alumni Association. The committee announces no specific rules governing the granting of loans, but in general gives preference to smaller amounts on short time over larger amounts which can not be paid for several years. Alumni are urged to add to the funds thus made available to worthy students. Students wishing loans from this fund may address Dean J. T. Willard, Chairman of the Alumni Loan Fund Committee, Manhattan, Kan.

THE HENRY JACKSON WATERS LOAN FUND. The Henry Jackson Waters loan fund consists of the royalties received from the Kansas sales of President Waters' textbook, *The Essentials of Agriculture*. The royalties so far have amounted to more than $1,000, which sum has been augmented by gifts of $100 each from Governor Capper, and L. R. Eakin, of Manhattan, and by smaller amounts received from some others. The entire amount has been loaned nearly all the time. The fund is administered by a committee appointed by the President of the College and approved by the Board of Administration. The rules for the loans are likewise approved by the Board. The rules allow emergency loans of $25 to any student who has completed two semesters of work in this College. Juniors may borrow $100 and seniors may borrow $150. Applications for loans should be made to Professor Albert Dickens, Chairman of the Waters Loan Fund Committee, Manhattan, Kan.

THE COLLEGE SOCIAL CLUB LOAN FUND. The College Social Club voted to use a balance in its treasury ($40) for a loan to some one of the young women students. The loan is administered by a committee representing the College Social Club. Further information regarding this fund can be obtained by addressing Dean Mary P. Van Zile, Manhattan, Kan.

THE STATE FEDERATION OF WOMEN'S CLUBS' LOAN FUND. Each year several of the young women students of the Kansas State Agricultural College are beneficiaries of the State Federation of Women's Clubs through the administration of its liberal young women's student loan fund. Information regarding this fund also can be obtained by addressing Dean Mary P. Van Zile, Manhattan, Kan.

SCHOLARSHIPS

MILLING INDUSTRY. During the summer of 1915 the Kansas Flour Mills Company offered $300 annually to advanced students specializing in milling industry. This sum has been divided into three scholarships, which are open to students in the Division of Agriculture, General Science, and Mechanic Arts who are specializing in flour milling and other milling-industry work. They are awarded on or before June 1 of each year, and except in unusual cases are not awarded to students below junior standing. Other things being equal, preference is given to residents of the State of Kansas.

In awarding these scholarships the following points regarding the student are considered: Course of study pursued, scholarship, character and personality, and financial condition. The stipend is divided into ten monthly payments, the first payment being due September 1 and the last June 1.

DEBATE. In the Department of English two scholarships of the value of $100 each, one for men and one for women students, are offered annually for proficiency in intercollegiate debating.

PRIZES AND MEDALS

STOCK JUDGING. The Saddle and Sirloin Club offers four medals, one gold, one silver, and two bronze, to students obtaining the highest four places in the club's stock-judging contest. The same organization offers prizes of books for stock judging. The faculty of the Department of Animal Husbandry offers prizes of books or papers on stock judging.

DAIRY JUDGING. The Student Dairy Association each year holds a dairy judging contest, and offers a gold, a silver and a bronze medal to students obtaining the highest three places.

PLAY WRITING. The Purple Masque Dramatic Fraternity offers each year a prize of $50 for the best original play written by a student of the Kansas State Agricultural College and suitable for presentation by the fraternity.

ORATORY. The literary societies, through the Oratorical Board, offer each year, in the Intersociety Oratorical Contest, the following prizes:

First prize, gold medal and $25.
Second prize, silver medal and $15.
Third prize, bronze medal and $10.

The Oratorical Board also finances the sending of a representative from the College to the annual Peace Oratorical Contests, to the winners of which valuable prizes in money are awarded.

The Department of Public Speaking sends to the annual Missouri Valley Contest an orator as the representative of the College. In this contest valuable prizes in money and medals are awarded.

SHORT-STORY WRITING. The Quill Club offers annually a gold medal to the student of Kansas State Agricultural College writing the best short story in a contest held by this organization.

MILITARY TRAINING. In the Department of Military Training prizes and medals are offered as follows:

1. The Knostman cup, offered by the Knostman Clothing Company, of Manhattan, to the company winning the intercompany basket-ball series.
2. The Henderson Ames cup, donated by the Henderson Ames Company of Kalamazoo, Mich., to the company winning the outdoor Henderson Ames match.
3. The Governor Hodges cup, donated by ex-Governor Hodges to the company having the highest percentage on outdoor range.
4. The Metcalf cup, donated by General W. S. Metcalf to the member of the Rifle Club having the highest aggregate in gallery matches of the United States military colleges.
5. A saber or pistol to the captain having the best-drilled company.
6. A silver-mounted saber knot to the first lieutenant of the best-drilled company.
7. A silver-mounted saber knot to the second lieutenant of the best-drilled company.
8. A silver medal to the corporal of the best-drilled squad.
9. A bronze medal to each private of the best-drilled squad.
10. A gold medal to the best-drilled cadet.

The team members of the College Rifle Club winning the series of intercollegiate matches in gallery-practice competition are issued individual marksmanship medals by the National Rifle Association of America.

General Information

DUTIES AND PRIVILEGES

Good conduct in general, such as becomes men and women everywhere, is expected of all students. Every possible aid and stimulus toward the development of sound and rational character, and toward the formation of high standards of personal honor and ideals of conduct, is given by the various Christian organizations of the College and the town. Every student is accordingly expected to render a good account of himself in the College community life. For those who are high-minded and reasonable, no other requirements need be expected. On the other hand, the demands of the College life leave no room for the idle or self-indulgent, for those who are too reckless to accept reasonable or wholesome restraint, or for those who are too careless or indifferent to take proper advantage of their opportunities. The College discipline is confined chiefly to sending away those whose conduct, after fair trial, makes their further attendance at the College unprofitable or inadvisable.

Absences from class or laboratory periods must be accounted for to the instructor concerned. Permission for absence from College for one or more days must be secured in advance from the dean of the division in which the student is registered. Students can not honorably leave the College before the close of a term except by previous arrangement with the deans concerned.

Opportunities for general scientific, literary and forensic training are afforded, in addition to the College courses, by various literary and scientific societies and clubs. The Science Club, meeting monthly, admits to membership all instructors and students interested in science. Papers given at the meetings of the Science Club represent original work in science done at the institution. The program is further characterized by free discussion of the papers presented and by general scientific notes and news contributed by the members. The numerous literary and professional societies, which are described elsewhere in the catalogue under the title "Student Organizations," also afford excellent training in their diverse lines.

At various times during the year the College halls are opened for social, literary, musical, and dramatic entertainments furnished by lecture courses, by the literary societies, by the Department of Music, by the Dramatic Club, by the Oratorical Association, and by other organizations of students and instructors. Addresses by prominent speakers, men of affairs, and persons prominent in scientific, educational, and social work are of frequent occurrence.

EXPENSES

Tuition is free. A matriculation or entrance fee of $5 and an incidental fee of $5 a semester and $5 for the summer term are charged all students resident in Kansas. For nonresidents a matriculation fee of $10 and an incidental fee of $10 a semester and $10 for the summer term are charged. The eight-weeks short-course students pay an incidental fee of $3 and a sick-benefit fee of 50 cents; short-course students remaining more than eight weeks pay the same incidental and health fees as the regular students. Each student, except as noted in the preceding statement, pays with his incidental fee a sick-benefit fee of $1 each semester and $1 for the summer term. In return for this he receives the services of the College physicians for any illness contracted while in College. The fee does not include the cost of medicine, surgical operations, reduction of fractures, hospital fees, or the treatment of chronic conditions. As far as possible, and provided the students requesting such services room within the city limits, the College physicians visit in their rooms students who are too ill to go to the physicians' office. Class instruction in music is free; for individual instruction a fee is required. For unexcused late registration the student is charged $1. Students, when graduating, pay a commencement fee of $5 to cover the cost of the diploma and other commencement expenses. No other fees are charged. In all laboratories students are required to pay for apparatus broken or lost, and for supplies.

Rooms and board are not furnished by the College. Table board in private families and at boarding houses varies from $3.25 to $4.50 a week, the average* being about $3.70. Rooms are obtainable at from $5 to $10 a month when occupied by one person, the average room rent paid in these circumstances being $6.80. In cases where a room or suite of rooms is occupied by more than one person the average cost for each person is $5.50 a month. The higher-priced accommodations include light, heat, and bath.

Some students board themselves at less cost than the prices charged for table board, and unfurnished rooms may sometimes be obtained very cheaply. The average expense for washing is 55 cents a week. Books cost on the average about $5.50 a term, the amount being smaller in the lower classes.

Each young man who takes military drill is required to have a military uniform, costing about $27, and each young woman who takes physical training must have a physical training suit, costing about $4. Expenditures, aside from clothing, vary according to individual tastes and circumstances; they average $265 a year.

BOARDING AND ROOMING HOUSES

The Christian Associations of the Agricultural College keep on file the official list of boarding and rooming houses. All correspondence relative to boarding accommodations, in advance of the student's arrival in Manhattan, may be addressed to the Secretary of the Young Men's

* The averages here given are from data received in 1915 from about 1,000 students fairly representing all classes. Board, at least, is now higher.

Christian Association, to the Secretary of the Young Women's Christian Association, or to the Registrar of the College. Upon arrival in Manhattan, young men should go directly to the Y. M. C. A. building, and the young women to the Y. W. C. A. offices at the College, taking the street car from either depot. The cars from Union Pacific station pass directly by the association building. Students leaving the Rock Island station on street car should ask for transfer to the line that passes the association building. For three days before the opening of the fall semester and for the first three days after the opening day, committees from these associations meet trains and assist in directing new students, either to the association buildings or directly to proper boarding places. The associations make no charge for their services or for lists of all approved boarding places, and new students should depend absolutely upon the recommendations of the association committees.

SELF-SUPPORT

The courses of instruction are based upon the supposition that the student is here for study, and therefore a proper grasp of the subjects cannot be obtained by the average student unless the greater part of his time is given to College work. Students of limited means are encouraged and aided in every possible way, but unless exceptionally strong, both mentally and physically, such students are advised to take lighter work by extending their courses, in case they are obliged to give any considerable time to self-support. As a rule, a student should be prepared with means for at least a semester, as some time is required in which to make acquaintances and to learn where suitable work may be obtained.

There are various lines in which students may find employment. The College itself employs labor to the extent of about $1,200 a month, at rates varying from 20 to 25 cents an hour, according to the nature of the employment and the experience of the employee. Most of this labor is upon the College farm, in the orchards and gardens, in the shops and the printing office, for the janitor, etc. Various departments utilize student help to a considerable extent during the vacations. Students demonstrating exceptional efficiency, ability, and trustworthiness obtain limited employment in special duties about the College. Many students secure employment in various lines in the town, and some opportunity exists for obtaining board in exchange for work, with families either in town or in the neighboring country. Labor is universally respected in the College community, and the student who remains under the necessity of earning his way will find himself absolutely unhampered by discouraging social conditions. Indeed, about one-quarter of the students support themselves wholly, while a third support themselves in part. False standards regarding physical work do not exist, and are not tolerated by the board of instruction or by the student body as a whole. Absolutely democratic standards prevail at the College, and students are judged on the basis of their personal worth and efficiency alone.

Students are assisted to obtain employment by means of the employ-

ment bureaus maintained by the Young Men's Christian Association and by the Young Women's Christian Association of the College, with secretaries of which organizations correspondence is encouraged.

BUSINESS DIRECTIONS

General information concerning the College may be obtained from the President or the Registrar. Financial matters are handled through the office of the Business Manager, State Board of Administration, Topeka, Kan.

Scientific and practical questions, and requests for special advice along lines in which the College and the Experiment Stations are prepared to give information, should be addressed to the heads of the departments concerned with the work regarding which information is sought.

Applications for farmers' institutes should be made as early in the season as possible to the Division of College Extension. Applications for the publications of the Agricultural Experiment Station should be addressed: Director of the Agricultural Experiment Station, Manhattan, Kan.

Donations to the Library should be addressed to the Librarian, and donations to the Museum to the Curator of the Museum.

STUDENT ASSEMBLY

The Student Assembly is held from eleven to twelve o'clock each Monday morning. At this time the library, offices, classrooms, and laboratories are closed and the students gather in the College Auditorium. These assembly exercises consist of devotional services, music, and addresses. The devotional exercises are conducted by members of the Faculty, by resident ministers of the various denominations, or by prominent visitors. Excellent music is provided by the College Orchestra, by members of the Department of Music, and by available outside talent. In addition to the short, pointed addresses delivered by the President and by members of the faculty, many prominent leaders of state and national reputation are invited to address the assembly. Thus the Student Assembly has become a center of true culture and enlightenment. Although attendance is not compulsory, it is common to see nearly two thousand enthusiastic students present during these exercises.

COLLEGE PUBLICATIONS

The official organ of the College is *The Kansas Industrialist,* published and printed at the College weekly by the Department of Industrial Journalism and Printing. Its pages are filled with articles of interest, with special reference to agriculture and the industries. Particular attention is paid to information concerning the work of the College, to investigations of the Experiment Stations, and to local and alumni news. *The Kansas Industrialist* will be sent to any address for seventy-five cents a year. The alumni may have *The Kansas Industrialist* free upon application.

The Division of College Extension issues a monthly publication entitled *Agricultural Education,* of special interest to institute members.

The students of the College publish a semi-weekly periodical, *The Kansas State Collegian*, in the interest of the students at large. This paper is edited and managed by a staff elected by students. A College annual, *Royal Purple*, is published each year by the senior class.

EXAMINATIONS

Examinations are held at the last regular recitation periods of the respective studies at the end of each semester. Whether the examination is to extend over the last two periods or over one only is left to the decision of the individual instructor.

Any student who receives a grade of E for the term, in any subject, and whose absences for all causes from the class in such subject do not exceed one-tenth of the number of times the class is scheduled to meet during the semester, may be excused from the final examination in that subject, at the discretion of the instructor; provided, however, that instructors are to announce such exemption lists in their respective subjects not earlier than the last session of the class preceding the final examinations.

Examinations to remove conditions are held on the fourth Saturday of each semester. A student who has received the grade C is entitled to take such special examination, provided the instructor or the department head be notified of the student's desire to take the examination not later than the Tuesday evening preceding the Saturday set for the examinations. If a subject in which a student is conditioned is not passed at the first opportunity, the grade is changed from C to F.

Permission for examination in subjects not taken in class must be obtained on recommendation of the professor in charge, from the dean of the division in which the student is assigned. Permission to take such examination is not granted unless the preparation for it is made under an approved tutor. All such examinations are under the immediate supervision of the professor in whose department the subject falls.

GRADES

Student grades are designated by the letters E, G, M, P, C, F, and U, having the following significance and order of rank:

The grade E designates really distinguished achievement, and is the net resultant of exceptionally good mental ability in conjunction with serious application. It is expected that this grade will not include more than ten per cent of all grades given a class, and usually will include about five per cent.

The grade G represents superior achievement, better than that exhibited by the average student, but not distinguished. It is recognized as a mark of considerable honor and is the resultant of high ability and fair application, or of fair ability and serious application. The percentage of students assigned this grade will depend somewhat upon the number assigned grade E, but the sum of grades E and G should approximate twenty-five per cent of all grades assigned.

The grade M represents the standing of about half of all students in the College. It means achievement equal to that of the average of students, and includes about half of all student grades. It indicates neither superior nor inferior accomplishment.

The grade P, meaning passed, represents achievement of a grade below that of the average of students. It indicates a student's position as being in the upper part of the lower fourth of the class and his work as being such as may be described as poor, or inferior. The number of grades P awarded, together with the grades C and F, should not, on the whole, exceed twenty-five per cent of all, and are expected to include about that proportion.

The grade C, meaning conditioned, is the symbol used to represent two types of inferior work: (*a*) that which is deficient in quality, and (*b*) that which is satisfactory as to quality but inadequate as to quantity. The results of examinations to remove conditions are reported simply as P (passed) or F (failed), and such examinations not taken, or taken and not passed, are recorded as F.

The grade F, meaning failure, is used to indicate work that is so unsatisfactory as to require that the work be repeated in class or under an approved tutor.

The letter U, meaning unfinished, is reported when, in the judgment of the instructor, the student deserves further time to complete work which has been interfered with by illness or other excusable cause of absence or disability. This is only a temporary report and in no way prejudices the student's final grade in a course.

PENALTIES

A student who, at the end of the semester, receives grades below passing in fifty per cent or more of the work to which he is assigned is required to leave College for at least one semester unless there are sufficiently extenuating circumstances, in which case his dean may suspend the rule and allow an assignment to twelve semester credits of work.

Any student who, at the end of a semester, receives grades below passing in twenty-five per cent of his assigned work is allowed not more than seventy-five percent of regular work the next semester.

Any student who is found to be persistently inattentive to study is at once temporarily suspended by his dean, and reported to the President for permanent suspension.

HONORS

In each of the divisions of the College "junior honors" are awarded at Commencement to not more than five per cent of the junior class having the highest standing up to the close of the junior year.

In a similar manner "senior honors" are awarded to not exceeding five per cent of the senior class having the highest standing up to the close of the senior year.

HONOR SOCIETIES

A chapter of Phi Kappa Phi, an honor scholarship fraternity, membership in which is open to honor graduates of all departments of American universities and colleges, was installed at the Kansas State Agricultural College on November 15, 1915. The eligibility of undergraduates to membership is determined on the basis of their scholarship. The candidates are elected to membership at the October and April meetings of

the chapter. Besides this, there are a number of honor fraternities, sororities and societies which are open to students in different divisions of the College or in different activities. These are treated later under the heading Student Organizations.

CREDITS FOR EXTRA WORK

Activities connected with the College, but not provided for by any of the courses of study, either as required subjects or as electives, are designated as *extra subjects*.

No credit is given for extra work of any kind unless the student is regularly assigned to it in accordance with the general rules governing assignments, and it is done under the constant supervision of a College officer, who sees that a proper standard is maintained and reports a grade for record.

No student may be assigned to extra work for credit except upon the written recommendation of the instructor in charge of the work. This recommendation is filed in the office of the student's dean, and is effective until revoked.

Credits earned for extra work may be counted as part or all of the electives in any of the College courses. In courses that do not include electives, credits for extra work are available only as substitutions for required work, and must be approved in the regular way before becoming effective. A total of not more than eight semester credits may be allowed a student for extra work, and not more than two of these may be obtained in any one semester.

The number of semester credits that may be allowed for extra work is as follows:

Subject.	Per semester.	Total.
Physical Training	1	4
Military Science (unpaid)	1	4
Orchestra	1	4
Band	1	4
Choral Society	1	4
Debate	2	4
Oratorical Contest	2	4
Kansas State Collegian journalism	1	4

BIBLE STUDY

Bible study is an elective. Two semester credits are granted for each completed one-year course. Credit may be granted to any one student for not more than two courses. Teachers of classes are to be approved as tutors, and the supervision of the work is placed in the Department of Education. This department also conducts the examinations for credit in Bible study.

CLASSES

The minimum numbers for which classes are organized are as follows:

School of Agriculture	18
Freshmen or sophomores	12
Juniors or seniors	7

This rule is varied only by special permission of the Board of Administration.

Division of Agriculture

LELAND EVERETT CALL, *Acting Dean*

The teaching of a rational, practical system of agriculture is fundamental to industrial development in a state whose principal resources are derived from agricultural pursuits. This State has permanent prosperity in direct proportion to the producing capacity of her land. The unit of production is the acre, and the most successful farmer is necessarily the one who can produce, at minimum cost, a maximum quantity of the best quality of agricultural products to the acre.

In order to do this it is necessary to know something of the soil, the conservation of its fertility and moisture, and its proper cultivation; the kinds of plants to grow and how to improve them; the selection, breeding, and feeding of livestock; the maintenance of orchards, gardens, and attractive surroundings; farm buildings, and the equipment of the farm home with modern conveniences; the best methods of marketing the products of the farm; and, in addition to all this, the making of the farm home the center of influence for good citizenship and fellowship in the neighborhood.

A man may get many of these things through practical experience, and thus become an exponent of modern farming, but the cost entailed is usually unnecessarily great. The Agricultural College furnishes a means of acquiring a systematic and practical training in agriculture, which fits young men adequately for the farm, at a minimum of time and financial cost.

EQUIPMENT

The facilities for such training in this College are of the best. The College owns 748 acres of land, which is used for instruction and demonstration in the various courses in agriculture and allied branches. By a recent appropriation $80,000 is now available for the purchase of additional land. The campus, which comprises 160 acres, affords one of the best examples of ornamental tree planting and forestry in the State. Students working daily amid such surroundings can scarcely fail to gain an appreciation of and love for the beautiful. A tract of 320 acres is devoted to the work in agronomy. For horticultural and forestry work, eighty acres are used; for dairy work, about seventy acres; and for animal husbandry purposes, 140 acres. The herds and flocks contain all the important breeds of dairy and beef cattle, hogs, horses, and sheep, many animals of which have won championships at local and state fairs in the past five years. With this class of stock available for the work in judging the student is supplied with types of the best breeds, and becomes familiar with these types by actual handling of the stock.

The College has one of the best-equipped schools of veterinary medicine in the West. It is rated in class "A" by the United States Depart-

ment of Agriculture, which rating places it among the best in the United States and Canada. In addition to giving the student the best possible technical training in veterinary medicine, the course is designed to give the broad culture necessary for men who are to take their place in social and public affairs. Professional men, such as veterinarians, are placed in a more or less public relation to the community they serve. They must have a broad groundwork in cultural and ethical training, which will win them the confidence and respect of their communities. Success is measured in something more than dollars and cents, and the man whose view of life is no broader than his profession adds but little to the world and its happiness. The training given by the College in veterinary science, as in its curriculum in agriculture, seeks to emphasize the value of the man as a man, as much as his value as a specialist in agriculture.

CURRICULA IN AGRICULTURE

The various needs of the student of agriculture are met by the following curricula:

A six-year curriculum in animal husbandry and veterinary medicine.

A four-year curriculum in agriculture.

A four-year curriculum in veterinary medicine.

A sixteen-week short winter course in agriculture (two winters, eight weeks each).

An eight-week creamery short course.

A short course in testing dairy products.

DEGREES AND CERTIFICATES

The four-year curriculum in agriculture leads to the degree of bachelor of science in agriculture. The four-year curriculum in veterinary medicine leads to the degree of doctor of veterinary medicine. A short-course certificate is granted to a student completing the two-year short course in agriculture.

The four-year curriculum in agriculture is designed to meet the needs primarily of the students who expect to return to the farm. However, the student who completes the curriculum will have had sufficient training to enable him to enter some one of the many lines of agricultural industry as a specialist. The demand for men thus trained is constantly increasing, and such positions offer attractive opportunities for men who by nature and training are adapted to the work. The United States Department of Agriculture, the state colleges and departments of agriculture, high schools, private institutions of secondary and college rank, and a great variety of commercial interests, are constantly demanding men trained in agriculture.

The young man who expects to make farming his life work can start with no better asset than the thorough training in practical and scientific agriculture afforded by the four-year curriculum. The American farmer needs more of the skill that comes through the training of the hand, in order that he may better do the work of farming; but infinitely more, he needs the training of the mind in the fundamental truths that lie back of every operation in farming, in order that he may use the skill of the

craftsman with reason and judgment. One may learn to plow a field with the greatest skill; the work may be a model of its kind. If, however, it is plowed with utter disregard of the moisture conditions which prevail the result may be a failure. To understand the conditions which should determine when and how to plow is the work of the trained mind; the other is the work of the trained hand. The farmer and the teacher of farming must possess both kinds of training, and the courses of study have been revised with this fact in view, and have been so arranged that *the student begins his practical training in agriculture on the first day he enters College, and continues it throughout the course.*

STATE TEACHERS' CERTIFICATES

By the selection of proper electives in the department of education, the four-year curriculum in agriculture may not only lead to the degree of bachelor of science in agriculture, but at the same time qualify the student for the three-year Kansas state teachers' certificate, renewable for life and valid in any high school or any other public school in the State. A student desiring to qualify for teaching should begin his professional preparation by electing psychology, first semester, junior year. A total of eighteen semester credits in the department of education is required for this certificate. These must include the following courses: psychology, educational administration, history of education and educational psychology.

STATE CERTIFICATES FOR TEACHERS OF VOCATIONAL AGRICULTURE

The forty-four semester hours of electives provided in this curriculum in agriculture may be so chosen as to thoroughly prepare the student for the teaching of vocational agriculture in schools participating in the Federal Smith-Hughes funds. The following are the electives suggested for those preparing to be supervisors or teachers of vocational agriculture:

	Semester credits.
Professional work in education	18
(Must include 3 hours in psychology and 5 hours in the teaching of vocational agriculture.)	
Seminar in Agriculture	1
Farm Management	3
Soil Management	2
Market Gardening *or* Farm Animals in Health and in Disease	3
Rural Architecture	3
Agricultural Economics	3
Tractors and Trucks, *or* Farm Motors	3
Field Machinery	2
Woodwork	2
Forging	2
Concrete Construction	2
Total	44

Candidates for the certificate in vocational agriculture must also have had not less than two full years of actual farm experience in labor or management, at least one of which shall have been continuous so as to give practical contact with farm conditions during all seasons.

THE CURRICULUM IN AGRICULTURE

One hundred thirty-two semester credits in addition to military science are required for graduates, as follows:

	Semester credits.	
Prescribed agriculture	42	
Electives in agriculture, required with their prerequisites	22	
Required in agriculture	—	64
Prescribed in nonagriculture	46	
Electives in nonagriculture, required	6	
Electives that may be nonagriculture	16	
Total allowed in nonagriculture	—	68
Required in military science		4
Total semester credits for graduation		136

As shown in the above general outline and in the tabulated curriculum given hereafter, the candidate for graduation must have completed one hundred thirty-six College semester credits. The twelve major electives required must be taken from some one of the departments of the Division of Agriculture. The ten minor electives must support the major work. They may be taken from more than one department, and may even be selected from departments in other divisions of the College, but they must directly strengthen the student's preparation in agriculture. At the discretion of the student, twenty-two elective credits may be nonagricultural. However, six semester credits of the junior electives and the ten senior semester credits, designated "free electives," may be earned in any College credit courses and may be chosen without restriction. Any candidate for a degree in agriculture must also have had at least six months farm experience approved by the Dean of the Division of Agriculture.

The student who completes the freshman and sophomore years will have had, in addition to the fundamental work in chemistry, zoölogy, botany, English, and physics, practical studies in the physiology of plants and plant diseases, farm crops, livestock, dairying, poultry, and horticulture. These two years give the student a general knowledge of the whole range of practical agriculture, more than one-third of his time in these freshmen and sophomore years being devoted to practical agricultural subjects.

During the junior and senior years the student continues his studies of fundamental science and learns to apply science to practical agriculture. He is led step by step to understand the scientific relation of every farming operation. There is so much agriculture to be taught that it becomes necessary for the student to choose in which of the general lines he will find that which best suits his needs or liking. This is made possible by numerous electives in soils, crops, animal husbandry, veterinary medicine, dairy husbandry, horticulture, milling, and poultry.

The foundation of all agricultural work is the soil and the crops grown upon it. Success in livestock or dairying depends, in a great measure, upon the ability of the soil to produce, with economy, sufficient crops of the right character. Success in grain farming depends wholly on the productiveness of the soil and the selection of the crops and of methods of culture adapted to the region under cultivation.

THE CURRICULUM IN VETERINARY MEDICINE

Veterinary medicine has made remarkable advances within recent years, and is taking its place alongside human medicine as a science. In truth, medical science and veterinary science are but specialized branches of the same science, and must be developed together. The modern veterinarian takes his place in the community as a professional man of education and culture. With the general improvement of the livestock on the farms, and with the advance of livestock in value, there is constant increase in the demand for skilled physicians to care for them.

The veterinarian, while primarily trained to conserve the health of farm animals, has a yet larger service to render in preventing diseases common to both man and beast from being communicated from domestic animals to man. Moreover, he must see that the animals slaughtered for meat are healthy and that the products are handled under such conditions as to render them suitable for human food. The public is now demanding that milk and other food products be free from contamination and that they be incapable of transmitting dangerous diseases, like tuberculosis, typhoid fever, scarlet fever, and diphtheria. There is ample work for all of the thoroughly competent veterinarians that the colleges of the country will train.

The curriculum in veterinary medicine at the Agricultural College was established to give the young men of this State an opportunity to pursue these studies in an agricultural environment, where the facilities offered by other branches of the College would be at their command. While the instruction in this curriculum is largely technical, enough subjects of a general character are included to give a sound education and a broad outlook. Better to fit the veterinarian to deal wisely with the livestock problems which he has to meet, he is required to take the work in stock feeding, stock breeding, stock judging, milk inspection, zoölogy, and embryology, in addition to his purely professional work.

The diploma from this school is recognized by the United States Department of Agriculture, by the United States Civil Service Commission, by the American Veterinary Medical Association, and by the various examining boards of the several states and territories of America where it has been presented.

CURRICULUM IN ANIMAL HUSBANDRY AND VETERINARY MEDICINE

The combined curriculum in animal husbandry and veterinary medicine has been outlined so that students may receive the degree of bachelor of science in agriculture at the end of four years, and the degree of doctor of veterinary medicine at the end of two years more, thus securing both degrees in six years.

Curriculum in Agriculture

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
Composition and Literature I Engl. 151	2(2-0)	Composition and Literature II Engl. 154	2(2-0)
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
General Botany I Bot. 101	3(1-4, 2)	General Botany II Bot. 104	3(1-4, 2)
Types and Classes of Live Stock An. Husb. 101	3(1-6)	Plant Propagation Hort. 101	3(2-2, 1)
Library Methods Lib. Ec. 101	1(1-0)	Dairy Judging Dairy Husb. 104	1(0-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Organic Chemistry Chem. 120	3(2-2, 1)	Quantitative Analysis I Chem. 150	2(0-6)
Elements of Dairying Dairy Husb. 101	3(2-3)	Agricultural Physics Physics 111	3(3-0)
Anatomy and Physiology Vet. 205	5(3-6)	General Zoölogy Zoöl. 105	5(3-6)
Grain Crop Production Agron. 101	3(2-2, 1)	Forage Crop Production Agron. 102	3(2-2, 1)
Plant Pathology I Bot. 107	3(1-4, 2)	Farm Poultry Production Poult. Husb. 101	2(1-2, 1)
Military Science III Mil. Tr. 103	1(0-3)	Orcharding Hort. 107	2(1-2, 1)
		Military Science IV Mil. Tr. 104	1(0-3)

JUNIOR

First Semester		Second Semester	
Principles of Feeding An. Husb. 104	3(3-0)	Principles of Breeding An. Husb. 106	3(3-0) *or*
Soils Agron. 131	4(3-3)	Plant Breeding Bot. 205	3(1-4, 2)
Agricultural Microbiology Bact. 106	3(1-6)	Soil Fertility Agron. 132	3(2-2, 1)
Electives *	6	Agricultural Journalism Ind. Jour. 121	1(1-0)
		General Entomology Ent. 101	3(2-3)
		Electives	6

SENIOR

First Semester		Second Semester	
Major electives †	6	Major electives	6
Minor electives ‡	5	Minor electives	5
Free electives §	5	Free electives	5

* Six semester credit hours of junior electives must be chosen from the work offered in history, economics, education, modern languages, or mathematics. Students preparing to teach should take not less than eight of these twelve semester credit hours of junior electives in the Department of Education.

† Major electives must be chosen from one department in the Division of Agriculture, and approved by the head of that department.

‡ Minor electives may be chosen from more than one department. They must be agricultural subjects, or closely related science, and support the major work.

§ Students preparing to teach must use senior free electives in completing their requirements for the state teachers' certificate.

Agricultural Electives for Students in the Curriculum in Agriculture

AGRONOMY

First Semester	Second Semester
Seed Identification and Weed Control 2(1-3)	Crop Improvement 3(2-3)
Advanced Forage Crops 2(1-3)	Advanced Grain Crops 2(1-3)
Advanced Soil Fertility 2(1-3)	Special Crops 1(1-0)
	Dry-land Farming 2(2-0)
Soil Management 2(1-3)	Advanced Soils Laboratory 2(0-6)
Principles of Agronomic Experimentation 1(1-0)	Soil Survey 2(1-3)
Cost Accounting 2(1-3)	Agronomic Seminar 1(1-0)
	Advanced Farm Management 3(1-6)

Farm Management
3(2-3)
(Each semester)

Crops Research
(1 to 5 semester credits)
(Each semester and Summer School, for graduates)

Soils Research
(1 to 5 semester credits)
(Each semester and Summer School, for graduates)

Farm Management Research
(1 to 5 semester credits)
(Each semester and Summer School, for graduates)

ANIMAL HUSBANDRY

First Semester	Second Semester
History of Breeds and Pedigrees 3(2-3)	Pork Production 2(2-0)
Mutton Production 2(2-0)	Beef Production 2(2-0)
Advanced Stock Judging I 2(0-6)	Advanced Stock Judging II 2(0-6)
	Horse Production 2(2-0)
Form and Function in Farm Animals 2(0-6)	Advanced Feeding 2(2-0)
Livestock Marketing 2(2-0)	Animal Husbandry Seminar 2(2-0)
Animal Genetics 2(1-3)	Advanced Animal Genetics. 2(1-3)
Livestock Management I 3(1-6)	Livestock Management II 3(1-6)

Meats
2(1-3)
(Each semester)

Teachers' Course in Animal Husbandry
(2 semester credits, Summer School)

ADAPTATION CURRICULA FOR CLASSES OF 1919 AND 1920

The class of 1920 is required to complete the sophomore, junior and senior years as provided in this curriculum, except that Qualitative Analysis (3 semester credits) is to take the place of Plant Pathology, first semester, sophomore year; and Library Methods is to be added to the work of the first or of the second semester, sophomore year. Free electives must include at least two semester credit hours in the Department of English.

The class of 1919 is required to complete the junior and senior years as provided in this curriculum, except that Farm Poultry Production and either Agricultural Chemistry or Quantitative Analysis (2 semester credits) are to take the place of Principles of Feeding, first semester, junior year. (This makes a total of 17 semester credits required for this semester's work.) Free electives must include at least two credit hours in the Department of English.

DAIRY HUSBANDRY

First Semester	Second Semester
Butter Making and Creamery Management 3(2-3)	Dairy Inspection I 2(1-3)
Market Milk 2(1-3)	Milk Production 3(3-0)
	Cheese and Ice Cream Making 3(2-3)
	Advanced Dairy Judging 1(0-3)
	Dairy Seminar 2(2-0)

Dairy Research
(3 semester credits)
(Each semester, for graduates)

HORTICULTURE

First Semester	Second Semester
Systematic Pomology 3(1-6)	Small Fruits 2(2-0)
	Dendrology 3(1-6)
Farm Forestry 4(3-3)	Silviculture 3(2-3)
Practical Pomology 3(2-3)	Orchard Management 4(3-3)
Spraying 2(1-3)	Market Gardening 3(2-3)
	Landscape Gardening I 4(2-6) (Also given in Summer School)
	School Gardening 3(2-3) (Also given in Summer School)
Greenhouse Construction and Management 3(3-0)	Plant Materials in Landscape Gardening 3(2-3)
History and Literature of Landscape Gardening 2(2-0)	Landscape Gardening II 3(0-9)
The Theory and Æsthetics of Landscape Gardening 3(2-3)	Tree Surgery 2(1-3)
	City and Town Planning 3(1-6)

MILLING INDUSTRY

First Semester	Second Semester
	Principles of Milling 1(0-3)
Grain Marketing 3(3-0)	Grain Products 2(2-0)
	Milling Practice I 3(1-6)
Wheat and Flour Testing 4(1-9)	Milling Practice II 2(0-6)
	Experimental Baking A 2(0-6)

POULTRY HUSBANDRY

First Semester	Second Semester
Practice in Poultry Feeding (1 semester credit)	Practice in Incubation (1 or 2 semester credits) (Also given in Summer School)
	Practice in Brooding (1 to 3 semester credits) (Also given in Summer School)
Practice in Milk Feeding (1 semester credit)	
Poultry Breeds and Types 2(1-3) (Also given in Summer School)	Advanced Poultry Judging 1(0-3)
Market Poultry 2(1-3) *or* 3(1-6) (Also given in Summer School)	Poultry Breeding 2(0-6)
	Poultry Farm Management 3(1-6)
	Poultry Bacteriology 3(1-6)
	Comparative Anatomy of Domestic Birds 3(1-6) (Given 1918-'19)
Poultry Research (2 to 4 semester credits)	

VETERINARY MEDICINE

First Semester	Second Semester
Anatomy I 6(3-9)	Anatomy II 7(3-12)
Anatomy III 5(1-12)	Anatomy IV 3(1-6)
Histology I 3(1-6)	Histology II 3(1-6)
	Farm Animals in Health and in Disease 3(2-3) (Also given in the Summer School)
	Obstetrics 3(3-0)
	Horseshoeing 1(1-0)

List of Electives for Agricultural Students, With Their Prerequisites

Subject	*Prerequisites*
AGRONOMY:	
Advanced Grain Crops	Grain Crop Production
Advanced Forage Crops	Forage Crop Production
Seed Identification and Weed Control	Grain Crop Production, and Forage Crop Production
Crop Improvement	Grain Crop Production, and Forage Crop Production
Special Crops	Grain Crop Production, and Forage Crop Production
Dry-land Farming	Soils
Advanced Soils Laboratory	Soils
Soil Survey	Soils
Advanced Soil Fertility	Soil Fertility
Soil Management	Soil Fertility
Cost Accounting	None
Principles of Agronomic Experimentation	Crop Improvement, and Soil Fertility
Farm Management	Grain Crop Production, Forage Crop Production, Soil Fertility, and Principles of Feeding
Advanced Farm Management	Farm Management
Crops Research	Advanced Grain Crops, and Advanced Forage Crops

ELECTIVES—AGRONOMY—*continued.*

Subject	*Prerequisites*
Soils Research	Soil Fertility, and Elementary Organic Chemistry
Farm Management Research	Farm Management
Agronomy Seminar	Grain Crop Production, Forage Crop Production, and Soils
ANIMAL HUSBANDRY:	
History of Breeds and Pedigrees	Types and Classes of Livestock
Livestock Management I	Principles of Feeding
Livestock Management II	Livestock Management I
Pork Production	Principles of Feeding
Mutton Production	Principles of Feeding
Beef Production	Principles of Feeding
Horse Production	Principles of Feeding
Meats	Principles of Feeding, Principles of Breeding
Advanced Stock Judging I	Types and Classes of Livestock
Advanced Stock Judging II	Advanced Stock Judging I
Form and Function in Farm Animals	Advanced Stock Judging II
Teachers' Course in Animal Husbandry,	None
Advanced Feeding	Principles of Feeding
Livestock Marketing	Agricultural Economics, and Coöperation and Marketing
Animal Husbandry Seminar	History of Breeds and Pedigrees
Animal Genetics	Principles of Breeding and General Embryology
Advanced Animal Genetics	Animal Genetics
APPLIED MECHANICS:	
Concrete Construction	None
Mechanical Drawing I	Descriptive Geometry
ARCHITECTURE:	
General Drawing I	None
Landscape Design	None
BACTERIOLOGY:	
Soil Microbiology	Agricultural Microbiology
Dairy Bacteriology	Agricultural Microbiology
Poultry Bacteriology	Agricultural Microbiology
BOTANY:	
Plant Physiology I	General Botany II
Plant Genetics I	Plant Breeding
Plant Genetics II	Plant Genetics I
Plant Genetics III	Plant Genetics II
Taxonomic Botany	General Botany II
Field Crops and Vegetable Diseases	Plant Pathology I
Fruit Crop Diseases	Plant Pathology I
Economic Botany	General Botany II
Plant Pathology II	Plant Pathology I
Plant Pathology III	Plant Pathology II
CHEMISTRY:	
Advanced Inorganic Chemistry	Chemistry II
Inorganic Preparations	Chemistry II
Organic Chemistry I	Chemistry II
Organic Chemistry II	Organic Chemistry I
Principles of Animal Nutrition	Organic Chemistry
Physiological Chemistry	Organic Chemistry
Quantitative Analysis II	Quantitative Analysis I
Quantitative Analysis III	Quantitative Analysis II
Chemistry of Soils and Fertilizers	Quantitative Analysis I
Chemistry of Plant Products	Quantitative Analysis I, Organic Chemistry
Chemistry of Dairy Products	Quantitative Analysis I, Organic Chemistry
Chemistry of Meats	Quantitative Analysis I, Organic Chemistry
Research in Agricultural Chemistry	(Depends upon work undertaken)
CIVIL ENGINEERING:	
Surveying I	Trigonometry
Elements of Irrigation and Drainage	None
Farm Sanitation and Water Supply	None
DAIRY HUSBANDRY:	
Advanced Dairy Judging	Dairy Judging
Dairy Inspection I	Elements of Dairying, Microbiology, and Dairy Chemistry
Milk Production	Elements of Dairying, Principles of Feeding
Butter Making and Creamery Management	Elements of Dairying, Dairy Bacteriology
Market Milk	Elements of Dairying, Dairy Bacteriology

ELECTIVES—DAIRY HUSBANDRY—*continued.*

Subject	*Prerequisites*
Cheese and Ice Cream Making	Elements of Dairying, Dairy Bacteriology, and Dairy Chemistry
Dairy Seminar	Dairy Inspection I, Milk Production
Dairy Research	Milk Production, Butter Making and Creamery Management
ECONOMICS:	
Agricultural Economics	None
Coöperation and Marketing	Agricultural Economics
Agricultural Land Problems	Agricultural Economics
Research in Agricultural Economics	Agricultural Economics
Economics	None
Sociology	None
Business Organization	Economics
Labor Problems	Economics
Money and Banking	Economics
Public Finance	Economics
Rural Sociology	None
EDUCATION:	
Psychology	None
Educational Administration	None
Methods of Teaching in High Schools	Psychology
History of Education	None
Educational Psychology	Psychology
Educational Sociology	None
Agricultural Education	Educational Administration
Special Methods in the Teaching of Agriculture	Educational Psychology
Rural Education	Educational Administration
Supervised Observation and Teaching in Agriculture	Educational Psychology
ELECTRICAL ENGINEERING:	
Electrical Engineering C	College Physics
Illuminating Engineering	College Physics
ENGLISH:	
Advanced Composition I	College Rhetoric II
Argumentation and Debate	College Rhetoric II
Business English	College Rhetoric II
Advertising English	College Rhetoric II
Oral English I	College Rhetoric II
Oral English II	College Rhetoric II
Methods of Teaching English	College Rhetoric II
Farm Advertising	Composition and Literature II
Farm Bulletins	Composition and Literature II
Technical Writing	Advanced Composition I, Business English, Advertising English, Farm Advertising, and Farm Bulletins
Short Story	Composition and Literature II
Community English	Composition and Literature II
English Bible	Composition and Literature II
American Literature	Composition and Literature II
ENTOMOLOGY:	
Apiculture	General Entomology
Milling Entomology	General Entomology
Horticultural Entomology	General Entomology
General Economic Entomology	General Entomology
Advanced General Entomology	General Entomology
Insect Morphology I	General Entomology
Taxonomy of Insects I	General Entomology, Insect Morphology I
Principles of Taxonomy I	(Must be taken with Taxonomy of Insects I)
Medical Entomology	General Entomology
FARM ENGINEERING:	
Rural Architecture	None
Field Machinery	None
Tractors and Trucks	None
Power Machinery	Field Machinery
Advanced Farm Machinery	Power Machinery
Farm Machinery Research	Power Machinery
Farm Equipment	None
FRENCH:	
French I	None
French II	French I
French Readings	French II
French Short Stories	French Readings

ELECTIVES—*continued.*

Subject	*Prerequisites*
GERMAN:	
German I	None
German II	German I
German Readings	German II
German Comedies	German Readings
German Short Stories	German Readings
Scientific German I	German Comedies *or* German Short Stories
Scientific German II	Scientific German I
HISTORY AND CIVICS:	
American History I	None
American History II	None
American History III	None
American Agricultural History	None
American Industrial History	None
American Political History	None
Pan-America	None
Modern Europe	None
European Industrial History	None
History of British Agriculture	None
Current History	None
American Government	None
Comparative Government	None
Business Law I	None
Business Law II	Business Law I
Farm Law	None
Seminar in American Economic History,	None
HORTICULTURE:	
Systematic Pomology	None
Small Fruits	Plant Propagation
Farm Forestry	None
Dendrology	None
Silviculture	Farm Forestry *or* Dendrology
Practical Pomology	Systematic Pomology
Orchard Management	None
Spraying	Chemistry II
Market Gardening	None
School Gardening	None
Greenhouse Construction and Management	None
Landscape Gardening I	None
Landscape Gardening II	Landscape Gardening I
History and Literature of Landscape Gardening	None
Plant Materials of Landscape Gardening,	Plant Propagation
Theory and Æsthetics of Landscape Gardening	History and Literature of Landscape Gardening
Tree Surgery	Plant Physiology I
City and Town Planting	None
INDUSTRIAL JOURNALISM:	
Elementary Journalism	None
Industrial Writing	Elementary Journalism *or* Agricultural Journalism
Industrial Feature Writing	Industrial Writing
Journalism Practice I	May be taken with Agricultural Journalism
Journalism Practice II	Journalism Practice I
MATHEMATICS:	
Plane Trigonometry	Plane Geometry
College Algebra	Plane Trigonometry
Analysis of Statistics	None
MILLING INDUSTRY:	
Principles of Milling	None
Grain Marketing	Grain Crop Production
Grain Products	Grain Marketing
Milling Practice I	Principles of Milling
Milling Practice II	Milling Practice I
Wheat and Flour Testing	Grain Products, Organic Chemistry, and Advanced Quantitative Analysis
Experimental Baking A	Wheat and Flour Testing
PHYSICS:	
General Physics I	Trigonometry
General Physics II	General Physics I
Photography	None

ELECTIVES—*continued.*

Subject	*Prerequisites*
POULTRY HUSBANDRY:	
Practice in Poultry Feeding	Farm Poultry Production
Practice in Incubation	Farm Poultry Production
Practice in Brooding	Farm Poultry Production
Practice in Milk Feeding	Farm Poultry Production
Poultry Breeds and Types	None
Advanced Poultry Judging	Poultry Breeds and Types
Market Poultry	Farm Poultry Production
Poultry Breeding	Principles of Breeding
Poultry Farm Management	Farm Management
Poultry Bacteriology	Microbiology
Comparative Anatomy of Domestic Birds,	Embryology
Poultry Research	Farm Poultry Production, Practice in Poultry Feeding, Practice in Incubation, and Practice in Brooding
SHOP PRACTICE:	
Woodwork I	None
Woodwork II	Woodwork I
Woodwork III	Woodwork II
Woodworking for Grammar Grades	None
Woodworking I for High Schools	Woodworking for Grammar Grades
Woodworking II for High Schools	Woodworking I for High Schools
Wood Turning	Woodworking II for High Schools
Foundry Practice	None
Pattern Making	Foundry Practice
Machine Tool Work I	Foundry Practice
Machine Tool Work II	Machine Tool Work I
Forging I	None
Forging II	Forging I
Forging III	Forging II
Forging IV	Forging III
SPANISH:	
Spanish I	None
Spanish II	Spanish I
Spanish Readings	Spanish II
STEAM AND GAS ENGINES:	
Farm Motors	None
Dairy Refrigeration	None
VETERINARY MEDICINE:	
Farm Animals in Health and Disease	Anatomy and Physiology
Anatomy I	None
Anatomy II	Anatomy I
Anatomy III	Anatomy II
Anatomy IV	Anatomy III
Comparative Physiology I	Organic Chemistry
Comparative Physiology II	Comparative Physiology I
Histology I	None
Histology II	Histology I
Horseshoeing	Anatomy and Physiology
Obstetrics	Anatomy and Physiology, and General Embryology
ZOÖLOGY:	
General Embryology	General Zoölogy
Advanced Zoölogy I	General Zoölogy
Advanced Zoölogy II	General Zoölogy
Invertebrate Taxonomy	General Zoölogy
Vertebrate Taxonomy	General Zoölogy
Animal Ecology	General Zoölogy, General Entomology
Cytology	Embryology
Evolution and Heredity	Embryology
Dynamic Geology	None
Historical Geology	Dynamic Geology

Curriculum in Veterinary Medicine*

FRESHMAN

First Semester		Second Semester	
Anatomy I Vet. 201	6(3-9)	Anatomy II Vet. 202	7(3-12)
Histology I Vet. 221	3(1-6)	Histology II Vet. 222	3(1-6)
Chemistry AV-I Chem. 105	5(3-4, 2)	Chemistry V-II Chem. 106	5(3-4, 2)
General Zoölogy Vet. Zoöl. 111	3(2-3)	Embryology Vet. Zoöl. 114	2(1-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Anatomy III Vet. 203	5(1-12)	Anatomy IV Vet. 204	3(1-6)
Comparative Physiology I Vet. 211	5(4-3)	Comparative Physiology II Vet. 212	3(2-3)
Medical Botany Bot. 113	2(1-3)	Pathogenic Bacteriology I Bac. 111	4(2-6)
College Rhetoric I Engl. 101	3(3-0)	Materia Medica I Vet. 131	2(2-0)
Types and Classes of Livestock Vet. An. Husb. 102	3(1-6)	Principles of Feeding An. Husb. 104	3(3-0)
Military Science III Mil. Tr. 103	1(0-3)	Principles of Breeding An. Husb. 106	3(3-0)
		Military Science IV Mil. Tr. 104	1(0-3)

JUNIOR

First Semester		Second Semester	
Surgery I Vet. 151	3(3-0)	Surgery II Vet. 152	3(3-0)
Diagnosis Vet. 161	2(2-0)	Medicine I Vet. 162	4(4-0)
Materia Medica II Vet. 132	2(2-0)	Horseshoeing Vet. 156	1(1-0)
Pharmacy Vet. 134	1(0-3)	Therapeutics Vet. 133	3(3-0)
Pathology I Vet. 241	5(4-3)	Pathology II Vet. 242	6(4-6)
Pathogenic Bacteriology II Bac. 116	4(2-6)	Clinics II Vet. 172	3(0-9)
Clinics I Vet. 171	3(0-9)		

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* ADJUSTMENT CURRICULA FOR THE CLASSES OF 1919 AND 1920

The class of 1920 will be required to complete the sophomore, junior and senior years as provided in this curriculum, except that Types and Classes of Livestock, Vet., first semester, sophomore year, is to be omitted; Histology (2 semester credits) and Organic Chemistry (3 semester credits) are to be added to this semester's work.

The class of 1919 will be required to complete the junior and senior years as provided in this curriculum, except that the course in Materia Medica, junior year, first semester, is to be a 4-semester credit course and Principles of Animal Breeding is to be added to the work of the second semester, junior year.

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

SENIOR

First Semester		Second Semester	
Surgery III Vet. 153	3(3-0)	Surgery IV Vet. 154	3(3-0)
Medicine II Vet. 163	5(5-0)	Medicine III Vet. 164	5(5-0)
Pathology III Vet. 243	3(2-3)	Ophthalmology Vet. 165	1(1-0)
Meat Inspection Vet. 246	2(2-0)	Operative Surgery Vet. 155	1(0-3)
Parasitology Zoöl. 123	2(1-3)	Jurisprudence Vet. 166	1(1-0)
Clinics III Vet. 173	4(0-12)	Obstetrics Vet. 157	3(3-0)
		Dairy Inspection II Dairy Husb. 118	1(0-3)
		Clinics IV Vet. 174	4(0-12)

Curriculum in Animal Husbandry and Veterinary Medicine*

FRESHMAN

Freshman year of the Curriculum in Agriculture

SOPHOMORE

First Semester		Second Semester	
Organic Chemistry Chem. 120	5(2-2, 1)	Quantitative Analysis I Chem. 150	2(0-6)
General Zoölogy Zoöl. 105	5(3-6)	Pathogenic Bacteriology I Bac. 111	4(2-6)
Anatomy I Vet. 201	6(3-9)	Anatomy II Vet. 202	7(3-12)
Elements of Dairying Dairy Husb. 101	3(2-3)	Grain Crop Production Agron. 101	3(2-2, 1)
Military Science III Mil. Tr. 103	1(0-3)	Agricultural Journalism Ind. Jour. 121	1(1-0)
		Military Science IV Mil. Tr. 104	1(0-3)

JUNIOR

First Semester		Second Semester	
General Embryology Zoöl. 117	3(2-3)	Forage Crop Production Agron. 102	3(2-2, 1)
Anatomy III Vet. 203	5(1-12)	Anatomy IV Vet. 204	3(1-6)
Histology I Vet. 221	3(1-6)	Histology II Vet. 222	3(1-6)
General Entomology Ent. 101	3(2-3)	Electives	7
Electives †	3		

* This curriculum is so arranged that students may receive the degree of bachelor of science in agriculture at the end of four years, and the degree of doctor of veterinary medicine at the end of two more years.

† Six semester credit hours of junior electives must be chosen from the work offered by the departments of history, economics, education, modern languages, or mathematics.

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

SENIOR

First Semester		Second Semester	
Principles of Feeding An. Husb. 104	3(3-0)	Principles of Breeding An. Husb. 106	3(3-0)
Comparative Physiology I		Soil Fertility Agron. 132	3(2-2, 1)
Soils Agron. 131	4(3-3)	Comparative Physiology II Vet. 212	3(2-3)
Vet. 211	5(4-3)	Materia Medica I Vet. 131	2(2-0)
Electives	4	Electives	5

FIFTH YEAR

Junior year of the Curriculum in Veterinary Medicine

SIXTH YEAR

Senior year of the Curriculum in Veterinary Medicine

Collections for Supplies or Materials Used in the Courses in Division of Agriculture

Department	*Course*	*Semester charge*
AGRONOMY:		
	Grain Crop Production	$1.50
	Forage Crop Production	2.00
	Farm Crops	1.50
	Crop Improvement	1.00
	Advanced Forage Crops	1.00
	Advanced Grain Crops	1.00
	Crop Research	2.50
	Soils	2.00
	Soil Fertility	2.00
	Dry-land Farming	2.50
	Soils Research	3.50
	Farm Management	1.00
	Cost Accounting	1.00
ANIMAL HUSBANDRY:		
	Meats	2.50
DAIRY HUSBANDRY:		
	Elements of Dairying	2.00
	Butter Making and Creamery Management	2.00
	Market Milk	1.00
	Dairy Inspection I	1.00
	Dairy Inspection II	1.00
HORTICULTURE:		
	Plant Propagation	.50
	Systematic Pomology	1.00
	Spraying	1.00
MILLING INDUSTRY:		
	Wheat and Flour Testing	5.00
	Experimental Baking A	2.00
	Experimental Baking H	2.00
	Principles of Milling	1.00
	Milling Practice I	1.00
	Milling Practice II	1.00
VETERINARY MEDICINE:		
	Histology I	2.50
	Histology II	2.50
	Pathology I	2.50
	Pathology II	2.50
	Pathology III	2.00
	Pharmacy	2.00
	Operative Surgery	5.00
	Anatomy I	5.00
	Anatomy II	5.00
	Anatomy III	5.00
	Anatomy IV	5.00
	Anatomy and Physiology	.50
	Physiology I	3.00
	Physiology II	3.00
	Experimental and Practical Physiology	2.00

Agronomy

Professor CALL
Professor SALMON
Associate Professor THROCKMORTON
Assistant Professor PARKER
Assistant Professor GRIMES
Assistant Professor CUNNINGHAM
Assistant Professor SEWELL
Assistant Professor BONNETT
Instructor ZAHNLEY
Assistant WILSON
Assistant HARLING
Assistant PHINNEY
Fellow TUTTLE
Fellow REISNER

The College farm used by the Department of Agronomy comprises 320 acres of medium rolling upland soil, well suited to experimental and demonstration work. It is well equipped with all kinds of farm machinery necessary in crop production. The general fields and experimental plots used for the breeding and testing of farm crops, and for conducting experiments in soil fertility and methods of culture, afford the student excellent opportunities for study and investigation.

Large and well-equipped laboratories for soil and crop work are maintained for the regular use of students. Material is provided for the study of the grain and forage crops best adapted to different purposes and most suitable for growing in the State. Ample greenhouse space is provided for germinating seeds under varying conditions, and for research work in soils during the winter months.

The Department of Agronomy offers courses in cereal and forage crop production and improvement, soils, soil fertility, soil survey, dry-land farming, and farm management.

The following detailed description of courses will give a definite understanding of each subject given, its position in the curriculum, and the proportion of time devoted to class and to laboratory work.

COURSES IN FARM CROPS

FOR UNDERGRADUATES

101. GRAIN CROP PRODUCTION. Sophomore year, first and second semesters. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Botany 101. Assistant Professor Bonnett and Mr. Zahnley.

This course is a study of the distribution, relative importance, and production of grain crops, including wheat, corn, oats, barley, rye, rice, buckwheat, and flax.

102. FORAGE CROP PRODUCTION. Sophomore year, first and second semesters. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Botany 101. Assistant Professor Bonnett and Mr. Zahnley.

This course is a study of the distribution, relative importance, value, and production of forage crops, including sorghums, alfalfa, clover, and the grasses.

103. FARM CROPS. Sophomore year, second semester. Class work, three hours; laboratory, three hours. Four semester credits. Assistant Professor Bonnett and Mr. Zahnley.

This course consists of a study of the more important grain and forage crops, especially from the production viewpoint.

105. SEED IDENTIFICATION AND WEED CONTROL. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisites: Agronomy 101 and 102. Assistant Professor Bonnett and Mrs. Harling.

Methods of propagation, control, and eradication of weeds are discussed in lecture. The laboratory is devoted to the identification of weed plants, and seeds; germination and purity testing; and field trips.

FOR GRADUATES AND UNDERGRADUATES

201. CROP IMPROVEMENT. Junior and elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Agronomy 101 and 102. Assistant Professors Parker and Bonnett.

This course reviews the principles of plant breeding and applies them to the principal groups of field crops. Methods of selection, hybridization, and breeding for special qualities are discussed. Laboratory work is a study of heritable characteristics and of their behavior in several generations following the cross.

202. ADVANCED GRAIN CROPS. Elective, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Agronomy 101. Professor Salmon.

Special phases of grain crop production are discussed in class. The laboratory work is devoted largely to identification and judging of threshed grain.

203. ADVANCED FORAGE CROPS. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Agronomy 102. Assistant Professor Bonnett.

Range and pasture management and improvement are discussed in class. The laboratory work is devoted to grass species and plant ecology in relation to pasture management.

204. SPECIAL CROPS. Elective, second semester. Class work, one hour. One semester credit. Prerequisites: Agronomy 101 and 102. Assistant Professor Bonnett.

The distribution, climatic and soil requirements, relative importance, and production of sugar beets, cotton, flax for fiber, hemp, tobacco and other minor crops are studied.

205. PRINCIPLES OF AGRONOMIC EXPERIMENTATION. Elective, first semester. Class work, one hour. One semester credit. Prerequisites: Agronomy 201 and 132. Professor Salmon.

A discussion of the principles of experimentation in general is followed by their application to agronomic problems. Important contributions to agronomic science are studied from the historical viewpoint.

206. AGRONOMY SEMINAR. Elective, second semester. Class work. one hour. One semester credit. Prerequisites: Agronomy 101, 102, and 131. Professor Call.

In this course students are required to review before the class timely articles appearing in bulletins and current periodicals.

FOR GRADUATES

301. CROPS RESEARCH. Elective, both semesters and summer school. Laboratory, three to fifteen hours. One to five semester credits according to the work done. Prerequisites: Agronomy 202 and 203. Professor Salmon.

Students choose or are assigned special problems for investigation. The completion of the work entitles them to credit according to the amount of work done.

COURSES IN SOILS

FOR UNDERGRADUATES

131. SOILS. Junior year, first semester. Class work, three hours; laboratory, three hours. Four semester credits. Prerequisite: Chemistry 102. Professor Call, Associate Professor Throckmorton, and Assistant Professor Sewell.

This course deals with the origin and formation, texture and composition, and management of soils to conserve moisture and liberate plant food.

132. SOIL FERTILITY. Junior or senior year, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Chemistry 150 and Agronomy 131. Professor Call, Associate Professor Throckmorton, and Assistant Professor Sewell.

Factors influencing the fertility of the soil, the effect of different systems of farming on soil fertility, and management of the soil to conserve its fertility receive most attention in this course.

FOR GRADUATES AND UNDERGRADUATES

231. DRY-LAND FARMING. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Agronomy 131. Associate Professor Throckmorton.

The principles underlying the cultivation methods and crop adaptation of dry-land farming are studied.

232. ADVANCED SOIL FERTILITY. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Agronomy 132. Associate Professor Throckmorton.

This course deals with the use of commercial fertilizers and their effects upon plants and soil. A study is also made of sulfofication and toxins.

233. SOIL SURVEY. Elective, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Agronomy 131. Associate Professor Throckmorton.

Types of soils of the United States and methods of mapping soil areas are studied in this course. Special attention is given to the study of Kansas soils in the field.

234. SOIL MANAGEMENT. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Agronomy 132. Associate Professor Throckmorton.

This course deals with the management of soils under irrigation and with the management of wet, sandy and eroded soils and with other types requiring special methods of working.

235. ADVANCED SOILS LABORATORY. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Agronomy 131. Associate Professor Throckmorton.

This course deals with the more advanced problems of soil physics and includes the making of mechanical analyses, the determination of moisture equivalent, specific heat, etc.

FOR GRADUATES

331. SOILS RESEARCH. Elective, both semesters and summer school. Laboratory, three to fifteen hours. One to five semester credits, according to the work done. Prerequisites: Agronomy 132 and Chemistry 150. Professor Call and Associate Professor Throckmorton.

Students are assigned special soil problems. The completion of the work entitles them to credit according to the amount of work done.

COURSES IN FARM MANAGEMENT

FOR GRADUATES AND UNDERGRADUATES

261. FARM MANAGEMENT. Elective, first and second semesters. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Agronomy 101, 102, and 132, and Animal Husbandry 104. Assistant Professor Grimes.

Farming is studied as a business, taking up the factors which effect its success and methods of improving it to obtain the most efficient organization. Methods of leasing are also studied.

262. ADVANCED FARM MANAGEMENT. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Agronomy 261. Assistant Professor Grimes.

The factors limiting profits in farming in various regions are studied. A number of well-managed farms are visited and studied.

263. COST ACCOUNTING. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Assistant Professor Grimes.

Various systems of farm records and accounts are studied to acquaint the student with the more practical methods.

FOR GRADUATES

361. FARM MANAGEMENT RESEARCH. Elective, both semesters and summer school. Laboratory, three to fifteen hours. One to five semester credits. Prerequisite: Agronomy 261 and 263. Assistant Professor Grimes.

Students are assigned special farm-management problems. The completion of the work entitles them to credit according to the amount of work done.

Animal Husbandry

Professor COCHEL
Professor ———
Associate Professor MCCAMPBELL
Assistant Professor VESTAL[1]
Assistant Professor THOMPSON[2]
Instructor GATEWOOD[3]
Assistant Professor PATERSON
Instructor VANDERWILT
Assistant ———
Fellow LUSH
Fellow HORLACHER

The Department of Animal Husbandry owns 140 acres of land, and rents 460 acres for the maintenance of herds and flocks of purebred horses, cattle, sheep, and hogs. The College livestock has attained a national reputation among the breeders and feeders on account of the many prize-winning animals produced.

The feed yards and barns are well arranged for experimental feeding and the maintenance of the herds. The laboratory of the animal husbandry student is, as a matter of fact, the feed yard and the animal. He studies the animal from the standpoint of the breeder and of the feeder. He learns to combine the needs of each and to find these qualities exemplified in the perfect animal.

The courses of study in this department are arranged to give the student special instruction in the selection, breeding, feeding, marketing,

1. Absent on leave, 1917-'18.
2. Exchange professor, 1917-'18.
3. Resigned.

and management of all classes of livestock. Attention is also given to the sanitary conditions and treatment of the more common forms of disease to which the animals are subject.

COURSES IN ANIMAL HUSBANDRY

FOR UNDERGRADUATES

101. TYPES AND CLASSES OF LIVESTOCK. Freshman year, both semesters and summer school. Class work, one hour; laboratory, six hours. Three semester credits. Associate Professor McCampbell, Assistant Professor Vestal, Assistant Professor Paterson, Messrs. Gatewood, Lush, and Horlacher.

This course consists of a study of the market and breeding types and classes of horses, cattle, sheep, and swine. Text: Vaughn's *Types and Market Classes.*

Laboratory.—Practice in scoring and judging market and breeding animals.

102. TYPES AND CLASSES OF LIVESTOCK (VET.). Sophomore year, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Associate Professor McCampbell.

One-fourth of this course is given by members of the Dairy Husbandry Department. A study is made of the market and breeding types and classes of horses, beef cattle, dairy cattle, sheep and swine. Text: Vaughn's *Types and Market Classes.*

Laboratory.—Practice in scoring and judging market and breeding animals.

104. PRINCIPLES OF FEEDING. Junior year, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisites: Veterinary Medicine 205, and Chemistry 120. Assistant Professor Vestal.

This course involves a study of the digestive system and the processes of nutrition, and of the theory of practical economy of rations, both for the maintenance and for the fattening of all classes of farm animals.

106. PRINCIPLES OF BREEDING.* Junior year, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisite: Zoölogy 105. Professor ———.

This course embraces the general principles of heredity, variation, sex-limited inheritance, prepotency, fertility and sterility, systems of breeding, and the influence of pedigree and herd-book standards.

108. HISTORY OF BREEDS AND PEDIGREES. Elective, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Animal Husbandry 101.

A study is made of the early history and development of purebred domestic animals; also a sufficient study of herd books and pedigrees to acquaint students with the leading strains and families of the different breeds of horses, cattle, sheep, and swine. Text: Plumb's *Types and Breeds of Farm Animals.*

110. LIVESTOCK MANAGEMENT I. Elective, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Animal Husbandry 104. Assistant Professor Paterson.

Practice is given in the feeding, care, and management of horses, cattle, sheep, and hogs.

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* Students are advised to elect Zoölogy 117, first semester of junior year, preparatory to this course.

111. LIVESTOCK MANAGEMENT II. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Animal Husbandry 110. Assistant Professor Paterson.

This course consists of a continuation of the work given in Livestock Management I.

112. PORK PRODUCTION. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 104. Mr. Gatewood.

This course comprises a systematic study of the most successful and economical methods of growing and finishing hogs, both for breeding purposes and for pork production.

114. MUTTON PRODUCTION. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 104. Assistant Professor Paterson.

This course comprises a systematic study of the most successful and economical methods of growing and finishing sheep, both for breeding purposes and for mutton production.

116. ADVANCED STOCK JUDGING I. Elective, first semester. Laboratory, six hours. Two semester credits. Prerequisite: Animal Husbandry 101. Associate Professor McCampbell and Mr. Horlacher.

This course deals with the judging of market classes as well as with all different breeds of purebred stock. The stock is judged in groups of from four to six animals in the same manner that is customary at county or state fairs.

118. ADVANCED STOCK JUDGING II. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Animal Husbandry 116. Associate Professor McCampbell and Mr. Horlacher.

This is a continuation of Animal Husbandry 116. During the work of the semester, occasional trips are made to the best livestock farms of the State, where the students have an opportunity to judge and to observe the management of herds and flocks as handled by the most successful stockmen of the State.

120. MEATS. Elective, first and second semesters. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisites: Animal Husbandry 104 and 106. Assistant Professor Paterson.

This course includes a study of the killing, dressing, cutting and curing of beef, pork and mutton.

122. BEEF PRODUCTION. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 104. Professor Cochel.

This course is devoted to a study of the most successful and economical methods of producing beef cattle for market. Various rations, comparisons of long and short feeds, the advisability of grain and of grass feed, and all questions pertaining to the production of beef are considered.

124. HORSE PRODUCTION. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 104. Associate Professor McCampbell.

This course involves a study of the most successful methods of growing and developing young horses and mules and of the most satisfactory rations for horses, together with an investigation of the best methods of preparing horses for market.

126. FORM AND FUNCTION IN FARM ANIMALS. Elective, first semester. Laboratory, six hours. Two semester credits. Prerequisite: Animal Husbandry 118. Associate Professor McCampbell.

A detailed and specific study of animal form and type, the influence

of type upon function, the relation of form, type and condition as affecting growth and development. Comparative measurements of growing and fattening animals, speed and draft horses, mutton and wool sheep, and lard and bacon type of hogs.

128. TEACHERS' COURSE IN ANIMAL HUSBANDRY. Elective, summer school. Class work, four hours. Two semester credits. Professor Cochel.

This course is planned to give a general review of the livestock industry with the purpose of encouraging a better standing of the teaching of animal husbandry in secondary schools. The course will include some work in judging and some attention will be paid to production.

FOR GRADUATES AND UNDERGRADUATES

201. ADVANCED FEEDING. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 104. Assistant Professor Vestal.

This course consists of a survey of the experimental feeding of horses, cattle, sheep and hogs, together with a study of the fundamental and practical feeding problems of the various sections of the country. Emphasis is placed upon the results obtained in the experimental investigation of these problems.

202. LIVESTOCK MARKETING. Elective, first semester. Class work, two hours. Two semester credits. Prerequisites: Economics 102 and 216. Professor Cochel.

This course includes a study of the art of marketing livestock and livestock products, freight and insurance rates in transit, liability of carrier and shipper, terminal charges, etc. Commissions for sale or storage. The relation of market prices of grain and hay upon contemporary values of livestock and meat.

204. ANIMAL HUSBANDRY SEMINAR. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Animal Husbandry 108.

206. ANIMAL GENETICS. Electives, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisites: Zoölogy 117 and Animal Husbandry 106 or Botany 205. Professor ———.

This course offers opportunity for individual problems in experimental heredity. Facilities are afforded for inheritance studies in laboratory animals. The lectures treat of disputed questions of heredity. In case work with domestic animals is elected, Animal Husbandry 208 must be taken in the following semester.

208. ADVANCED ANIMAL GENETICS. Elective, second semester. Class work, one hour; laboratory work, three hours. Two semester credits. Prerequisite: Animal Husbandry 206. Professor ———.

This course is a continuation of Animal Husbandry 206. Library reference work takes the place of lectures.

Dairy Husbandry

Professor REED
Associate Professor FITCH
Assistant DAVIS
Assistant FAIRCHILD

The College dairy farm, including the building and yards, consists of fifty acres of medium upland. This land is used for growing corn, alfalfa, and other crops, such as cowpeas, field peas, and sorghum, and for the pasture of the dairy herd.

The barn is built on the most approved model for the housing of dairy cattle, and is light, well-ventilated, and sanitary, with stalls for one hundred ten cows. Four silos of modern type, feed rooms, a milk room, a boiler room and a laboratory exist in connection with the barn. Each of these illustrates some especially desirable feature in dairy building and construction.

The dairy herd consists of excellent types of the four dairy breeds: Jersey, Guernsey, Ayrshire, and Holstein. These animals are purebred, and a number have been entered in the advanced registry of their respective breeds. The excellence of the dairy herd is shown by an average production for the past year of over 400 pounds of butter by the Guernseys, 475 pounds by the Ayrshire, over 500 pounds by the Jerseys, and 572 pounds by the Holsteins. Maid Henry, a thirteen-year-old Holstein, produced 19,600 pounds of milk, yielding 835 pounds of butter in one year. Canary Bell, an Ayrshire, produced in one year 17,406.4 pounds of milk, containing 668.16 pounds of fat, which is equivalent to 786 pounds of average butter. This is the second highest record ever made in Kansas. The Owl's Design ranks high among the Jerseys of the world, with a record of 14,606 pounds of milk produced in one year. She has also produced 764 pounds of butter in a year.

The dairy building houses the creamery, the cheese rooms, the classrooms, and the offices, and the necessary laboratories for testing and hand-separator work. Refrigeration is secured from a refrigerating machine and ice plant installed in the building. These facilities of barn, herd, and laboratories are in constant use by the students of dairying. The instruction in dairy husbandry includes the study of the selection and breeding of dairy animals, the production of milk, its manufacture into butter, cheese, and other dairy products, or its sale on the market.

COURSES IN DAIRY HUSBANDRY

FOR UNDERGRADUATES

101. ELEMENTS OF DAIRYING. Sophomore year, first and second semesters. Class work, two hours; laboratory, three hours. Three semester credits. Associate Professor Fitch, Mr. Davis and Mr. Fairchild.

This is a general course in dairying, dealing with the secretion, composition and properties of milk, with the factors influencing the quantity and quality of milk, and with care of milk and cream on the farm. It includes a study of the different methods of creaming, the construction and operation of farm separators, the principles and application of the Babcock test, the use of the lactometer, and butter making on the farm. Lectures, supplemented by text, Wing's *Milk and Its Products.*

Laboratory.—Practice is given in operating the Babcock test and lactometer, separation of milk, and farm butter making.

102. TYPES AND CLASSES OF LIVESTOCK (VET). Freshman year, first semester. Associate Professor Fitch.

One-fourth of this course, which is described more fully under the Department of Animal Husbandry, is given by members of the Department of Dairy Husbandry, and comprises the judging and scoring of dairy cattle.

104. DAIRY JUDGING. Freshman year, first and second semesters. Laboratory, three hours. One semester credit. Associate Professor Fitch and Mr. Fairchild.

This course calls for the judging of dairy stock from the standpoint of economical production and breed type. Score cards are used for the purpose of training the student to become accurate, thorough and systematic in the selection of animals as representatives of breeds or for breeding purposes. No textbook is required. *Types and Breeds of Farm Animals*, by C. S. Plumb, and Breeder's Association literature are used as references.

106. DAIRY INSPECTION I. Elective, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisites: Bacteriology 106, Chemistry 254 and Dairy Husbandry 101. Mr. Davis.

Advanced work is given in the testing of dairy products, including testing for adulterations. Practice is given in the use of score cards for inspecting and grading milk depots, dairy farms, and creameries. The course is designed to give training in the duties of a city, state, or government inspector or commissioner. State and city ordinances governing the handling and public sale of dairy products are outlined. Text: Farrington and Woll's *Testing Milk and Its Products.*

108. MILK PRODUCTION. Elective, second semester. Class work, three hours. Three semester credits. Prerequisites: Dairy Husbandry 101 and Animal Husbandry 104. Professor Reed.

This course deals with the economical production of milk and with the most approved method of handling the dairy herd, also the construction of dairy barns and buildings, and other subjects which relate to the dairy farmer.

110. BUTTER MAKING AND CREAMERY MANAGEMENT. Elective, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Dairy Husbandry 101 and Bacteriology 211. Mr. Davis.

This course comprises a study of the principles of creamery butter making, the construction and care of creameries and their appliances, methods of sampling and grading cream, pasteurization, starter making, cream ripening, and creamery accounting. Text: McKay and Larson's *Principles and Practice of Butter Making.*

Laboratory.—Practice is given in the sampling and grading of milk and cream; in separating and ripening cream; in the preparation and use of the starter in pasteurized and in raw cream; in churning; in working, washing, salting, and packing butter; and in keeping complete records of each operation. The work also includes the making of salt, fat, and moisture determinations of the finished product, and judging and scoring butter.

112. HOME DAIRYING. Elective, last half of second semester. Class work, two hours; laboratory, three hours. One and one-half semester credits. Professor Reed and Mr. Davis.

This course includes a study of the composition of milk, Babcock testing, separation of milk, cream ripening, and farm butter making; also a

brief study of the breeds of dairy cattle. It is given with the elective course, Poultry Husbandry 102, which is offered the first half of the second semester.

114. CHEESE AND ICE-CREAM MAKING. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Chemistry 254, Bacteriology 211, and Dairy Husbandry 101. Mr. Davis.

This course includes the making of cheese on the farm for home use and for sale, and the commercial manufacture of Chedder cheese, comprising each detail from the receipt of the milk to the marketing of the finished product. The cheese work is given the first half of the semester; the manufacture and handling of ice cream and ices for the retail and wholesale trade in the second half. Text: Van Slyke-Publow's *The Science and Practice of Cheese Making.*

Laboratory.—Practice is given in making cheese under farm conditions and on a commercial scale. Records are kept of the different operations and their influence upon the finished product is noted. Exercises are given in testing, judging and scoring cheese. The latter half of the semester is devoted to the making of ice cream and ices.

116. MARKET MILK. Elective, first semester. Lecture, one hour; laboratory, three hours. Two semester credits. Prerequisites: Dairy Husbandry 101 and Bacteriology 211. Mr. Davis.

This course includes a study of the classes of market milk (certified, inspected and pasteurized, also other classifications), equipment and methods for clean milk production, and the relation of clean milk to producer, dealer, and consumer. Also systems of milk inspection, score cards and milk and cream contests. Lectures are also given on milk plants, including their methods and equipment, such as receiving, storing, separating, removing sediment, pasteurization, bottling and capping, cleaning and sterilizing bottles and cans, the use of homogenizer and emulser and practical laboratory methods of examining milk.

Laboratory.—The work includes actual practice in all the steps in the production of market milk and cream in the College milk plant.

118. DAIRY INSPECTION II. Senior year, second semester. Laboratory, three hours. One semester credit. Mr. Davis.

This course comprises the testing of dairy products, the inspection and scoring of dairies and milk depots, and the testing for adulterants in dairy products. Text: Farrington and Woll's *Testing Milk and Its Products.*

FOR GRADUATES AND UNDERGRADUATES

201. ADVANCED DAIRY JUDGING. Electives, second semester. Laboratory, three hours. One semester credit. Associate Professor Fitch.

This course is a continuation of Dairy Husbandry 104. Visits are made to the best farms in the State and students are given an opportunity to judge and to handle stock kept by the most successful breeders.

202. DAIRY SEMINAR. Elective, second semester. Class work, one hour. One semester credit. Prerequisites: Dairy Husbandry 101, 106 and 108. Professor Reed.

This course includes a study and review of dairy periodicals and experiment station bulletins, books and other dairy literature.

FOR GRADUATES

301. DAIRY RESEARCH. Elective, both semesters. By appointment. Three semester credits. Prerequisites: Dairy Husbandry 108 and 110.

This course gives credit on special problems assigned to students. Professor Reed.

Horticulture

Professor DICKENS	Assistant DOERNER
Professor AHEARN	Assistant PRATT
Assistant Professor ————	Fellow ————

A wealth of illustrative material for classes in all horticultural subjects is found in the large collection of species growing upon the College campus, in the orchard plantations, and in the greenhouses.

The horticultural grounds consist of eighty acres of land devoted exclusively to horticultural and forestry work and gardens, and to nurseries. Orchards and vineyards are maintained for experimental and demonstrative work. A full equipment of tools, spraying machinery, and special apparatus used in horticulture, floriculture, and gardening is available for the use of the students. The College grounds furnish one of the finest laboratories in the State for the study of landscape gardening.

The instruction in the Department of Horticulture covers fruit judging, plant propagation, pomology, gardening, small fruits, spraying, orcharding, and landscape gardening. The following descriptions give datailed accounts of the instruction in these various fields.

COURSES IN HORTICULTURE

FOR UNDERGRADUATES

101. PLANT PROPAGATION. Freshman year, second semester and summer school. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Botany 101. Professor Dickens and Assistant Doerner.

A discussion of natural and cultural methods of propagation; seeds, seed testing, and seed growing; the treatment required for different kinds of seeds, the production of seedlings for stock; grafting, budding, layering; the making of cuttings, and the special requirements for propagating commercial fruits and ornamental plants. The work is given by means of lectures and assigned readings.

Laboratory.—Practical work is given in the preparation of seeds and in seed testing; in the preparation of seed beds, and in the use of seeding machinery; in transplanting, grafting, budding, and in general nursery practice.

104. SYSTEMATIC POMOLOGY. Elective, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Professor Ahearn.

This comprises exercises in identification and description of the different types of fruits, such as grapes, peaches, apples, pears and citrus fruits. An intercollegiate exchange of fruit makes possible a valuable study of the effect of climatic conditions upon variety and characteristics. Work is also done in the selection, preparation and judging of fruits for exhibits. Text: Waugh's *Systematic Pomology.*

107. ORCHARDING. Sophomore year, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Horticulture 101. Professor Dickens.

This includes studies of the necessary conditions for success with orchards, including location, improvement of soil, application of fertilizers and cultural methods and pruning.

Laboratory.—A study in laying out plantations and orchards. Various systems of setting, topography of various localities, adaptability of level and hilly sections, methods of setting, pruning for setting, work in orchards with trees of various species and varying ages and a study and observation of cover crops, methods of cropping and general orchard practices up to bearing age.

110. SMALL FRUITS. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Horticulture 101. Professor Ahearn.

The small fruits of commercial importance are considered with reference to their requirements as to soil, fertilizers, cultivation and protection. The management of small areas designed to furnish a supply of fruits for home use, and the handling of commercial plantations, are considered.

113. FARM FORESTRY. Elective, first semester. Class work, three hours; laboratory, three hours. Four semester credits. Professor Dickens.

This course consists of a study of the needs of Kansas farms for windbreaks and wood lots for post and fuel production, forest conservation, maintenance and handling timber and soil best suited for this purpose. The growing of trees in locations better suited for timber than for other crops. The composition of windbreaks and their value as a protection to home orchards and fields.

Laboratory.—Includes identification of species, methods of forming windbreaks and nursery work in transplanting trees of various sizes and an opportunity to determine the rate of growth of trees under various conditions.

116. DENDROLOGY. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Professor Ahearn.

Classification and identification of forest trees, including a study of forest ecology and taxonomy, the classification of commercial species, relative importance of timber species and the life history and requirements of trees.

Laboratory.—Work in the College arboretum and excursions to nearby wood lots. The student is given an opportunity to become acquainted with trees that succeed well in this State.

119. SILVICULTURE. Elective, second semester. Class work, two hours; field work, three hours. Three semester credits. Prerequisite: Horticulture 113 or 116. Professor Dickens.

A study of the business of tree growing for timber and economic purposes. Requirements of species, their range and requirements as to soils, climate and the various factors that determine their reproduction and rate of growth. Protection of forests from fire and insects and the application of various systems of silviculture.

FOR GRADUATES AND UNDERGRADUATES

201. PRACTICAL POMOLOGY. Electives, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Horticulture 104. Professor Ahearn.

The class work is given by means of lectures, and includes practical information on harvesting, grading, packing, storage, marketing, and the use of fruit by-products.

Laboratory.—Consists of field work in harvesting fruit and practice in grading and packing fruit. Several types of mechanical graders are used for demonstrations and the various types of commercial box and barrel are offered. One-third of the laboratory work will be given to pruning practice.

204. ORCHARD MANAGEMENT. Elective, second semester. Class work, three hours; laboratory, three hours. Four semester credits. Professor Dickens.

The class work includes studies of the following factors that are of vital importance to fruit growers: Location, soil improvement, cultural methods, pruning, capital and equipment for handling orchards, and crop disposition.

Laboratory.—This course offers practice in establishing young orchards, spraying (orchard work), pollination studies, thinning of fruit, summer pruning and problems in orchard management.

207. SPRAYING. Elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Chemistry 102. Professor Ahearn.

The class work consists of lectures on spraying machinery, accessories, and the principal materials used as insecticides and fungicides.

Laboratory.—Laboratory exercises offer practice in preparing and testing spraying mixtures and in the use of the various types of spraying machinery. Nozzles and spraying accessories are carefully tested.

210. MARKET GARDENING. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Professor Ahearn.

This course is made as practical as possible. In the classroom the lecture work is reinforced with problems concerning the business end of market gardening. The students are required to prepare seed orders and estimate the cost per acre of growing various garden crops. Particular stress is laid upon the harvesting, storing and marketing of vegetables.

Laboratory.—This work is given in the College gardens. Each student is assigned a plot of ground to plant and care for during the semester. Careful records are kept of cultural operations and the yields. Disease and insect control is studied in a practical way.

213. GARDENING. Junior year, second semester. Class work, three hours. Three semester credits. Professor Ahearn.

It is the purpose of this course in gardening to give young women a working knowledge of and a close acquaintance with the garden as it concerns the home. The first part of the course is concerned with the principles of plant growth, relation of soils to plants and the methods necessary for successful work in kitchen gardening, flower beds, window gardening, the requirements of plants in regard to watering, temperatures, hotbeds and the first principles of floriculture.

In the latter part of the course the young women are introduced to the principles of landscape gardening, with particular reference to the problems of home plantings. In conjunction with the lectures, each member of the class is required to prepare plans for town home, farm home and country place, and the classes are required to do group work that will give them an insight into the needs of school grounds. Play grounds, public parks and cemeteries are considered and are given a considerable amount of time.

Particular emphasis is placed upon acquaintance with materials that are used for garden purposes. The College campus, gardens and greenhouses furnish a wealth of material that is best adapted to garden problems and landscape composition.

216. LANDSCAPE GARDENING I. Elective, second semester and summer school. Class work, two hours; laboratory, six hours. Four semester credits. Professor Ahearn.

Designed for the individual needs of students and for those who expect to take advanced work in landscape art. The principles of land-

scape gardening are studied and civic improvement problems discussed with special attention given to rural and city problems.

Laboratory.—The laboratory consists of field trips and work in fields, in excavation and leveling. Students are instructed in the delineation of landscape plans with special reference to home and city planning.

219. GREENHOUSE CONSTRUCTION AND MANAGEMENT. Elective, first semester. Class work, three hours. Three semester credits. Professor Ahearn.

This course consists of work covering the more important points of greenhouse construction and the proper methods of conducting the greenhouse business. Not only is this subject treated from the commercial standpoint, but the management of private conservatories is also carefully studied.

220. SCHOOL GARDENING. Elective, second semester and summer school. Class work, two hours; laboratory, three hours. Three semester credits. Assistant Doerner.

The object of this course is to give teachers a knowledge of the principles which underlie success in gardening and the adaptation of small areas to the production of vegetables and flowers. The subjects of soil preparation, seed selection, fertilizers, hotbeds, plant manipulation, and the planning of the garden are given special consideration. Opportunity is given for teachers to become familiar with general garden methods and the use and manipulation of garden tools, including seeders, weeders and wheel hoes. Allotments of ground areas required for different crops, the length of time required to mature various vegetable and flower crops, the adaptation of these to country and city schools, and suggestions for marketing, are among the subjects considered.

222. HISTORY AND LITERATURE OF LANDSCAPE GARDENING. Elective, first semester. Class work, two hours. Two semester credits. Assistant Doerner.

A study of the chronological order of the history and literature of landscape gardening with special reference to the early influences as they govern modern design.

225. PLANT MATERIALS OF LANDSCAPE GARDENING. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Horticulture 101. Professor Ahearn.

A thorough study is made of the hardiness, form, color, habits, and adaptations of trees, both deciduous and evergreen, shrubs, hardy perennials, biennials and annuals with a view to giving the student a working knowledge of the materials essential to formulate a working landscape plan.

227. LANDSCAPE GARDENING II. Elective, second semester. Laboratory, nine hours. Three semester credits. Professor Ahearn.

A study of the more advanced problems of designing and reconstruction from topographic and transit surveys as offered by large areas of parks, playgrounds and country estates.

230. THE THEORY AND ESTHETICS OF LANDSCAPE GARDENING. Elective, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Horticulture 222. Assistant Doerner.

A careful study is made of the underlying principles of landscape art and design. This course is primarily intended for students who wish to specialize in landscape work, but will be of interest to all those who intend to teach.

233. TREE SURGERY. Elective, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Botany 208. Assistant Doerner.

A study and practice of the most approved methods of caring for ornamental trees and the technical details of planting, pruning and spraying, bolting, chaining and cavity work. Shade tree legislation and the duties of shade-tree commissions and tree wardens.

237. CITY AND TOWN PLANTING. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Assistant Doerner.

This course has to do with the laying out of forests and planting of same. A study is also made of civic centers, of cities and towns located in different parts of the world.

Milling Industry

Professor FITZ
Assistant Professor DUNTON
Miller OAKES

The Department of Milling Industry was primarily established by the Board of Regents to undertake investigations in the handling, marketing and milling of wheat. Every student of agriculture should have some knowledge of this subject, and also of the handling of grain products other than those obtained from wheat. A full and complete knowledge of the needs of grain growing as an industry must necessarily include the utilization of grain in the manufacture of food, together with the natural by-products resulting therefrom.

The department has a well-equipped plant, consisting of six double-stand 7″ x 14″ rolls, with necessary cleaning machinery and dust collectors, sifters, and purifiers. The results secured here are comparable with those from a regular commercial mill. A baking laboratory equipped with proofing closet, dough mixer, and electric ovens is open for student use, as is also a laboratory for chemical tests on wheat and flour.

COURSES IN MILLING INDUSTRY

FOR UNDERGRADUATES

101. PRINCIPLES OF MILLING. Sophomore year, second semester. Laboratory, three hours. One semester credit. Miller Oakes.

This course includes a study of the theory and practice of milling with demonstrations on a small experimental mill.

102. GRAIN MARKETING. Junior year and elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Agronomy 101. Professor Fitz.

This course includes a study of methods of handling, storing, marketing and grading of grain; the history of the origin and development of grain inspection and grades; a study of commercial grain grades and government standards; the classification and organization of inspection system; the organization and functions of grain exchanges or boards of trade; and principal grain markets, with receipts, shipments, and consumption.

103. GRAIN PRODUCTS. Junior year and elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Milling Industry 102. Professor Fitz.

A brief study of the methods of manufacturing food products from cereals, with the resulting by-products, and a comparison of composition and feeding value of these by-products.

FOR GRADUATES AND UNDERGRADUATES

201. MILLING PRACTICE I. Junior year and elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Milling Industry 101. Miller Oakes.

This course consists of practice in the art of milling, with demonstrations on a model mill.

202. MILLING PRACTICE II. Senior year, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Milling Industry 201. Miller Oakes.

This course is a continuation of Milling Industry 201.

203. WHEAT AND FLOUR TESTING. Senior year, first semester. Class work, one hour; laboratory, nine hours. Four semester credits. Prerequisites: Milling Industry 103, Chemistry 120, 150 and 260. Assistant Professor Dunton.

This course includes special quantitative tests applied to cereals and their by-products; methods for analysis and interpretation of results.

204. EXPERIMENTAL BAKING A. Senior year, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Milling Industry 203. Assistant Professor Dunton.

This course includes practice in baking tests; comparison of methods, formulas, and flour; and interpretation of results.

205. EXPERIMENTAL BAKING H. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Domestic Science 102. Assistant Professor Dunton.

This course includes demonstration in milling and practice in bread making; comparison of methods, yeasts and flours, and a study of the more important conditions which influence the quality of bread.

Poultry Husbandry

Professor LIPPINCOTT
Assistant FOX
Superintendent AMOS

The poultry plant, occupying eight acres and situated just north of the northeast corner of the College campus, is devoted to the breeding and rearing of the stock used for class work. It is equipped with various types of houses, runs, incubators and brooders, and with flocks of the leading breeds of fowls.

There is in the government and state experiment stations and in schools and colleges an increasing demand for men with experience and systematic training in handling poultry. There is likewise a growing demand for men to enter poultry-packing houses or capable of managing poultry-farming enterprises of considerable proportions.

COURSES IN POULTRY HUSBANDRY

FOR UNDERGRADUATES

101. FARM POULTRY PRODUCTION. Sophomore year, both semesters and summer school. Class work, one hour; laboratory, three hours. Two semester credits. Professor Lippincott and Mr. Fox.

This course takes up the problems of poultry management on the general farm. The subjects of feeding, housing, breeding, incubation, brooding and preparing poultry for market are studied.

102. HOME POULTRYING. Elective, second semester. Class work, three hours for the first half of the semester. One and one-half semester credits. Professor Lippincott and Mr. Fox.

This course takes up the problems of poultry management for egg and meat production. The subjects of feeding, breeding, housing, incubation, brooding, and preparing poultry for market are studied. It is given with the elective course, Dairy Husbandry 112, the second half of the semester.

104. PRACTICE IN POULTRY FEEDING. Elective, first semester. Three times a day, seven days a week, for a period of six weeks, at hours outside of the regular schedule. One semester credit. Prerequisite: Poultry Husbandry 101. Mr. Fox.

This course consists of the actual care of a flock of fowls by the student under the supervision of an instructor. Careful records are kept of the feeds consumed and the eggs produced. A financial statement is required at the end of the feeding period.

105. PRACTICE IN INCUBATION. Elective, second semester and summer school. Three times a day, seven days a week, for a period of not less than four weeks at hours outside of regular schedule. One to two semester credits. Prerequisite: Poultry Husbandry 101. Mr Fox.

This course consists of the care of an incubator by the student through the incubation period, testing the eggs and bringing off the hatch. Careful records of fertility, cost of incubation, and varying temperature, moisture, and ventilation conditions are kept. For one credit one successful hatch must be brought off in either a hot-air or hot-water incubator. For further credit other types must be operated. Students specializing in poultry husbandry must take two credits.

107. PRACTICE IN BROODING. Elective, second semester and summer school. Three times a day, seven days a week, for a period of not less than four weeks, at hours outside the regular schedule. One to three semester credits. Prerequisite: Poultry Husbandry 101. Mr. Fox.

In this course each student handles a flock of chicks. He has the entire care of brooding and feeding them during the most critical weeks. A report of cost of fuel and feed, of grains in weight and of mortality is required. This course must be preceded or accompanied by practice in incubation. For one credit, a group of at least fifty chicks must be successfully brooded for four weeks, in any one of the several types of brooders. For further credits, broods must be handled successfully in two other types of brooders for at least six weeks. Students specializing in poultry husbandry must take three credits.

108. PRACTICE IN MILK FEEDING. Elective, first semester. Twice a day, seven days a week, for a period of six weeks, at hours outside the regular schedule. One semester credit. Prerequisite: Poultry Husbandry 101. Mr. Fox.

This course consists of milk feeding poultry confined in crates. The time is divided into periods of two weeks, so that the student will have an opportunity to fatten three lots of chickens. A financial statement is required.

110. POULTRY BREEDS AND TYPES. Elective, first semester and summer school. Class work, one hour; laboratory, three hours. Two semester credits. Mr. Fox.

In this course a historical study is made of the various breeds commonly found on the Kansas farm. Particular attention is paid to tracing the evolution of the present breed types. The laboratory is given over largely to judging the different breeds and varieties, both by score card and by comparison.

111. ADVANCED POULTRY JUDGING. Elective, second semester. Laboratory, three hours. One semester credit. Prerequisite: Poultry Husbandry 110. Offered every other year; will be given in 1918-1919. Mr. Fox.

This course is a continuation of Poultry Husbandry 110, giving further practice in judging the more common varieties, and taking up some of the rarer breeds.

FOR GRADUATES AND UNDERGRADUATES

201. MARKET POULTRY. Elective, first semester and summer school. Class work, one hour; laboratory, three to six hours. Two to three semester credits. Prerequisite: Poultry Husbandry 101. Mr. Fox.

In this course the lectures will cover the methods of handling market poultry, alive and dressed. For three hours of laboratory work, practice will be given in candling and grading eggs, caponizing, killing, cooling, grading and packing poultry for market. When six hours of laboratory work is taken, the student will also feed three lots of chickens for a period of two weeks each.

202. POULTRY BREEDING. Elective, second semester. Conferences and laboratory, six hours. Two semester credits. Prerequisite: Animal Husbandry 106. Professor Lippincott.

The experimental work on inheritance in poultry is reviewed by means of assigned readings and laboratory experiments.

POULTRY FARM MANAGEMENT. See Agronomy 262.

POULTRY BACTERIOLOGY. See Bacteriology 216.

204. COMPARATIVE ANATOMY OF DOMESTIC BIRDS. Elective, second semester. Offered alternate years; given 1918-1919. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Zoölogy 117. Professor Lippincott.

This course is designed particularly for those intending to teach or carry on research in poultry husbandry, or who are particularly interested in bird study. The various structures of domestic birds are discussed in the lectures, in their relation to the same structure in wild forms, and in a limited measure other vertebrates, as well as from a development standpoint.

The laboratory work is given over to the dissection and the first-hand comparison of the structures of the several species of domestic birds common in the central West.

205. POULTRY RESEARCH. Elective, first semester. Two to four semester credits. Prerequisites: Poultry Husbandry 101, 104, 105 and 107. Professor Lippincott.

In this course the student pursues a definite line of investigation concerning some phases of poultry work. Arrangements must be made to continue this work throughout the second semester when the problem attacked cannot be solved within the limits of the first semester.

Veterinary Medicine

Professor ———
Professor Goss
Professor Dykstra
Associate Professor Burt
Instructor Hobbs
Instructor Patterson
Assistant Scott
Assistant Elder

The Department of Veterinary Medicine gives most of the technical work in the curriculum in veterinary medicine, a general description of which is given elsewhere. The department is housed in the Veterinary Building, which was erected at a cost of over $60,000, and is thoroughly equipped throughout. It contains modern classrooms, and its laboratories possess the necessary appliances for illustrating the several subjects required. The mode of instruction is more specifically detailed in succeeding sections.

The courses in anatomy require several lecture rooms, which contain models, skeletons, and bones of all kinds, and a thoroughly sanitary dissecting room equipped with all of the latest materials necessary to give a course in anatomy second to none on the continent.

For work in histology and pathology the department is exceedingly well provided. It has over thirty large microscopes, equipped with both high and low power, and several oil immersion objectives, microtomes, the best reflectoscope and projectoscope obtainable, besides a large assortment of histological and pathological slides, materials, and specimens for use in demonstration work in class and laboratory.

The equipment for instruction in physiology is ample to give the student a thoroughly comprehensive course of laboratory study.

For the study of materia medica and pharmacy there is a general pharmacy laboratory containing all the drugs used in the practice of veterinary medicine, and a practicing pharmacy where medicines are compounded for the every-day practice connected with the College.

For instruction in surgery and clinic the equipment is excellent. The surgical amphitheater is an annex to the main Veterinary Building, seating over three hundred people, and equipped with every modern appliance for performing before the classes the most delicate operations upon both large and small animals. The hospital has a capacity of about thirty animals and is nearly always filled with patients, which give ample material for study of internal medicine as well. The out-clinic furnishes many cases yearly, giving the student opportunity to become familiar with the diseases and their treatment under the guidance of proficient practitioners.

The policy adhered to in the instruction in all the departments is that the science of veterinary medicine is the foundation, and the art merely supplementary. A thorough drill is given in the foundation studies, and later in the curriculum practical application of these is made in actual field work. This result is a thoroughly scientific veterinary education.

In the arrangement of the schedule of the veterinary curriculum it is implied that the courses should be followed in regular sequence, as each year's work depends upon the work done the previous year. Certain courses, however, may be selected as electives if a student has the necessary prerequisites. These courses are listed in the list of electives.

COURSES IN ANATOMY

FOR GRADUATES AND UNDERGRADUATES

This branch of veterinary medicine extends over the freshman and sophomore years for veterinary students, and one semester is required in the curriculum in agriculture.

The classroom instruction consists of lectures, quizzes and recitations and special dissection of the part under discussion, also a study of dissected specimens, various models, and the Azoux model of the horse. Mounted skeletons and limbs, and loose bones are abundant in the museum. The horse is taken as a type and the other domestic animals are compared with the horse. As often as necessary parts of other animals are dissected to show the differences.

The subjects for dissection are preserved by the injection of a formalin solution followed by a starch solution colored red, which fills and hardens within the arteries. Each half of the subject is divided into three parts, namely the head and neck; fore limb and thorax; hind limb and posterior half of body. The students work in pairs, each pair dissecting one part before passing on to another part. The work is arranged so that bones are first studied, then the muscles and joints. This is followed by the dissection of the circulatory and nervous systems. The viscera of certain regions are studied by the students at work on those respective parts, *i. e.*, the abdominal organs are studied by the students at work on the hind limb, etc.

In addition to numerous atlases and charts furnished by the College, the student is required to have Sisson's *Veterinary Anatomy* as a textbook and Sisson's *Dissecting Guide* as a laboratory guide.

201. ANATOMY I. Freshman year, first semester. Class work, three hours; laboratory and dissection, nine hours. Six semester credits. Doctors Burt and Scott.

This course consists of the osteology, or the study of the bones and the dissection of one-third of the horse. The bones of the horse are studied in detail and a comparison of the bones of other domestic animals, including man and chicken, is made. Drawings of the bones are made by the students in order that he obtain a better mental picture of their shape and characteristic parts. The bones of the head are studied separately and collectively. Careful attention is given to the sinuses of the head and points of ossification. For convenience the horse is divided into three regions or parts for dissection, therefore, the one-third dissected during this semester may be any third of the subject, depending upon the part upon which the student is working.

202. ANATOMY II. Freshman year, second semester. Class work, three hours; dissection, twelve hours. Seven semester credits. Prerequisite: Veterinary Medicine 201. Doctors Burt and Scott.

This course is a continuation of the work begun in Veterinary Medicine 201. The course deals with myology and arthrology. The student is required to make a careful dissection of the muscles of the body, learning their location, attachments and relations one to another, as well as their relations to other important structures. After the muscles are dissected and learned the student dissects the ligaments of the various joints. The student also studies the viscera of the respective part at the time of dissection of that part. Check cards and drawings indicating the different stages of dissection are kept, and the work is checked at frequent intervals.

203. ANATOMY III. Sophomore year, first semester. Class work, one hour; dissection, twelve hours. Five semester credits. Prerequisite: Veterinary Medicine 202. Doctor Burt.

This course and Veterinary Medicine 204 consist of the study of angiology and neurology, and all parts not previously dissected. Having had osteology and myology, the student is now prepared to get an accurrate mental picture of the distribution, location and relation of the blood vessels and nerves. As in Veterinary Medicine 202, the subject is divided into three parts. During this semester two parts will be dissected, leaving one part for Veterinary Medicine 204. Drawings are required as in Veterinary Medicine 202.

204. ANATOMY IV. Sophomore year, second semester. Class work, one hour; dissecting, six hours. Three semester credits. Prerequisite: Veterinary Medicine 203.

This course is a continuation of Veterinary Medicine 203. The student will now complete the dissection of every part of the subject, including special parts, as the foot, brain, eye, etc. In addition to the completion of the dissection of the horse, a comparative study of the principal structural differences of the various domestic animals, not studied concurrently with the previous courses, will now be made.

205. ANATOMY AND PHYSIOLOGY. Sophomore year, first semester. Class work, three hours; laboratory and dissection, six hours. Five semester credits. Doctors Burt and Scott.

This combined course is planned to give the agricultural student a general idea of the anatomy or structure of the domestic animal and the functions of the various organs. As far as possible the two parts will be taught concurrently. The object sought is to aid the student in understanding conformation by means of the study and dissection of the structures beneath the skin, at the same time observing the muscles of locomotion and the various levers, both as regards speed and power of draughting. Considerable attention is given to the digestive and genital systems. The functions of the various parts are studied, so that the student can realize and understand the benefits derived from the judicious application of proper breeding, feeding and care of farm stock. Attention will be directed to parts subjected to diseases and perverted physiological functions. Text: In addition to notes, Strangeway's *Anatomy* and F. Smith's *Manual of Veterinary Physiology* will be used.

COURSES IN CLINICS

FOR UNDERGRADUATES

171. CLINICS I. Junior year, first semester. Laboratory, nine hours. Three semester credits. Doctors Dykstra and Gingery.

A free clinic which affords an abundance of material is conducted. All species of domesticated animals are presented for treatment. These patients are assigned in regular order to the senior students for diagnosis and treatment; clinic sheets are provided, on which are recorded the history, symptoms, pulse, temperature, respiration, diagnosis, prognosis, treatment, and the unsoundness, defects or blemishes of the animal. The clinician in charge discusses all the abnormal conditions present in the patient, thus assisting the student to develop his powers of observation. The junior students assist the senior students and, in addition, are required to master, by practical experience, the restraint of animals, bandaging, etc. The compounding of prescriptions, the preparation of antiseptics and other medicinal agents, is taken in charge by the junior students.

172. CLINICS II. Junior year, second semester. Laboratory, nine hours. Three semester credits. Doctors Dykstra and Gingery.

This work is a continuation of Clinics I.

173. CLINICS III. Senior year, first semester. Laboratory, twelve hours. Four semester credits. Doctors Dykstra and Gingery.

Patients left at the hospital for treatment are assigned to seniors, who are required to administer all medicines, change dressings of surgical wounds, etc. All work is performed under the direct supervision of the clinician in charge. Numerous country calls are received by the veterinary department, which are taken care of by one of the clinicians, and who is always accompanied by one or more senior students. This phase of the work is particularly valuable, as it gives the student practical experience under actual conditions.

174. CLINICS IV. Senior year, second semester. Laboratory, twelve hours. Four semester credits. Doctors Dykstra and Gingery.

This work is a continuation of Clinics III.

COURSES IN HISTOLOGY

FOR GRADUATES AND UNDERGRADUATES

Lectures and recitations cover the work, which is done in the laboratory. During the lectures the projectoscope is used to illustrate the tissues studied. It is essential that the student obtain a thorough knowledge of the manipulation of the microscope, of the microscopical structure of the normal animal tissues, and of the methods of fixing, embedding, sectioning, staining and mounting tissues. This work gives the foundation for the study of pathological histology. Each student must prepare a full set of slides, from which he makes high- and low-power drawings.

221. HISTOLOGY I. Freshman year, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Doctors Goss and Elder.

The first part of the semester is spent upon the care and manipulation of the microscope, in the use of which the student must become proficient. This is followed by a microscopical examination of cotton, woolen, silk and linen fibers, bubbles of air, and drops of oil, to enable the student to recognize these when they are accidentally mounted with tissue. The fundamental tissues are next studied: epithelial tissues with regard to form, structure, arrangement and location; connective tissues with regard to structure and location, including bone development and teeth and their development; muscular tissue, voluntary, involuntary, and cardiac; nerve tissue, the structures and forms of its cells, of medullated and nonmedullated nerve fibers; spinal cord; the blood vessels, heart, and lymphatic vessels. Blood corpuscles are studied with regard to size, shape, and structure, including each kind of white corpuscles. Also, the blood forming organs as bone-marrow, lymph glands, and spleen are studied. The histology of the digestive tract is studied, including study of the mouth, the tongue, the taste buds, the parotid, the submaxillary and sublingual, the thyroid and thymus glands, and the æsophagus. In this semester the student studies and mounts sixty-five slides, some of which are teased, and many of which are sectioned in paraffin and celloidin. Textbook: *Histology*, by Stohr, or *Histology*, by Bailey.

222. HISTOLOGY II. Freshman year, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Doctors Goss and Elder.

In this semester the student takes up the study of the stomachs of the dog, the horse, and the ox; the small intestines—duodenum, jujunum, and ileum; the large intestines—cæcum, colon, rectum and anus; liver, the pancreas, the respiratory tract—nasal mucous membrane, larynx, trachea,

bronchi and lungs; the urinary organs—kidney, ureter, bladder, urethra; the male and female genital organs; the skin and its appendages; the suprarenal gland; the medulla; the cerebellum; the cerebrum; the eye; and the ear. During this semester the student stains, mounts, studies with microscope and makes drawings of the above-mentioned tissues. Some of the tissues studied are injected with gelatine mass to bring out the blood vessels. Textbook: *Histology,* by Stohr, or *Histology,* by Bailey.

COURSES IN MATERIA MEDICA

FOR UNDERGRADUATES

131. MATERIA MEDICA I. Sophomore year, second semester. Class work, two hours. Two semester credits. Doctor Gingery.

The course includes definitions of terms, modes of action of drugs in general, their method and rapidity of absorption and elimination, physiological and chemical incompatibles, etc. The drugs and medicinal agents are grouped according to their action. The lecturer discusses the origin, physical properties, active constituents, and official preparations of the medicinal agents.

132. MATERIA MEDICA II. Junior year, first semester. Class work, two hours. Two semester credits. Doctor Gingery.

This course is a continuation of Veterinary Medicine 131.

133. THERAPEUTICS. Junior year, second semester. Class work, three hours. Three semester credits. Prerequisites: Veterinary Medicine 131 and 132. Doctor Gingery.

The student is thoroughly drilled in the physiological action of the various drugs, or action on the healthy animal, and the therapeutic action, or action on the diseased animal. A course in toxicology is included in this work, taking up the symptoms and treatment of poisons frequently encountered in veterinary practice. The science of posology, or dosage, is considered of the utmost importance, and a liberal amount of time is devoted to it, taking up the proper dose of the crude drug and its preparation for the horse, cow, dog, cat, and swine. Reference works: Winslow's *Veterinary Materia Medica and Therapeutics; United States Dispensatory;* Wood's *Therapeutics, its Principles and Practice.*

134. PHARMACY. Junior year, first semester. Class and laboratory work, three hours. One semester credit. Doctor Gingery.

In the lectures the meaning of the various pharmaceutical terms are discussed. Various systems of weights and measures, and the conversion of one system into another, are taught. Official preparation of each is studied in regular order. Particular stress is placed upon prescription writing, the student being taught to avoid incompatibilities, to give nouns the proper case ending, and to understand the meanings of certain Latin phrases. In the laboratory work the principles of filtration, percolation, hot-water and sand baths, etc., are taught. The student is required to prepare at least one of each of the following preparations: An infusion, a decoction, a tincture, a wine, a syrup, a fluid extract, a liniment, an emulsion, a liquor, an aqua, spirit, avolus, an ointment, an electuary, and a cataplasm. In addition, a thorough course in the compounding of prescriptions is afforded at the clinic, where all medicines are prescribed and compounded by the students, under guidance of the instructor in charge. Reference works: *U. S. Pharmacopœia;* Maltbie's *Practical Pharmacy;* Remington's *Practice of Pharmacy;* Fish's *Exercises in Materia Medica and Pharmacy.*

COURSES IN MEDICINE

FOR UNDERGRADUATES

161. DIAGNOSIS. Junior year, first semester. Class work, two hours. Two semester credits. Doctor ————.

This is a course preparatory to the study of medicine proper. It takes up in detail the different diagnostic methods employed for the detection of diseases, including auscultation, percussion, palpation, and inspection, and also treats of the normal and abnormal abdominal and thoracic sounds, and considers in detail the specific examination of the various organs, including diagnostic inoculations as an aid to the detection of disease.

162. MEDICINE I. Junior year, second semester. Class work, four hours. Four semester credits. Doctor ————.

The noninfectious diseases of the respiratory organs are studied in this course, taking up in regular order the nasal and accessory cavities, the larynx, bronchi, lungs, and pleura.

163. MEDICINE II. Senior year, first semester. Class work, five hours. Five semester credits. Doctor ————.

This course is devoted to noninfectious diseases of the mouth, salivary glands, œsophagus, stomach and intestines, liver, pancreas, and peritoneum. This is followed by diseases of the urinary organs, of the circulatory organs, diseases of metabolism, of the nervous system, of the organs of locomotion, and the skin.

164. MEDICINE III. Senior year, second semester. Class work, five hours. Five semester credits. Doctor ————.

In contradistinction to the preceding courses in medicine, the distinctly infectious and contagious diseases of domesticated animals are discussed. The following order is usually adopted: Acute general infectious diseases, acute exanthematous infectious diseases, acute infectious diseases with localization in certain organs, infectious diseases with special involvement of the nervous system, chronic infectious diseases, infectious diseases produced by protozoa. In addition particular attention is given to propagation and spread of infectious dieases, predisposing and exciting causes of disease, general sanitation, etc.

165. OPHTHALMOLOGY. Senior year, second semester. Class work, one hour. One semester credit. Doctor ————.

This course discusses the method of conducting examinations of the eye by means of the ophthalmoscope, illumination of the eye, and the use of drugs as an aid to this process; and acute and chronic diseases of the eye.

Reference books for the courses in medicine: Hutyra and Marek's *Pathology of the Diseases of Domestic Animals,* Vols. I and II; Friedberger and Frohner's *Veterinary Pathology,* Vols. I and II; Law's *Veterinary Medicine,* Vols. I, II, III, IV, and V; Moussu and Dollar's *Diseases of Cattle;* Glass' *Diseases of the Dog;* Cadiot's *Clinical Veterinary Medicine.*

166. JURISPRUDENCE. Senior year, second semester. Class work, one hour. One semester credit. Doctor ———.

This course deals with the veterinarian's legal responsibilities, with national and state livestock laws, quarantine regulations, etc.

167. FARM ANIMALS IN HEALTH AND IN DISEASE. Elective, second semester and summer school. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Veterinary Medicine 205. Doctor Gingery.

Study of the domestic animals in relation to their surroundings. First-aid treatment of diseases; contagious and noncontagious diseases; the sound horse. Text: Craig's *Common Diseases of Farm Animals.*

COURSE IN OBSTETRICS

FOR UNDERGRADUATES

157. OBSTETRICS. Senior year and elective, second semester. Class work, three hours. Three semester credits. Prerequisites: Veterinary Medicine 204 and Zoölogy 114, or Veterinary Medicine 205 and Zoölogy 117. Doctor Dykstra.

This course discusses in detail the physiology of pregnancy, anatomy of the generative organs, care and hygiene of pregnant animals, sterility, diseases incidental to pregnancy, diseases of new-born animals, care of new-born animals, abnormal presentations during parturition, surgery of obstetrics, etc. This work is supplemented by demonstrations on an obstetrical phantom and fœtus; in addition, the College farm and surrounding agricultural territory furnish an abundance of actual material. References: Williams' *Veterinary Obstetrics,* Williams' *Surgical and Obstetrical Operations,* De Bruin's *Bovine Obstetrics,* and Fleming's *Veterinary Obstetrics.*

COURSES IN PATHOLOGY

FOR GRADUATES AND UNDERGRADUATES

The laboratory is equipped with microscopes, microtomes, paraffin ovens, microphotographic and projection apparatus. Each student is furnished with a microscope, and locker containing staining dishes and stains. Material is furnished the student for embedding, sectioning and staining tissues for microscopic study. In addition, the student is furnished for study many mounted slides, which contain the pathological lesions to which the domestic animals are subject. In addition to this, the material from the post-mortem of animals and that sent to the College from over the State furnish ample material for laboratory diagnosis.

241. PATHOLOGY I. Junior year, first semester. Class work, four hours; laboratory, three hours. Five semester credits. Prerequisites: Veterinary Medicine 222 and 212 and Bacteriology 111. Doctors Goss and Elder.

The course in general pathology treats of the history of pathology, predisposition, immunity, congenital and inherited disease; circulatory disturbances—cardiac difficulties, hyperaemia, hemorrhage, dropsy, oedema, thrombosis, embolism, and alteration of the blood; disturbances in metabolism—fever, necrosis, atrophy, cloudy swelling, fatty changes, inflammation, calcification and concrement formation; and process of repair, tumors, and functional disturbances. Text: *Comparative General Pathology,* by Kitt.

242. PATHOLOGY II. Junior year, second semester. Class work, four hours; laboratory, six hours. Six semester credits. Doctors Goss and Elder.

This course is devoted to special pathology and pathological technique; collecting, fixing, hardening, embedding in celloidin and paraffin, sections of fresh, frozen, and embedded tissues; and a study of the method of preserving gross specimens. Considerable time is devoted to stains and the method of staining. This work is followed by special pathology, which includes the macroscopic and microscopic examination of the following tissues in all of the pathological conditions to which they are subject:

cardiac muscle, skeletal muscle, the liver, the kidney, the bladder, the pancreas, the lungs, digestive tract, the serous membranes, the vascular system, lymph nodes, the spleen, bone, skin, and genital organs. The students stain, mount, study, and make drawings of the above-mentioned tissues. Textbooks: *Pathology*, by Delafield and Prudden; *Pathologische Anatomie*, by Kitt; and *Pathology*, Vol. II, by Adami and Nichols.

243. PATHOLOGY III. Senior year, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Doctors Goss and Elder.

This course is devoted to the pathology of the infectious diseases and to laboratory diagnosis. Post-mortem examinations are made on all animals dying in the hospital at the College barns and in the neighborhood. The students attend and take turns in holding the autopsy. Each student is expected to keep a written report of the pathological changes, also of the microscopic findings. The above work is done under the direction of the pathologist in charge. Text: *Pathology of Infectious Diseases*, by Moore.

244. PATHOLOGICAL TECHNIQUE AND DIAGNOSIS I. Elective, first and second semesters. Laboratory, six hours. Two semester credits. Prerequisite: Veterinary Medicine 243. Doctors Goss and Elder.

This course consists of practice in post-mortem and laboratory diagnosis. The various methods of embedding and staining tissues are carried out upon the large collection of material which the laboratory contains, as well as the material which is constantly coming into the laboratory from various parts of the State.

245. PATHOLOGICAL TECHNIQUE AND DIAGNOSIS II. Elective, first and second semesters. Laboratory, eight hours. Four semester credits. Doctors Goss and Elder.

This course is a continuation of Veterinary Medicine 244.

246. MEAT INSPECTION. Senior year, first semester. Class work, two hours. Two semester credits. Doctor Goss.

The course in meat inspection is designed to prepare men for national, state, and local sanitary work, which is being more strongly urged and demanded every day. The kinds and classes of stock, the traffic and transportation of animals, their inspection before death, their slaughter, the normal conditions of healthy animals, the diseases discernible at the time of slaughter, the disposition of the condemned from economic, hygienic and sanitary standpoints, and different preparations and methods of preservation, adulterations, sanitary laws and regulations, and other points bearing upon the question of healthful meat production, are considered. Visits are made to the local slaughtering establishments, and to the large packing plants in Topeka, Kansas City, or Wichita. Text: Edelman's *Meat Hygiene*, translated by Mohler and Eichorn.

COURSES IN PHYSIOLOGY

FOR GRADUATES AND UNDERGRADUATES

The courses in physiology consist of Comparative Physiology, and the combined course of Anatomy and Physiology.

211. COMPARATIVE PHYSIOLOGY I. Sophomore year, first semester. Class work, four hours; laboratory, three hours. Five semester credits. Prerequisites: Veterinary Medicine 201 and 222, and Chemistry 106. Doctors Burt and Scott.

This course treats of the physiology of domestic animals, beginning with the study of the blood, heart, blood vessels, and continuing with the ductless glands and internal secretions, respirations, digestion, and absorption. Textbook: *A Manual of Veterinary Physiology*, by Fred Smith.

Laboratory.—The laboratory work consists of a practical application of the knowledge derived in the classroom. The laboratory is equipped with all necessary material and apparatus to make a detailed study of the composition and digestive action of the saliva, gastric juice, bile, pancreatic and intestinal juices. Hormones and other substances in relation to their influence upon the production and action of the digestive juices are also considered. The composition and properties of the blood are studied by the aid of chemical, microscopic, and spectroscopic methods. Textbook: Halliburton's *Essentials of Chemical Physiology.*

212. COMPARATIVE PHYSIOLOGY II. Sophomore year, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Doctors Burt and Scott.

The work of this semester is a continuation of Veterinary Medicine 211, and treats of the urine and urinary system, nutrition, animal heat, muscular and nervous symptoms, locomotion, generation and development, growth and decay. Textbook: Smith's *A Manual of Veterinary Physiology.*

Laboratory.—The laboratory work consists of a study of the normal urine, determining the composition, quantitatively as well as qualitatively. Tests for the detection of abnormal constituents, such as bile, blood-sugar and albumen, are applied to normal and also pathological urine. Microscopic examination is made for blood casts, blood, etc. The laboratory work in practical physiology consists in studying the phenomena associated with the nervous, muscular, respiratory and circulatory systems, and making graphic records of the same. References: *Urine of the Horse and Man,* by Fish; *Practical Physiology,* by Hemmeter; *An Introduction to Physiology,* by Porter; and standard textbooks.

COURSES IN SURGERY

FOR UNDERGRADUATES

151. SURGERY I. Junior year, first semester. Class work, three hours. Three semester credits. Doctor Dykstra.

This course includes methods of restraint; asepsis and antisepsis; anæsthesia, both local and general; inoculations, bandaging, massage, controlling hemorrhage; division of tissues and the uniting of wounds; injections of medicines into the subcutaneous tissues, blood streams, trachea, spinal canal. Animal dentistry is taken up very thoroughly, is so far as it constitutes an important part of the veterinarian's work. The students have free access to a large number of museum specimens of abnormal teeth. Also, many dental patients are presented at the College hospital for treatment.

152. SURGERY II. Junior year, second semester. Class work, three hours. Three semester credits. Doctor Dykstra.

This course considers in regular order the surgical diseases of the head, neck, thorax, abdomen, stomach and bowels, urinary organs, and organs of generation.

153. SURGERY III. Senior year, first semester. Class work, three hours. Three semester credits. Doctor Dykstra.

During this course particular attention is paid to causes, symptoms and treatment of lameness. It considers in detail fractures and their reduction, diseases of joints, tendons and sheaths, muscles and fascia, and surgical diseases of the foot.

154. SURGERY IV. Senior year, second semester. Class work, three hours. Three semester credits. Doctor Dykstra.

Surgery as taught during this course includes special operations, such as neurectomies, autoplasties, desmotomies, actual cauterization, tenot-

omies, myotomies, enterectomy and enteroanastomosis, and surgery of the eye. Reference books: Dollar's *Regional Veterinary Surgery;* Merillat's *Veterinary Surgery,* Vols. I, II, and III; Williams' *Surgical Operations;* Fleming's *Operative Veterinary Surgery,* parts I and II; White's *Restraint of Domestic Animals.*

155. OPERATIVE SURGERY. Senior year, second semester. Laboratory, three hours. One semester credit. Doctors Dykstra and Gingery.

Old horses are purchased by the Department, placed on the operating table, anæsthetized, and over one hundred operations are preformed on the animal. During this work the student is required to observe a careful technique, such as antisepsis, and, in fact, performs the operation as thoroughly and completely as possible. It is a very practical course and fits the student for surgical work in actual practice.

156. HORSESHOEING. Junior year and elective, second semester. Class work, one hour. One semester credit. Doctor Dykstra.

The course is taught by means of lectures, recitations and demonstrations, taking up the various divisions in the following order: normal conformation in both limb and foot, the anatomy of these parts, physiological movements and correct normal shoeing. This is followed by a study of the proper shoeing for the correction of wry limbs and feet; diseases of the feet, and the relation of horseshoeing thereto. The course ends with the study of the shoeing of mules and oxen. Throughout the entire course the purpose is to instill in the mind of the student normal shoeing, in order that he may be able to correct abnormalities in the foot and limb in so far as this can be accomplished by shoeing. Reference books: Lungwitz's *Textbook of Horseshoeing;* Dollar's *Handbook of Horseshoeing.*

Short Course in Agriculture and Creamery Short Course

The Agricultural College offers primarily a four-year curriculum in agriculture, which gives the student fundamental training in the sciences relating to agriculture, and their application to the production of crops and livestock and to farming in general. Such a curriculum not only equips a man to become a successful farmer, but makes of him a better citizen, and a leader in the broader duties of life.

Many young men with aspiration for an agricultural education in school are denied the opportunity of taking a complete college curriculum. This institution offers to such persons a two-year short, practical course in agriculture, commonly called the Farmers' Short Course. Some young men desire to engage in the creamery business. To such the institution offers the Creamery Short Course covering a period of eight weeks for one year only. These courses are offered during the winter months when most young men who really desire practical instruction are able to attend with little loss to the farm business.

GENERAL INFORMATION

REQUIREMENTS FOR ADMISSION

Students over seventeen years of age are admitted to the Farmers' Short Course or to the Creamery Short Course without examination. All students entering are required to be present at the beginning of the term.

CERTIFICATE

A certificate will be granted Farmers' Short Course students who satisfactorily complete forty-eight credit hours work of the first and second years, and to Creamery Short Course students who successfully complete the required eight-week course and who show satisfactory evidence of having spent at least six months successfully in actual work in a creamery, either previous to or after the time the course is taken.

SELF SUPPORT

These courses are primarily practical. They bring the student into actual contact with farm conditions and products. Besides the classroom work, many hours each week are spent in the judging pavilion, laboratory, shop and barn. Altogether this leaves the student but little time for outside labor, and short-course students are advised to come provided with as nearly all the necessary funds for the course as possible.

DESCRIPTION OF THE WORK

The Farmers' Short Course covers a period of sixteen weeks, eight weeks each year for two years. The entire time of the student is occupied in learning how to do the various things which are necessary for the production of good crops and good livestock, and for the business management of the farm. The subjects taught in such a course cover as much as can be given in the time, and are made intensely practical in presentation. The student is taught *why* and *how* to do the various farm operations. The student who has not taken scientific work is not able to study agricultural subjects from the same standpoint as one trained in chemistry, physics, zoölogy, etc., but can get from his work in class and laboratory the art of doing these things properly. The farmer needs to know how to select stock and crops that will be best adapted to his environment, and the short course trains him to do this. He needs to know how to prepare his soil for the reception of the seed, and how to manage his feed so as to make the greatest gains in feeding livestock. These things are taught successfully to short-course students.

The required work of the first year covers the chief phases of farming on the average Kansas farm. Besides these required subjects, the first-year student takes two or three electives. These may be in agriculture or in farm engineering or shop work. They thus provide the opportunity for each student to meet his own interests or needs.

In the second year larger liberty is given in the selection of the work. Sixteen credit hours must be taken in group I, as outlined hereafter.

The subjects in this group all deal with practical agricultural problems. All of the work of the second year may be selected from this group if the student so desires, or after having selected sixteen credit hours from group I, four or five subjects may be selected from group II (subjects dealing with problems in farm engineering). While the minimum work to be passed in each short-course term is twenty-four credit hours, many short-course students take twenty-five, twenty-six or even twenty-seven credit hours each term.

The Creamery Short Course is for eight weeks only. Its aim is to combine theory and practice in butter, cheese and ice-cream making, and also in the handling of market milk.

Farmers' Short Course

The Arabic numeral immediately following the name of a subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and laboratory, respectively.

FIRST YEAR

REQUIRED:

Soil Management	4(4-0)
Judging Livestock	3(1-4)
Feeding Livestock	2(2-0)
Farm Horticulture	3(2-2)
Dairying I	4(2-4)
Poultry	1(1-0)
Total	17

ELECTIVES:

Grain Crops	4(3-2)
Forage Crops	4(3-2)
Breeding Livestock	2(2-0)
Livestock Sanitation	3(3-0)
Gas Engines	3(1-4)
Traction Engines	2(0-4)
Carpentry I or Blacksmithing I	2(0-4)
Farm Field Machinery	1(0-2)
Physical Training	1(0-2)
Special Lectures	1(1-0)

SECOND YEAR

GROUP I.—AGRICULTURAL ELECTIVES

(16 credit hours must be taken in this group)

Grain Crops	4(3-2)
Forage Crops	4(3-2)
Breeding Livestock	2(2-0)
Livestock Sanitation	3(3-0)
Advanced Stock Judging	2(0-4)
Farm Management	4(3-2)
Dairying II	5(3-4)
Fruit Growing	5(3-4)
Incubation and Brooding	3(0-6)
Beekkeeping	3(2-2)
Farm Insects	3(3-0)
Rural Life	2(2-0)

GROUP II.—ELECTIVES IN RURAL ENGINEERING

Gas Engines and Automobiles	2(0-4)
Gas Engines or Traction Engines	2(0-4)
Practical Electricity	2(2-0)
Carpentry I or Carpentry II	2(0-4)
Blacksmithing I or Blacksmithing II	2(0-4)
Power Farming Machinery	2(0-4)
Concrete Construction	2(2-0)
Concrete Construction Laboratory	2(0-4)

Commercial Creamery Short Course

Creamery Management	2(2-0)
Creamery Butter Making	8(4-8)
Market Milk	2(2-0)
Dairy Bacteriology	2(2-0)
Cheese and Ice Cream Making	4(1-6)
Judging Dairy Products	1(0-2)
Dairying II	5(3-4)
Dairy Mechanics and Refrigeration	2(0-4)

Subjects Taught in the Short Course

AGRONOMY

1. GRAIN CROPS. Elective. Class work, three hours; laboratory, two hours. Four credits. Professor Salmon, Assistant Professor Bonnett and Mr. Zahnley.

This course consists of a practical study of grain-crop production, especially for Kansas conditions. In the laboratory exercises are given for the identification of different kinds of threshed grain and the determination of damage and market classes and grades.

2. FORAGE CROPS. Elective. Class work, three hours; laboratory, two hours. Four credits. Assistant Professor Bonnett and Mr. Zahnley.

A practical study is made of the distribution and production of important forage crops, especially for Kansas conditions.

3. SOIL MANAGEMENT. First year. Class work, four hours. Four credits. Professor Call and Associate Professor Throckmorton.

The various soil types common in Kansas are studied, especially with reference to their economical management for the production of profitable crops and the maintenance of fertility.

4. FARM MANAGEMENT. Elective. Class work, three hours; laboratory, two hours. Four credits. Assistant Professor Grimes.

In this course the work in the various agricultural courses is correlated and placed on a practical, workable basis. The principles of farm accounting, distribution of capital, laying out of fields, planning rotations, etc., are given first consideration.

10. RURAL LIFE. Class work, two hours. Two credits. Mr. Durham.

The purpose of this course is to help students become acquainted with the essentials of a prosperous rural community, especially those concerned with better business and better living. The deficiencies of rural life and their remedies; the country town; rural organization and coöperation along economic, social, educational, moral and religious lines; tenancy and rural credit and leadership are among the subjects considered.

ANIMAL HUSBANDRY

1. JUDGING LIVESTOCK. First year. Class work, one hour; laboratory, four hours. Three credits. Associate Professor McCampbell, Messrs. Gatewood, Lush and Horlacher.

This work includes careful drill in judging and showing horses, beef cattle, dairy cattle, sheep and hogs. The student first becomes familiar with the leading types by use of the score card, and later learns to judge by comparison. The aim throughout this work is not so much to make judges of the students as to render them so familiar with the best types

that they may be able to select stock that will give the best returns from every standpoint. Text: Gay's *Principles and Practice of Judging Livestock.*

3. FEEDING LIVESTOCK. First year. Class work, two hours. Two credits. Professor Cochel.

The work in feeding comprises (1) a study of all the common feedstuffs of Kansas, including mill feeds and factory by-products as well as those grown on the average farm; and (2) a survey of the best feeding practices for the production of meat, milk and work. In connection with the former a rather detailed study of the composition of the feedstuffs is made, and with the latter a study of their effect upon the products sought. Text: Henry's *Feeds and Feeding.*

5. BREEDING LIVESTOCK. Elective. Class work, two hours. Two credits. Associate Professor McCampbell.

Studies are made for the purpose of determining ways and means of preventing the birth of individuals not highly efficient as producers of human food or for work. Some of the topics discussed are, crossing, hybridization, grading, line breeding, inbreeding and prepotency.

7. ADVANCED STOCK JUDGING. Elective. Laboratory, four hours. Two credits. Prerequisite: Animal Husbandry 1. Associate Professor McCampbell and Mr. Horlacher.

This course deals largely with the judging of breeding classes of horses, cattle, sheep, and swine. Methods used in judging at county and state fairs will be followed in presenting the course. Special attention will be given to the selection of foundation stock for purebred herds.

DAIRY HUSBANDRY

1. DAIRYING I. First year. Class work, two hours; laboratory, four hours. Four credits. Professor Reed and Mr. Davis.

A general course in farm dairying, consisting of lectures and laboratory work on the secretion, composition, and properties of milk; the effect of the period of lactation; the Babcock test; the farm separator; farm butter making, and dairy sanitation; the handling of milk, feeding the dairy cow, and selecting and breeding the dairy herd.

3. DAIRYING II. Class work, three hours; laboratory, four hours. Five credits. Associate Professor Fitch.

Instruction is given in keeping records and accounts of dairy-farm business; in building up a dairy herd; concerning buildings and dairy farm; concerning silos and silage; on the fertility account of the dairy; on cow-testing associations; the coöperative ownership of dairy sires, and the making of detailed plans for the management of the dairy farm.

Laboratory.—In the laboratory dairy stock is judged from the standpoint of economical production and breed type. Score cards are used for the purpose of training the student to become accurate, thorough and systematic in the selection of dairy animals.

5. CREAMERY MANAGEMENT. Class work, two hours. Two credits. Mr. Davis.

This course includes the advisability of starting a creamery, forms of organizations (copartnership, corporation, coöperative and joint-stock companies), creamery construction, sewage disposal, refrigeration, labor, purchase of milk and cream, the purchase of equipment and supplies. Also the overrun and manufacturing losses, cost of power (steam, gas, kerosene and motor), pasteurization costs, marketing, advertising, salesmanship, business correspondence, credits and collections and bookkeeping. No text.

7. CREAMERY BUTTER MAKING. Class work, four hours; laboratory, eight hours. Eight credits. Mr. Davis.

Lectures are given on the sampling, weighing and grading of cream and milk; on natural and commercial starters; on the pasteurization of milk and cream; on cream ripening and the churning, washing, salting, packing and marketing of butter; on conditions controlling the per cent of moisture in butter, etc. The laboratory work comprises practice in sampling, weighing and grading milk and cream, and in churning, packing, and marketing butter; the study of different makes of churns; the pasteurization of cream, and practice with starters.

9. CHEESE AND ICE-CREAM MAKING. Class work, one hour; laboratory, six hours. Four credits. Mr. Davis.

This course deals with the making of cheese on the farm, for home use and for sale. All the common types of cheese are made. The last half of the term is devoted to the study of ice-cream making, including proportion of cream, flavoring, fillers, freezing, packing, and storing ice cream. Practice is given in the making of cheese, ice cream, and ices, for home use, and on a commercial scale. The student judges cheese and prepares cream; flavors, freezes, and packs ice cream.

11. MARKET MILK. Class work, two hours. Two credits. Mr. Davis.

This course is a study of the methods of managing the handling of milk in a city milk plant.

13. JUDGING DAIRY PRODUCTS. Laboratory, two hours. One credit. Mr. Davis.

This course comprises scoring and judging butter, cheese, milk and ice cream. It is laboratory work supplemented by occasional lectures.

HORTICULTURE

1. FARM HORTICULTURE. First year. Class work, two hours; laboratory, two hours. Three credits. Professor Dickens and Mr. Doerner.

The purpose of this course is to acquaint the student with those horticultural principles and practices which are concerned in making the farm a better place for a home. The planning of the farmstead and the improvement of its appearance by the use of trees, shrubs and flowers is first considered. The possibilities of the vegetable garden, the fruit garden and the orchard in furnishing a more varied and more healthful diet for the farm home, and the means of securing these products, are among the subjects considered. The economic consideration of the cost of production and methods of handling and marketing products are briefly discussed.

2. FRUIT GROWING. Elective. Class work, three hours; laboratory, four hours. Five credits. Professor Ahearn.

This course considers the possibilites of fruit growing on a commercial scale and for the home orchard. The subjects studied are: types of soil adapted to fruit growing, location of orchard as regards sites and drainage, interplanting and cropping, pruning, harvesting and marketing of the crops.

The laboratory work offers practical experience in the different branches of orchard practice.

POULTRY HUSBANDRY

1. GENERAL POULTRY LECTURES. First year. Class work, one hour. One credit. Professor Lippincott and Mr. Fox.

The lectures given in this course put special emphasis on the subjects of poultry management which are of greatest importance to the student in making more from his farm poultry.

2. INCUBATION AND BROODING. Elective. Three times a day for a period of not less than seven weeks. Three credits. Prerequisite: General Poultry Lectures. Mr. Fox.

The students will have an opportunity to operate incubators and care for chicks with brooders.

ADDITIONAL SUBJECTS

BLACKSMITHING I. (Shop 1.) Elective. Laboratory, four hours. Two credits. Mr. Lynch and Mr. Bundy.

A beginning course in forging operations, including drawing, upsetting, bending, twisting, hot and cold punching, and welding, together with instructions in the use of the fire and the selection and care of tools. The exercises given are such as to be of practical value to the man on the farm.

BLACKSMITHING II. (Shop 2.) Elective. Laboratory, four hours. Two credits. Prerequisite: Shop 1. Mr. Lynch and Mr. Bundy.

A continuation of Blacksmithing I, with additional exercises in iron and machine steel. Some practice is given in hardening and tempering tool steel, and in making some of the tools used in the shop. Some practice is also given in plow work.

CARPENTRY I. (Shop 20.) Elective. Laboratory, four hours. Two credits. Mr. Parker and Mr. Ball.

A practical course in woodworking to give an understanding of the proper use and care of tools and material. The work includes making tool boxes, singletrees, doubletrees, feed boxes, wheel-barrows, porch swings and other practical work. All work is done from blue prints and drawings.

CARPENTRY II. (Shop 21.) Elective. Laboratory, four hours. Two credits. Prerequisite: Shop 20. Mr. Parker and Mr. Ball.

A continuation of Carpentry I. Considerable work with paints, varnishes and wood finishes is provided. Some practice is given with the square as used in cutting rafters and framing and other operations especially useful on the farm.

CONCRETE CONSTRUCTION. (Applied Mechanics 20.) Elective. Class work, two hours. Two credits. Assistant Professor Wendt.

Instruction is given in the principles governing the selection and preparation of materials, the proper proportioning of materials for different conditions, the construction of forms, mixing and handling concrete, elementary reinforced concrete construction, finishing concrete surfaces, stucco and plaster work, and the water-proofing and coloring of concrete. A brief study is made of the application of these principles to the making of concrete building blocks and bricks, fence posts, sidewalks, floors, tanks, cisterns, silos, and bridges and culverts. Text: Seaton's *Concrete Construction for Rural Communities.*

CONCRETE CONSTRUCTION LABORATORY. (Applied Mechanics 21.) Elective. Laboratory, four hours. Two credits. Must be taken with Applied Mechanics 20. Assistant Professor Wendt and assistants.

Laboratory and field work is given in hand and machine mixing and handling of concrete, and in the construction of forms for such objects as machine and building foundations, floors, sidewalks, fence posts and building blocks. Tests are made on concrete cylinders and beams to illustrate the effect of different methods of treatment on the strength and reliability of plain and reinforced concrete.

DAIRY BACTERIOLOGY. (Bacteriology 1.) Elective. Class work, two hours. Two credits. Assistant Professor Hunter.

This course is designed for students who have had no training in chemistry and biology and is a general study of the bacteriology of milk and milk products. Bacterial contaminations of milk from air, water, utensils, the cow, the milker, etc., are discussed. Normal and abnormal fermentations, their significance and control in milk, butter, cheese, and special dairy products are considered.

DAIRY MECHANICS AND REFRIGERATION. (Steam and Gas 25.) Laboratory, four hours. Two credits. Assistant Professor Simmering.

A study of the compression systems of refrigeration; also operation, care and repair of refrigerating machinery and auxiliaries.

PRACTICAL ELECTRICITY. (Electrical Engineering 1.) Elective. Class work, two hours. Two credits. Professor Reid.

An elementary course in the practical application of electricity to the electrical machines and apparatus which are now to be found in the small isolated plant, the rural or small town house and store, the electrical equipment of automobiles (with the exception of the ignition) and other electrical devices concerning which the general public now should be informed.

This course will treat of the care and operation of dynamos, motors and generators, of storage batteries, lead and nickel iron or Edison types, for both stationary and portable use; of the proper methods of wiring houses and other buildings, and the different classes of approved material for this purpose; methods of outside wiring between buildings; and general uses of electric light and power.

FARM INSECTS. (Entomology 1.) Elective. Class work, three hours. Three credits. Mr. McColloch.

The more important insects of the farm, garden and orchard are discussed, together with the best means of control. In this course the instructor will endeavor to show the student that clean culture and good farm methods are very effective in the control of many of the serious insect pests. Many of the lectures will be illustrated with lantern slides.

BEEKEEPING. (Entomology 10.) Elective. Class work, two hours; laboratory, two hours. Three credits. Assistant Professor Merrill.

This course gives a general survey of the subject of beekeeping, with a general consideration of the elements of practical beekeeping. The subjects which will be considered are: Life history, behavior and instincts of the honey bee, products of the apiary, and relation of bees to crop production. A study will be made of the various bee diseases, together with their treatment. The laboratory exercises are to consist of practice in constructing the hives, supers, brood frames, comb-honey sections, extracting frames, wiring frames, and putting in and embedding foundation. Demonstrations are given of various methods of transferring bees, manipulating colonies for swarm prevention and making increase, treatment of brood diseases, and methods for wintering. The object of this course is to give such practical experience as will help a person to engage successfully in beekeeping.

FARM MACHINERY. (Farm Machinery 1.) Elective. Laboratory, two hours. One credit. Mr. Collins.

There is a great waste on farms from the lack of knowledge of the kind of machinery to use and the way to care for it. The purpose of this course is to acquaint the student with the factors underlying wise selection and proper care of farm machines, as well as with methods of operation of a number of important machines. Some practical instruction is given in rope work. Fences and the farm power plant are studied. The work is given in the form of lectures and laboratory demonstrations.

POWER FARMING MACHINERY. (Farm Machinery 2.) Elective. Laboratory, four hours. Two credits. Mr. Collins.

This course takes up the study of those machines that are used with the tractor, including the engine plows, feed-mills, corn shellers, hay balers, ensilage cutters, husker-shredders, and threshing machines.

LIVESTOCK SANITATION. (Veterinary Medicine I.) Elective. Class work, three hours. Three credits. Doctor Elder.

This subject deals with diseases that are communicable from animal to animal or from animal to man. The causes, symptoms and methods that are employed to prevent and to combat the spread of diseases, and the drugs that are commonly used as disinfectants, for washes, dips, etc., are given full consideration. The use of serums, vaccines, etc., for the prevention of diseases is considered. Methods of disposal of sick and dead animals as well as the means employed to clean and to disinfect the premises so as to prevent a recurrence of diseases are considered.

PHYSICAL TRAINING. (Physical Education 1.) Elective. Two hours. One credit. Professor Clevenger and Assistant Professor Bauer.

This course includes elementary free-hand calisthenics; elementary light-hand apparatus, including wands and dumb-bells, and elementary heavy apparatus work. Almost one-half of the time is devoted to the playing of games. A shower bath is a part of the work of each class period, each member of the class also being regularly given the opportunity of taking a plunge and swim in the large gymnasium pool.

SPECIAL LECTURES. Elective. One hour a week. One credit.

At least once each week during the eight weeks of the short course special lectures on subjects of timely interest are given by persons connected with the College or well known as agricultural leaders.

GAS ENGINES. (Steam and Gas 1 and 2.) Elective. Class work, one hour; laboratory, four hours. Three credits. Mr. Mack and Mr. Stoker.

A study of gasoline and kerosene engines; four-stroke and two-stroke cycle engines, gas-engine fuels, carburetors, ignition systems, lubrication, governing; selection, erection and operation of stationary gasoline and kerosene engines; fundamental parts of automobiles.

GAS ENGINES AND AUTOMOBILES. (Steam and Gas 6.) Elective. Laboratory, four hours. Prerequisites: Steam and Gas 1 and 2. Mr. Mack and Mr. Stoker.

A study of gas engines and automobiles, with particular reference to ignition systems, carburetors, transmissions, lubricating systems and automobile auxiliaries.

TRACTION ENGINES. (Steam and Gas 16.) Elective. Laboratory, four hours. Two credits. Mr. Sanders and Mr. Hill.

A study of gas traction engines or of steam traction engines, including care and operation of various types.

Charges for Supplies Used in the Short Course Laboratory Classes

Soil Management		$0.25
Grain Crops		.50
Forage Crops		.50
Farm Management		.50
Concrete Construction Laboratory		.50
Traction Engines		.75
Blacksmithing I and II	each	1.00
Carpentry I and II	each	.50
Gas Engines		.75
Gas Engines and Automobiles		1.00
Creamery Short Course (all)		2.00

Course in Testing Dairy Products

This course is offered to those who are buying milk or cream and who wish to gain, in a short time, skill and accuracy in the application of the various tests necessary in such work. The law of the State requires that all persons buying milk or cream by test must pass a satisfactory examination and secure a certificate from the State Dairy Commissioner. This course is designed to meet the needs of those who find they have not sufficient knowledge of the subject to pass such an examination.

In addition to a study of the Babcock test, the student receives lectures on ordinary sanitation, and learns the methods necessary to keep his place of business in a sanitary condition. Exercises are given in grading milk and cream, and in methods of handling cream so as to keep it in condition until used or delivered at the railway station. This course is offered at different periods throughout the year, dates being announced a few days previous to the opening of each period.

Agriculture in the Summer School

During recent years the greatest hindrance to the general introduction of agriculture into the high schools and grade schools of the State has been the lack of properly prepared teachers. The recent Federal Smith-Hughes act and its acceptance by the State of Kansas will within a few years lead to a large demand for teachers of vocational agriculture in Kansas high schools. The world war has both increased the demand for teachers of agriculture and demonstrated the necessity of the introduction of vocational agriculture in the high schools. The Agricultural College stands ready to aid teachers of the State, young women as well as young men, in their preparation to meet these demands, and the Summer School offers to active teachers an exceptional opportunity in this respect.

The work offered in the summer session includes courses in grain crop production, soils, soil fertility, common-school agriculture, livestock judging, principles of feeding, teachers' course in animal husbandry, elements of dairying, dairy judging, poultry production, poultry judging, practice in incubation and brooding, diseases of farm animals, plant propagation, orcharding, school gardening, and methods of teaching agriculture in high schools. Special emphasis is laid upon the subject matter and methods adapted to secondary and elementary schools. Additional war emergency courses will be offered for the purpose of preparing teachers, especially young women, to be of larger service in the present crisis.

Brief information regarding many of these courses in the Summer School may be found in the department write-ups in this catalog. For further information write to the Dean of the Summer School.

Division of Engineering

ANDREY ABRAHAM POTTER, *Dean*

The Division of Engineering offers curricula in agricultural, engineering, architecture, civil engineering, electrical engineering, flour-mill engineering, and mechanical engineering, each leading to the degree of bachelor of science in the profession selected.

The work of the freshman year is the same in all curricula of the division except that in architecture, in which a minor change is made. Electrical and mechanical engineering students take the same work in the sophomore year, and various courses are common to two or more curricula in each of the four years.

While the curricula, as offered, are believed to be sufficient to cover the needs of the average young man, it is possible to combine portions of the work of two or more of them in such a way that one may be prepared to take up a special line of work for which he desires to fit himself. For example, by substituting certain courses from the departments of chemistry and geology for some of those in the course in mechanical engineering a young man can fit himself for work in connection with the manufacture of cement. By substituting some of the courses in chemistry for others in mechanical engineering, a special preparation can be secured for chemical engineering. By combining some of the courses in civil and mechanical engineering and by taking additional work in chemistry and geology a young man may fit himself for special work in connection with the development of the coal fields of the country. By combining courses in architecture and civil engineering, specialization in architectural engineering may be secured. In special cases permission will be granted to combine the work on the lines here indicated. With the permission of the dean of the division, students desiring to do so may substitute work in military engineering for certain subjects in any of the courses of the division.

It is believed that the curricula as tabulated give the best preparation for students expecting to follow general work in the profession selected, and for those who are not certain what branch of their profession they will follow. The substitutions and combinations indicated, and others similar to them, will be permitted only when there is good evidence that the student desiring such work is practically certain to follow the branch selected.

In the case of any of these modifications, the degree granted will be that of the course in which the major portion of the work is taken. In no case will the substitution of an additional amount of technical work for any of the general cultural work in the course be allowed.

Besides the four-year professional curricula, the Division of Engineering offers:

A three-year curriculum in mechanic arts in the School of Agriculture, with trade practice electives in blacksmithing, carpentry, concrete construction and stationary and traction engines, and

Short winter courses of eight weeks each in road building, irrigation and drainage, in shop work, and in traction engines.

These are all discussed elsewhere in this catalogue.

CURRICULUM IN AGRICULTURAL ENGINEERING

The curriculum in agricultural engineering is designed to qualify men for engineering work in rural communities; for positions in the farm-machinery and farm-motor industry; for the management of farms where drainage, irrigation or power-farming methods are prevalent; and for the positions of advisors, consulting engineers or architects in connection with farm buildings and equipment.

The work of the first year is the same as in the other engineering curricula. During the last three years about one-third of the time is devoted to agricultural subjects, in order to familiarize the students with the modern methods of scientific agriculture and to enable them to apply engineering principles to agricultural problems in a practical way. Considerable time is also devoted to farm machinery, farm motors, rural architecture, highway engineering, irrigation, drainage, and concrete construction.

The agricultural engineering students are also given considerable training in drawing, machine design, shop practice, physics, chemistry, surveying, steam engineering, gas engineering, and electrical engineering.

CURRICULUM IN ARCHITECTURE

The curriculum in architecture aims to provide the technical training which will give a broad and sound foundation for the needs of the practicing architect, as well as the essentials of a liberal education. Although closely associated with and somewhat dependent upon science and engineering, architecture is primarily a fine art; hence the training of the architect, while including the general fundamentals of engineering and science, must be based primarily upon a study and understanding of the basic architectural principles together with the canons of art and good taste. A major portion of the curriculum is therefore devoted to the study of architectural design, supplemented by those subjects preparatory or contributory to it.

Supporting this line of study the student is given a comprehensive view of the development of civilization together with a more detailed study of the history of architecture and of art. Throughout the course draughtsmanship as applied to architectural design and construction, as well as to free-hand drawing and sketching, is given constant attention. Courses dealing with the fundamental principles of building construction, sanitation, heating and lighting, together with a careful study of the properties and uses of building materials, are given simultaneously with the courses in design and drawing.

In addition to the above-outlined professional and technical studies,

approximately one-quarter of the curriculum is devoted to more general studies designed to broaden the student's view and to give him the essentials of a liberal education. These subjects include English, French, history, economics, chemistry and physics. Thus it is the aim not only to provide a fundamental training upon which the student may base his professional development and advancement, but to afford a training which is in the broadest sense educational.

CURRICULUM IN CIVIL ENGINEERING

The aim of the curriculum in civil engineering, as outlined in the catalogue, is to give the young men taking the work the best possible preparation for entering upon the active practice of the profession under present conditions. It will be noted that the first and second years are devoted almost entirely to general culture studies and the sciences, including mathematics. This follows the arrangement generally found in the engineering curricula of American colleges, and it finds its justification in the well-nigh universally accepted idea that any engineering education worthy of consideration must be grounded upon ample preliminary education in the allied sciences. In recognition of the mechanical trend of the age, liberal provision is made for class and laboratory work in mechanical and electrical engineering.

In view of the growing importance of municipal problems, such as paving, sewerage and water-supply, the curriculum in civil engineering includes required courses in these subjects.

Advanced elective courses in railroad, highway, and irrigation and drainage engineering are offered in the second semester of the senior year.

CURRICULUM IN ELECTRICAL ENGINEERING

The essential elements underlying a sound engineering training are based upon a thorough study of mathematics and the physical sciences. The professional work of this curriculum begins in the junior year and continues throughout the last two years. General culture subjects are included in the work of each of the four years.

Emphasis is placed upon training to deal with the forces and matter according to scientific principles, rather than upon the accumulation of facts. The department laboratories are well equipped with the various measuring instruments, standardizing apparatus, and different types of dynamo machinery. The different subjects are presented in the classroom, and the classroom work is supplemented by laboratory practice. The curriculum provides a liberal training in wood- and iron-working, mechanical drawing, and machine-shop practice.

The laboratory experiments selected for the students are designed to give a clear conception of the theoretical work of the classroom.

Students are given extensive practice in connecting up the different types of machines for testing purposes and for standard commercial work. This practice work and testing extends throughout the junior and senior years, and is intended to give the student familiarity with the underlying principles of the different machines, and a knowledge of the

care necessary to operate them successfully. Opportunity is also given to undertake the investigation of commercial problems as they are sent to the College from the different central stations of the State.

CURRICULUM IN FLOUR-MILL ENGINEERING

The milling of wheat and other cereals is an important industry in this State. The curriculum in flour-mill engineering is designed to prepare men for the management of mills, for work in connection with the designing of milling plants, and for research work in the preparation and utilization of mill products.

The work of the freshman year is the same as in the other engineering courses. The sophomore year is similar to that of the mechanical engineering course, but includes additional chemistry and a beginning course in milling practice. In the junior and senior years, besides the courses dealing with the production, marketing, testing and milling of grain products, a considerable amount of time is devoted to mechanics, chemistry, history, economics, business law and organization, steam and gas engineering and flour-mill design.

CURRICULUM IN MECHANICAL ENGINEERING

The work in mechanical engineering prepares for the successful management and superintendence of factories and power plants; for the design of power and machinery installation; for the design and construction of machine tools, steam and gas engines, compressors, hydraulic machinery, etc.; and for the design and erection of engineering buildings and factories, including the selection, purchasing and location of the equipment.

The curriculum has been laid out with the aim of securing a judicious mixture of theory and practice, such as will not only give the student the technical skill required for engineering operations, but will also endow him with an understanding of the scientific and economic principles necessary for the solution of engineering and industrial problems.

Throughout the four years the theoretical studies in the classroom are supplemented by the practical work in the laboratories in such a manner as very materially to strengthen both. In the materials and machinery testing laboratories the work does not end when the test is completed, but the entire problem must be written up in such a manner as would be approved in the best commercial testing laboratories. The laboratory work in the shops not only gives the student practice in performing the machining and various other mechanical operations, but includes a scientific study of the factors of production, so that the loss of material and the expenditure of human effort will be a minimum.

Students pursuing a mechanical engineering course are urged to spend at least two summers in some shop or commercial plant in order to broaden their training.

Curriculum in Agricultural Engineering

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	Plane Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)		
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
Woodwork Shop 101	1(0-3)		
Forging I Shop 150	1(0-3) *or*		
Surveying I C. E. 101, 105	2(1-3)	Surveying I C. E. 101, 105	2(1-3) *or*
		Woodwork Shop 101	1(0-3)
		Forging I Shop 150	1(0-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Engineering Physics II Physics 212	5(4-3)
Calculus I Math. 113	5(5-0)	Calculus II Math. 116	3(3-0)
Surveying II C. E. 110, 115	3(2-3) *or*	Farm Crops Agron. 103	4(3-3)
Organic Chemistry Chem. 120	3(2-2, 1)	Field Machinery Farm Eng. 106, 107	3(2-3)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Metallurgy Shop 165	2(2-0) *or*
Foundry Practice Shop 160	1(0-3)	Quantitative Analysis I Chem. 150	2(0-6)
Forging II Shop 155	1(0-3)	Pattern Making Shop 145	1(0-3)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

JUNIOR

First Semester

Applied Mechanics I
Ap. Mech. 101, 105.... 4(3-3)

American Industrial History
Hist. 105 ..... 3(3-0)

Soils
Agron. 131 ..... 4(3-3)

Farm Motors
Steam and Gas 140, 145, 3(2-3)

Types and Classes of Live Stock
An. Husb. 101..... 3(1-6)

Seminar
General Eng. 105..... R

Second Semester

Applied Mechanics E-II
Ap. Mech. 115, 120.... 4(3-3)

Economics
Econ. 101 ..... 3(3-0)

Power Machinery
Farm Eng. 111, 112.... 2(1-3)

Kinematics
Ap. Mech. 180..... 3(3-0)

Tractors and Trucks
Farm Eng. 116, 117.... 3(2-3) *or*

Mechanical Drawing II
Ap. Mech. 170..... 3(0-9) *or*

Hydraulics
Ap. Mech. 130, 135.... 4(3-3)

Machine Tool Work I
Shop 170 ..... 2(0-6)

Seminar
General Eng. 105..... R

SENIOR

First Semester

Farm Management
Agron. 261 ..... 3(2-3)

Extempore Speech I
Pub. Sp. 201..... 2(2-0)

Principles of Feeding
An. Husb. 104..... 3(3-0)

Rural Architecture
Farm Eng. 102..... 3(1-6)

Highway Engineering I
C. E. 230 and Ap. Mech. 250 ..... 3(2-3)

Business Law I
Hist. 153 ..... 1(1-0)

Advanced Farm Machinery
Farm Eng. 201..... 2(0-6)

Seminar
General Eng. 105..... R

Thesis
Ap. Mech. 150, C. E. 170, Farm Eng. 175, Shop 195, *or* Steam and Gas 195 ..... R

Second Semester

Drainage and Irrigation I
C. E. 160..... 3(3-0)

Engineering English
Engl. 110 ..... 2(2-0)

Electrical Engineering C
Elect. Engr. 160, 165... 3(2-2, 1)

Concrete Construction
Ap. Mech. 140, 145.... 2(1-3)

Steam and Gas Engineering C
Steam and Gas 120, 125, 3(2-3)

Business Organization
Econ. 204 ..... 1(1-0)

Elements of Dairying
Dairy Husb. 101..... 3(2-3) *or*

Soil Fertility
Agron. 132 ..... 3(2-2, 1)

Seminar
General Eng. 105..... R

Thesis
Ap. Mech. 150, C. E. 170, Farm Eng. 175, Shop 195, *or* Steam and Gas 195 ..... R

Curriculum in Architecture

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry AV-I Chem, 105	5(3-4, 2)	Descriptive Geometry Arch. 104, 107	3(1-6)
Plane Trigonometry Math. 101	3(3-0)	Plane Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)	American Industrial History Hist. 105	3(3-0)
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Perspective Arch. 126	1(0-3)
		Shades and Shadows Arch. 129	1(0-3)
Free-hand Drawing I Arch. 111	2(0-6)	Free-hand Drawing II Arch. 114	2(0-6)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Applied Mechanics A-I Ap. Mech. 102	3(3-0)
French I Mod. Lang. 151	3(3-0)	French II Mod. Lang. 156	3(3-0)
Materials of Construction I Arch. 135	2(2-0)	Materials of Construction II Arch. 138	2(2-0)
History of Architecture I Arch. 153	2(2-0)	History of Architecture II Arch. 156	2(2-0)
Elements of Design Arch. 141	1(1-0)	History of Western Europe Hist. 123	3(3-0)
Design I Arch. 142	3(0-9)	Design II Arch. 144	3(0-9)
Free-hand Drawing III Arch. 115	1(0-3)	Free-hand Drawing IV Arch. 117	1(0-3)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

JUNIOR

First Semester

Applied Mechanics A-II
Ap. Mech. 116, 121 .... 4(3-3)

Graphic Statics A-I
Ap. Mech. 126 ..... 1(0-3)

Working Drawings and Specifications I
Arch. 168 ..... 2(0-6)

History of Architecture III
Arch. 159 ..... 2(2-0)

Design III
Arch. 145 ..... 5(0-15)

Free-hand Drawing V
Arch. 118 ..... 2(0-6)

Domestic Architecture
Arch. 171, 172 ..... 2(2-0)

Seminar
General. Eng. 105 ..... R

Second Semester

Heat, Light, and Sanitation
Arch. 174 ..... 2(2-0)

Working Drawings and Specifications II
Arch. 169 ..... 2(0-6)

History of Architecture IV
Arch. 160 ..... 3(3-0)

Design IV
Arch. 147 ..... 5(0-15)

Free-hand Drawing VI
Arch. 120 ..... 2(0-6)

History of Ornament
Arch. 175 ..... 1(1-0)

Theory of Architecture,
Arch. 177 ..... 1(1-0)

Pen and Pencil Rendering
Arch. 178 ..... 1(0-3)

Color
Arch. 180 ..... 1(0-3)

Seminar
General Eng. 105 ..... R

SENIOR

First Semester

Civilization and Art I
Arch. 183 ..... 3(3-0)

Design V
Arch. 148 ..... 8(0-24)

Free-hand Drawing VII
Arch. 121 ..... 2(0-6)

Color Rendering
Arch. 188 ..... 1(0-3)

Economics
Econ. 101 ..... 3(3-0)

Seminar
General Eng. 105 ..... R

Second Semester

Civilization and Art II
Arch. 185 ..... 3(3-0)

Design VI
Arch. 150 ..... 9(0-27)

Free-hand Drawing VIII
Arch. 123 ..... 2(0-6)

Office Practice
Arch. 190 ..... 1(1-0)

Engineering English
Engl. 110 ..... 2(2-0)

Seminar
General Eng. 105 ..... R

Curriculum in Civil Engineering

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise: and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	Plane Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)		
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
Woodwork Shop 101	1(0-3)		
Forging I Shop 150	1(0-3)	*or*	
Surveying I C. E. 101, 105	2(1-3)	Surveying I C. E. 101, 105	2(1-3) *or*
		Woodwork Shop 101	1(0-3)
		Forging I Shop 150	1(0-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Engineering Physics II Physics 212	5(4-3)
Calculus I Math. 113	5(5-0)	Calculus II Math. 116	3(3-0)
Surveying II C. E. 110, 115	3(2-3)	Masonry and Foundations C. E. 120	2(2-0)
Extempore Speech I Pub. Sp. 201	2(2-0)	American Industrial History Hist. 105	3(3-0)
		Metallurgy Shop 165	2(2-0)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Civil Engineering Drawing I C. E. 125	2(0-6)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 101	R	Seminar General Eng. 101	R

JUNIOR

First Semester		Second Semester	
Applied Mechanics I Ap. Mech. 101, 105	4(3-3)	Applied Mechanics II Ap. Mech. 110, 120	6(5-2, 1)
Engineering Geology Geol. 102	4(2-6)	Hydraulics Ap. Mech. 130, 135	4(3-3)
Railway Engineering I C. E. 145	2(2-0)		
Surveying III C. E. 150, 155	3(2-3)	Drainage and Irrigation I C. E. 160	3(3-0)
Economics Econ. 101	3(3-0)	Steam and Gas Engineering C Steam and Gas 120, 125,	3(2-3)
Business Law I Hist. 153	1(1-0)	Business Organization Econ. 204	1(1-0)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

SENIOR

First Semester		Second Semester	
Bridge Stresses C. E. 201	4(4-0)	Bridge Design C. E. 240, 245	4(3-3)
Civil Engineering Drawing II C. E. 205	2(0-6)		
Astronomy and Geodesy C. E. 210, 215	4(3-3)	Electrical Engineering C Elect. Engr. 160, 165	3(2-2, 1)
Water Supply C. E. 220	2(2-0)	Engineering English Engl. 110	2(2-0)
Sewerage C. E. 225	2(2-0)	Concrete Design C. E. 250, 255	3(2-3)
Highway Engineering I C. E. 230 and Ap. Mech. 250	3(2-3)	Railway Engineering II C. E. 260, 265	4(2-6) *or*
		Highway Engineering II C. E. 270, 275	4(2-6) *or*
		Drainage and Irrigation II C. E. 280, 285	4(2-6)
Seminar General Eng. 105	R	Seminar General Eng. 105	R
Thesis Ap. Mech. 150 *or* C. E. 170	R	Thesis Ap. Mech. 150 *or* C. E. 170	R

Curriculum in Electrical Engineering

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)		
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Surveying I C. E. 101, 105	2(1-3) *or*
Woodwork Shop 101	1(0-3)		
Forging I Shop 150	1(0-3)	*or* Woodwork Shop 101	1(0-3)
		Forging I Shop 150	1(0-3)
Surveying I C. E. 101, 105	2(1-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Engineering Physics II Physics 212	5(4-3)
Calculus I Math. 113	5(5-0)	Calculus II Math. 116	3(3-0)
Kinematics Ap. Mech. 180	3(3-0)	American Industrial History Hist. 105	3(3-0)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Mechanical Drawing II Ap. Mech. 170	3(0-9)
Foundry Practice Shop 160	1(0-3)	Metallurgy Shop 165	2(2-0)
Forging II Shop 155	1(0-3)	Pattern Making Shop 145	1(0-3)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

JUNIOR

First Semester		Second Semester	
Applied Mechanics I Ap. Mech. 101, 105	4(3-3)	Applied Mechanics E-II Ap. Mech. 115, 120	4(3-3)
Extempore Speech I Pub. Sp. 201	2(2-0)	Business Organization Econ. 204	1(1-0)
Economics Econ. 101	3(3-0)	Hydraulics Ap. Mech. 130, 135	4(3-3)
Direct Current Machines I Elect. Engr. 101, 105	4(3-2, 1)	Direct Current Machines II Elect. Engr. 110, 115	4(3-2, 1)
Instruments and Calibration Elect. Engr. 120, 125	2(1-2, 1)	Alternating Current Machines I Elect. Engr. 201, 205	3(2-2, 1)
Machine Tool Work I Shop 170	2(0-6)	Business Law I Hist. 153	1(1-0)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

SENIOR

First Semester		Second Semester	
Steam and Gas Engineering I Steam and Gas 101, 105,	5(4-3)	Steam and Gas Engineering II Steam and Gas 110, 115,	4(3-3)
Alternating Current Machines II Elect. Engr. 210, 215	6(4-4, 2)	Generation and Distribution of Electrical Energy Elect. Engr. 230	3(3-0)
Electrical Machine Design I Elect. Engr. 150	1(0-3)	Electrical Machine Design II Elect. Engr. 155	2(0-6)
Telephony Elect. Engr. 220, 225	3(2-3)	Illuminating Engineering Elect. Engr. 235	2(2-0)
Factory Engineering Shop 245, 250	2(1-3)	Electric Railways Elect. Engr. 240	2(2-0)
		Engineering English Engl. 110	2(2-0)
Seminar General Eng. 105	R	Seminar General Eng. 105	R
Thesis Elect. Engr. 195	R	Thesis Elect. Engr. 195	R

Curriculum in Flour-mill Engineering

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	Plane Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)		
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
{ Woodwork Shop 101	1(0-3)		
Forging I Shop 150 } *or*	1(0-3)		
Surveying I C. E. 101, 105	2(1-3)	Surveying I C. E. 101, 105	2(1-3) *or*
		{ Woodwork Shop 101	1(0-3)
		Forging I Shop 150 }	1(0-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Engineering Physics II Physics 212	5(4-3)
Calculus I Math. 113	5(5-0)	Calculus II Math. 116	3(3-0)
		Extempore Speech I Pub. Sp. 201	2(2-0)
Organic Chemistry Chem. 120	3(2-2, 1)	Kinematics Ap. Mech. 180	3(3-0)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Mechanical Drawing II Ap. Mech. 170	3(0-9)
Quantitative Analysis I Chem. 150	2(0-6)	Principles of Milling Mill. Ind. 101	1(0-3)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

JUNIOR

First Semester		Second Semester	
Applied Mechanics I Ap. Mech. 101, 105	4(3-3)	Applied Mechanics E-II Ap. Mech. 115, 120	4(3-2, 1)
Advanced Quantitative Analysis Chem. 260	2(0-6)	Hydraulics Ap. Mech. 130, 135	4(3-3)
American Industrial History Hist. 105	3(3-0)	Economics Econ. 101	3(3-0)
Business Law I Hist. 153	1(1-0)	Grain Products Mill. Ind. 103	2(2-0)
Grain Crop Production Agron. 101	3(2-3)	Milling Practice I Mill. Ind. 201	3(1-6)
Grain Marketing Mill. Ind. 102	3(3-0)	Milling Entomology Ent. 116	1(1-0)
Foundry Practice Shop 160	1(0-3)		
Seminar General Eng. 105	R	Seminar General Eng. 105	R

SENIOR

First Semester		Second Semester	
Wheat and Flour Testing Mill. Ind. 203	4(1-9)	Experimental Baking A Mill. Ind. 204	2(0-6)
Flour Mill Design Ap. Mech. 215	3(0-9)	Milling Practice II Mill. Ind. 202	2(0-6)
Steam and Gas Engineering I Steam and Gas 101, 105,	5(4-3)	Steam and Gas Engineering II Steam and Gas 110, 115,	4(3-3)
Business Organization Econ. 204	1(1-0)	Refrigeration, Heating and Ventilation Steam and Gas 210, 215,	3(2-3)
Factory Engineering Shop 245, 250	2(1-3)	Electrical Engineering C Elect. Engr. 160, 165	3(2-2, 1)
Machine Tool Work I Shop 170	2(0-6)	Engineering English Engl. 110	2(2-0)
Seminar General Eng. 105	R	Seminar General Eng. 105	R
Thesis Ap. Mech. 150, Shop 195, *or* Steam and Gas 195	R	Thesis Ap. Mech. 150, Shop 195, *or* Steam and Gas 195	R

Curriculum in Mechanical Engineering

The Arabic numeral immediately following the name of a subject indicates the number of semester credits: the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	Plane Analytical Geometry Math. 110	4(4-0)
College Algebra Math. 104	3(3-0)		
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
General Drawing Arch. 101	1(0-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
Woodwork Shop 101	1(0-3)		
Forging I Shop 150	1(0-3) *or*		
Surveying I C. E. 101, 105	2(1-3)	Surveying I C. E. 101, 105	2(1-3) *or*
		Woodwork Shop 101	1(0-3)
		Forging I Shop 150	1(0-3)
Military Science I Mil. Tr. 101	1(0-3)	Military Science II Mil. Tr. 102	1(0-3)
Engineering Lectures General Eng. 101	R	Engineering Lectures General Eng. 101	R
Physical Education M-I Phys. Ed. 103	(0-2)	Physical Education M-II Phys. Ed. 104	(0-2)

SOPHOMORE

First Semester		Second Semester	
Engineering Physics I Physics 211	5(4-3)	Engineering Physics II Physics 212	5(4-3)
Calculus I Math. 113	5(5-0)	Calculus II Math. 116	3(3-0)
Kinematics Ap. Mech. 180	3(3-0)	American Industrial History Hist. 105	3(3-0)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Mechanical Drawing II Ap. Mech. 170	3(0-9)
Foundry Practice Shop 160	1(0-3)	Metallurgy Shop 165	2(2-0)
Forging II Shop 155	1(0-3)	Pattern Making Shop 145	1(0-3)
Military Science III Mil. Tr. 103	1(0-3)	Military Science IV Mil. Tr. 104	1(0-3)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

JUNIOR

First Semester		Second Semester	
Applied Mechanics I Ap. Mech. 101, 105	4(3-3)	Applied Mechanics II Ap. Mech. 110, 120	6(5-2, 1)
Economics Econ. 101	3(3-0)	Hydraulics Ap. Mech. 130, 135	4(3-3)
Steam and Gas Engineering I Steam and Gas 101, 105,	5(4-3)	Steam and Gas Engineering II Steam and Gas 110, 115,	4(3-3)
Business Law I Hist. 153	1(1-0)	Business Organization Econ. 204	1(1-0)
Mechanical Drawing III Ap. Mech. 175	1(0-3)		
Graphic Statics Ap. Mech. 125	1(0-3)		
Machine Tool Work I Shop 170	2(0-6)	Machine Tool Work II Shop 225	2(0-6)
Seminar General Eng. 105	R	Seminar General Eng. 105	R

SENIOR

First Semester		Second Semester	
Electrical Engineering M-I Elect. Engr. 130, 135	4(3-2, 1)	Electrical Engineering M-II Elect. Engr. 140, 145	4(3-2, 1)
Power Plant Engineering Steam and Gas 201, 205,	5(3-6)	Refrigeration, Heating and Ventilation Steam and Gas 210, 215,	3(2-3)
Machine Design I Ap. Mech. 201, 205	5(3-6)	Machine Design II Ap. Mech. 210	2(0-6)
Factory Engineering Shop 245, 250	2(1-3)	Factory Design Shop 255	2(0-6)
Machine Tool Work III Shop 230	1(0-3)	Extempore Speech I Pub. Sp. 201	2(2-0)
		Engineering English Engl. 110	2(2-0)
Seminar General Eng. 105	R	Seminar General Eng. 105	R
Thesis Ap. Mech. 150, Shop 195, *or* Steam and Gas 195	R	Thesis Ap. Mech. 150, Shop 195, *or* Steam and Gas 195	R

Applied Mechanics and Machine Design

Professor Seaton*
Assistant Professor Wendt
Assistant Professor Pearce
Instructor Robert†

The courses in applied mechanics are designed primarily to teach the graphical and analytical methods of determining the forces acting on the parts of structures and machines, and of the effect of these forces on the parts. The courses are intended to be of a highly practical character. For the purpose of better fixing in the mind of the student the principles taught, the solution of a large number of problems involving these principles is required. The principles are further illustrated by means of the laboratory and drafting-room work, which parallels the classroom instruction. The textbooks in several of the courses are supplemented by notes and assigned reference work.

All laboratory tests of a commercial character are conducted in accordance with the standard methods prescribed by the national societies. Complete reports are required of the students on all laboratory exercises.

* Absent on leave for the period of the war.
† Absent in military service.

APPLIED MECHANICS LABORATORY†

For testing the strength of materials, this laboratory is provided with a 50,000-pound and a 100,000-pound Riehle universal testing machine, a 200,000-pound Olsen universal testing machine adapted for receiving columns up to 15 feet in height and beams up to 20 feet in length, a K. S. A. C.-Miller 250,000 inch-pound torsion testing machine, a 10,000-pound Riehle beam-testing machine, and the auxiliary apparatus usually found in well-equipped laboratories.

This laboratory also contains transmission and absorption dynamometers, a Shore sceleroscope, a Brinnell hardness machine, two Berry strain gages, several extensometers and deflectometers, planimeters, micrometers, slide rules, jacks, hoists, scales, gauges and other small instruments of taking weights and measures. A complete set of standard test weights ranging from one grain to 600 pounds total capacity is provided for the calibration of weighing apparatus.

The cement and concrete laboratory contains one each of Olsen, Riehle and Fairbanks 1,000-pound automatic shot cement-testing machines; two Vicat needles and one set of Gilmore needles for testing the consistency of cement paste; one steaming oven for accelerated tests; one electric drying oven; one large water-jacketed drying oven; a moist closet; immersion storage tanks; a complete set of fineness sieves from 4 meshes to 200 meshes per linear inch, including No. 20-mesh, 30-mesh and 200-mesh sieves certified by the U. S. Bureau of Standards; various scales and balances; and a full equipment of briquette, cube and cylindrical molds, including a large number of 8 in. by 16 in. cylindrical cast-iron molds for concrete. The laboratory also contains one Hobbs concrete building-block machine, one Miles block machine, and molds for various cast concrete products, such as drainage tile and fence posts.

The road materials laboratory contains an Olsen standard rattler for testing paving brick, a ball mill, a briquette former, one Page impact machine for cementation tests, one Page impact machine for toughness tests, a Deval abrasion machine, a Dorry hardness machine, a diamond saw, a core drill, and mechanical analysis sieves ranging from 3-inch holes to 200 meshes per linear inch. For the testing of bituminous road materials, the equipment includes N. Y. T. L. penetrometer, Scott viscosimeter, Forrest aggregate extractor, Smith ductility machine, New York State Board of Health oil tester, open-cup tester, N. Y. T. L. copper drying oven, Hubbard pycnometers, Becker analytical balance, and the necessary auxiliary apparatus.

HYDRAULICS LABORATORY

The hydraulics laboratory contains two hydraulic pits each of 25,000 gallons capacity, equipped with rectangular, triangular and trapezoidal weirs, an air-pressure tank, two hydraulic rams, two 4-inch volute centrifugal pumps, one 6-inch Hill-Tripp centrifugal pump, one 15-inch Layne and Bowler three-stage deep-well centrifugal pump, one positive

† This laboratory has been designated by law as the official testing laboratory for the State Highway Commission of Kansas.

rotary pump, one deep-well reciprocating pump, a water motor, a Pelton-Doble water wheel, a Trump water turbine, a small Price current meter, a Haskell current meter, electric motors for driving the pumps, and many pieces of small apparatus, such as an orifice tank, weirs, scales, tanks, hook gauges, pressure gauges, pressure regulators, water meters, including a 6-inch Venturi meter, and manometers.

COURSES IN APPLIED MECHANICS

FOR UNDERGRADUATES

101. APPLIED MECHANICS I RECITATION. Junior year, first semester and summer school. Class work, three hours. Three semester credits. Prerequisites: Calculus I. (Math. 113) and Engineering Physics II (Physics 212). Professor Seaton, Assistant Professors Wendt and Pearce, and Mr. Robert.

A study is made of the composition, resolution and conditions of equilibrium of concurrent and nonconcurrent forces; center of gravity; laws of rectilinear and curvilinear motion of material points; moments of inertia; relations between forces acting on rigid-bodies and the resulting motions; work energy and power; graphical solution of problems in statics. Text: Riggs' *Hancock's Applied Mechanics for Engineers.*

102. APPLIED MECHANICS A-I RECITATION. Sophomore year, second semester. Class work, three hours. Three semester credits. Prerequisites: Analytical Geometry (Math. 110), Descriptive Geometry (Arch. 104, 107), and Engineering Physics I (Physics 211). Professor Seaton, Assistant Professors Wendt and Pearce, and Mr. Robert.

The course comprises a study of statics, with applications to stresses in structures; center of gravity; moment of inertia. Algebraic methods are more generally employed, supplemented by graphic construction and numerous examples.

105. APPLIED MECHANICS I LABORATORY. Junior year, first semester and summer school. Laboratory work, three hours. One semester credit. Must accompany or follow Applied Mechanics I Recitation. Assistant Professor Wendt and Mr. Robert.

The calibration and use of laboratory measuring instruments and apparatus, such as micrometers, planimeters, dynamometers, platform scales, jacks, hoists and various types of testing machines. Text: Carpenter and Diederichs' *Experimental Engineering.* (This text is also used in the subsequent laboratory courses in applied mechanics and hydraulics, and in steam and gas engineering.)

110. APPLIED MECHANICS II RECITATION. Junior year, second semester. Class work, five hours. Five semester credits. Prerequisite: Applied Mechanics I. Professor Seaton, Assistant Professors Wendt and Pearce, and Mr. Robert.

Behavior of materials subjected to tension, compression and shear; riveted joints; torsion; shafts, and the transmission of power; strength and stiffness of simple and continuous beams and cantilevers; bending moments and shear forces in beams; design of beams of wood, steel and reinforced concrete; design of built-up beams and box girders; resilience of beams; stresses in columns and hooks; and the design of columns of wood, steel and reinforced concrete. Texts: Boyd's *Strength of Materials* and Hool's *Reinforced Concrete Construction,* Vol. I. *Cambria Steel* is used for reference.

115. APPLIED MECHANICS E-II RECITATION. Junior year, second semester. Class work, three hours. Three semester credits. Prerequi-

site: Applied Mechanics I. Professor Seaton, Assistant Professors Wendt and Pearce, and Mr. Robert.

The subject matter of this course is very similar to that of Applied Mechanics II, but much less time is devoted to the study of continuous girders and of reinforced concrete. Text: Boyd's *Strength of Materials.*

116. APPLIED MECHANICS A-II RECITATION. Junior year, first semester. Class work, three hours. Three semester credits. Prerequisites: Applied Mechanics A-I Recitation. Professor Seaton, Assistant Professors Wendt and Pearce, and Mr. Robert.

Behavior of materials subjected to tension, compression and shear; strength and stiffness of simple beams; moment and shear in flexure of beams, with diagrams; design of beams of wood, steel and reinforced concrete and design and investigation of columns.

120. APPLIED MECHANICS II LABORATORY. Junior year, second semester. Laboratory work, three hours. One semester credit. Must accompany or follow Applied Mechanics II or E-II Recitation. Professor Seaton, Assistant Professor Wendt, and Mr. Robert.

Tension, compression, shear and bending tests are made on specimens of iron, steel, wood and concrete. These include standard commercial tests and tests to determine the elastic properties of the materials. Torsion tests are also made on steel shafting. Standard tests are made on cement, on fine and coarse aggregates for concrete, and on brick.

121. APPLIED MECHANICS A-II LABORATORY. Junior year, first semester. Laboratory work, three hours. One semester credit. Must accompany or follow Applied Mechanics A-II Recitation. Assistant Professor Wendt and Mr. Robert.

This course comprises the use of micrometers, planimeters and slide rules and a study of the various testing machines. Tension, compression, shear and bending tests are made on specimens of iron, steel, wood and concrete. Tests are also made on cement and on the fine and coarse aggregates for concrete.

125. GRAPHIC STATICS. Junior year, first semester. Drafting-room practice, supplemented by lectures, three hours. One semester credit. Must accompany or follow Applied Mechanics I. Professor Seaton and Assistant Professor Wendt.

Graphical solutions are made of the stresses existing in a number of typical trusses, under a variety of loadings, and a detail design is made of one of the simpler forms of roof trusses.

126. GRAPHIC STATICS A-I. Junior year, first semester. Drafting-room practice, supplemented by lectures, three hours. One semester credit. Must accompany Applied Mechanics A-II Laboratory. Professor Seaton and Assistant Professor Wendt.

This course deals with the stresses in trusses, graphic methods being used. The elements of roof design and structural detail are treated. The graphic analysis of a voussoir arch is also given.

130. HYDRAULICS RECITATION. Junior year, both semesters. Class work, three hours. Three semester credits. Prerequisite: Applied Mechanics I. Professor Seaton, Assistant Professor Wendt, and Mr. Robert.

A study of fluid pressure, stresses in containing vessels and pipes, center of pressure, immersion and flotation; Bernoulli's theorem, with applications; flow through orifices, weirs, short and long pipes; loss of head due to various causes; flow of water in open channels, and its measurement; Kutter's formula; impulse and reaction of a jet; elements of water power, impulse wheels, reaction turbines and centrifugal pumps. Text: Daugherty's *Hydraulics.*

135. HYDRAULICS LABORATORY. Junior year, both semesters. Laboratory work, three hours. One semester credit. Must accompany or follow Hydraulics Recitation (Ap. Mech. 130). Professor Seaton, Assistant Professor Wendt, and Mr. Robert.

Tests to determine the coefficients of weirs, orifices, tubes and pipes; use and calibration of water meters; tests to determine loss of head in pipes due to various causes; measurement of water in open streams, and tests on water wheels, water turbines, rams and pumps.

140. CONCRETE CONSTRUCTION RECITATION. Senior year and elective, both semesters and summer school. Lectures and recitations, one hour. One semester credit. Professor Seaton and Assistant Professor Wendt.

Instruction is given in the principles governing the selection and preparation of materials, the proper proportioning of materials for different conditions, the construction of forms, mixing and handling concrete, elementary reinforced concrete construction, finishing concrete surfaces, stucco and plaster work, and the waterproofing and coloring of concrete. A brief study is made of the application of these principles to the making of concrete foundations, building blocks and bricks, posts, sidewalks, floors, tanks, cisterns, silos, and bridges and culverts. Text: Seaton's *Concrete Construction for Rural Communities.*

145. CONCRETE CONSTRUCTION LABORATORY. Senior year and elective, both semesters. Laboratory work, three hours. One semester credit. This course must accompany or follow Concrete Construction Recitation (Ap. Mech. 140). Professor Seaton, Assistant Professor Wendt, and assistants.

Laboratory and field work is given in hand and machine mixing and handling of concrete, and in the construction of forms, for such objects as machine and building foundations, floors, sidewalks, fence posts and building blocks. Tests are made on concrete cylinders and beams to illustrate the effect of different methods of treatment on the strength and reliability of plain and reinforced concrete.

150. THESIS. Senior year, continuing through the year. Professor Seaton and Assistant Professor Wendt.

The laboratories of the department furnish an excellent opportunity for experimental work suitable for thesis projects of students in any branch of engineering. Projects in machine design may also be worked out as theses in this department. The subject of the investigation should be selected, in consultation with the head of the department, at the beginning of the first semester of the senior year.

FOR GRADUATES AND UNDERGRADUATES

250. HIGHWAY ENGINEERING I LABORATORY. Senior year, first semester. Laboratory work, three hours. One semester credit. Prerequisite: Applied Mechanics II Laboratory. Assistant Professor Wendt.

This is a comprehensive course in the examination and testing of bituminous and non-bituminous road materials.

COURSES IN MECHANICAL DRAWING AND MACHINE DESIGN

FOR UNDERGRADUATES

160. MECHANICAL DRAWING I RECITATION. Sophomore year and elective, first semester and summer school. Lectures and recitations, one hour. One semester credit. Prerequisite: Descriptive Geometry (Arch. 104, 107). Must accompany Mechanical Drawing I Laboratory (Ap. Mech. 165). Professor Seaton, Assistant Professor Pearce, and Mr. Robert.

A review is made of the selection and use of drawing instruments, lettering developed surfaces and intersections, pictorial methods of representation and orthographic projection. A study is made of working drawings, conventional representations, modern drawing-room systems, technical sketching, and methods of reproduction of drawings. Text: French's *Engineering Drawing*.

165. MECHANICAL DRAWING I LABORATORY. Sophomore year and elective, first semester and summer school. Drafting-room practice, three hours. One semester credit. Prerequisite: Descriptive Geometry (Arch. 104, 107). Must accompany Mechanical Drawing I Recitation (Ap. Mech. 160). Professor Seaton, Assistant Professor Pearce, and Mr. Robert.

Practice is had in the construction of the inclined Gothic and Reinhardt systems of letters, and exercises in making working drawings from given plates. Special emphasis is laid upon the proper selection of views to present the necessary information in convenient form, and to give the proper dimensioning of the drawings. Attention is given to the arrangement of views to secure balance, and to the subject matter and layout of titles and notes. Text: French's *Engineering Drawing*.

170. MECHANICAL DRAWING II. Sophomore or junior year, second semester, and summer school. Drafting-room practice, nine hours. Three semester credits. Prerequisites: Mechanical Drawing I (Ap. Mech. 160, 165). Kinematics (Ap. Mech. 180) must accompany or precede this course. Professor Seaton, Assistant Professor Pearce, and Mr. Robert.

About one month is occupied in making free-hand sketches of simple machine and complete working drawings from these sketches without further reference to the objects. At least one drawing is traced, and a blue print made from the tracing. The remainder of the semester is devoted to the study of kinematic problems, including the design of cams, gears and quick returns to fulfill specified conditions. Center line drawings are first made, embodying the solution of the problems, and upon these are built working drawings of the machine parts. An effort is made to follow standard practice in the design of those details usually determined by empirical methods. Displacement and velocity diagrams are drawn for linkages, cams, and quick return motions.

175. MECHANICAL DRAWING III. Junior year, first semester. Drafting-room practice, three hours. One semester credit. Prerequisite: Mechanical Drawing II (Ap. Mech. 170). Steam and Gas Engineering I (Steam and Gas 101) must accompany or precede this course. Professor Seaton and Assistant Professor Pearce.

This includes the solution of a problem on the slide valve by the Zeuner diagram, followed by the design, mostly by empirical methods, of the cylinder, piston, steam chest, valve, and reciprocating parts of a steam engine. Kent's *Mechanical Engineer's Pocketbook* and Mark's *Mechanical Engineers' Handbook* are extensively used for reference, and each student is expected to have a copy of one of these books.

180. KINEMATICS. Sophomore or junior year, both semesters and summer school. Lectures and recitations, three hours. Three semester credits. Prerequisites: Plane Trigonometry (Math. 101) and Descriptive Geometry (Arch. 104, 107). Professor Seaton, Assistant Professor Pearce, and Mr. Robert.

An analysis of the motions and forms of the parts of machines. Among the subjects discussed are: bearings, screws, worm and wheel, rolling cylinders, cones, and other surfaces; belts, cords and chains; levers, cams and linkwork, with velocity and motion diagrams; quick returns, straight-line motions, and other special forms of linkages;

gearing and combinations of mechanisms. The solution of a large number of graphical and mathematical problems is required in this course. Text: Schwamb and Merrill's *Elements of Mechanism.*

FOR GRADUATES AND UNDERGRADUATES

201. MACHINE DESIGN I RECITATION. Senior year, first semester. Lectures and recitations, three hours. Three semester credits. Prerequisites: Applied Mechanics II and Mechanical Drawing II (Ap. Mech. 110, 170); Steam and Gas Engineering II (Steam and Gas 110). Must accompany Machine Design I Laboratory (Ap. Mech. 205). Professor Seaton and Assistant Professor Pearce.

A study is made of the straining actions in machine elements in general, with special attention to the design of springs, riveted fastenings, screw fastenings, key, force fits, tubs, plates, journals, bearings, shafting, couplings, and belt, rope, chain and gear transmissions. Some time is devoted to a study of friction and lubrication, to the action of reciprocating parts in engines, and to the problems arising in the design of high-speed machinery. Text: Kimball and Barr's *Elements of Machine Design* and Lanza's *Dynamics of Machinery.*

205. MACHINE DESIGN I LABORATORY. Senior year, first semester. Drafting-room practice, six hours. Two semester credits. Must accompany Machine Design I Recitation (Ap. Mech. 201). Professor Seaton and Assistant Professor Pearce.

A steam boiler is designed in strict conformity to the *A. S. M. E. Boiler Code.* Calculations are made for all parts except standard fittings, and working drawings are made. In the latter part of the term designs are made for a large pulley, shaft and shaft coupling.

210. MACHINE DESIGN II. Senior year, second semester. Drafting-room practice, six hours. Two semester credits. Prerequisites: Machine Design I (Ap. Mech. 201, 205). Professor Seaton and Assistant Professor Pearce.

This is a continuation of the preceding course, with the design of a small power shear. Calculations are made for all parts.

215. FLOUR-MILL DESIGN. Senior year, first semester. Drafting-room practice, nine hours, supplemented by lectures and assigned reading. Three semester credits. Prerequisites: Applied Mechanics E-II (Ap. Mech. 115) and Milling Practice I (Mill. Ind. 201). Professor Seaton and Mr.———.

A design is made for a medium capacity flour mill, including the selection and the planning of the arrangement of the machinery.

Architecture

Professor BAKER
Professor WALTERS (Emeritus)
Instructor HARRIS
Instructor SMITH

The courses in architecture are offered not only to provide for the fundamental training necessary for the practice of architecture, but also to give the student a facility and working knowledge which will be of immediate value to him upon graduation. The foundation which the student acquires in college should be supplemented by continual professional study, especially during those years immediately following graduation, when it is desirable that he should acquire practical experience in the employ and under the guidance of capable and experienced

members of the profession. Students are most urgently advised to acquire practical experience in an architect's office during the summer vacations of their college course.

Throughout the course the instruction by lectures, recitations and drawing-room practice is fully amplified and expanded by a free use of the equipment of the Department of Architecture. Within the Department is housed a good working library of the standard architectural works and leading professional magazines, together with the collections of lantern slides and photographs, to all of which the student has free access. Placed about the amply lighted and well-equipped rooms of the Department is a generous collection of plaster casts, including important examples of architectural fragments and ornament from historical monuments. On the walls of the drawing rooms, where they are constantly before the student, are hung selected examples from the Department's collection of original drawings, including specimens of both academic and current professional work. From time to time this exhibit is changed.

At frequent intervals representative men actually engaged in the practice of architecture and the allied arts and trades are invited to talk to and to advise the students. During the junior or senior year, under the direction of and in company with a member of the departmental faculty, each student is expected to make a visit to one or more of the neighboring cities, thus enabling him to acquaint himself with the representative work of the profession as well as with the operations and processes involved in the conduct of allied professions and industries.

All drawings or designs made during the student's course are to become the property of the Department, to be used or returned at the discretion of the faculty.

COURSES IN ARCHITECTURE

FOR UNDERGRADUATES

101. General Drawing. Freshman year, first semester. Drafting room, three hours. One semester credit. Mr. Smith.

The course is designed to teach the student the correct use of drawing instruments and materials, the principles of free-hand drawing, and the fundamentals of projection drawing methods. The planes of projection and the use of the angles are studied as a preparation for Descriptive Geometry.

104, 107. Descriptive Geometry. Freshman year, second semester. Lectures, one hour. Drafting room, six hours. Three semester credits. Prerequisite: Arch. 101. Mr. Harris and Mr. Smith.

In this course, which is a continuation of course 101, more advanced problems, involving the point, line, and plane; the intersection and development of the surfaces of geometric solids; single-curved, double-curved, and warped surfaces, with their sections, tangents and tangent planes, as well as the practical applications of the principles involved, are studied. Emphasis is laid on developing the student's ability to visualize drawings in the third dimension.

111. Free-hand Drawing I. Freshman year, first semester. Drafting room, six hours. Two semester credits. Mr. Harris.

The course comprises the drawing of simple objects and groups in out-

line, as exercises in developing the powers of observation as well as in training the hand. Special attention is given to representations of the third dimension. The Cross drawing glass is used as an aid during the earlier weeks of the course.

114. FREE-HAND DRAWING II. Freshman year, second semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 111. Mr. Harris.

This is an amplification and expansion of the principles taught in Free-hand Drawing I, as applied to architectural forms and architectural ornament. The work consists of drawing in charcoal from casts.

115. FREE-HAND DRAWING III. Sophomore year, first semester. Drafting room, three hours. One semester credit. Prerequisite: Arch. 114. Mr. Harris.

This is a continuation of Free-hand Drawing II, and consists of drawing from casts of architectural ornament and of the human figure, with occasional exercises in rapid sketching.

117. FREE-HAND DRAWING IV. Sophomore year, second semester. Drafting room, three hours. One semester credit. Prerequisite: Arch. 115. Mr. Harris.

In this course Free-hand Drawing III is continued.

118. FREE-HAND DRAWING V. Junior year, first semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 117. Mr. Harris.

This is a continuation of Free-hand Drawing III and IV, and consists of a more detailed study and rendering in charcoal of architectural ornament and the human figure. More time is given than in the previous course to rapid sketching in pencil and pen and ink, as well as to drawing from memory.

120. FREE-HAND DRAWING VI. Junior year, second semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 118. Mr. Harris.

In this course Free-hand Drawing V is continued.

121. FREE-HAND DRAWING VII. Senior year, first semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 120. Mr. Harris.

This is a continuation of Free-hand Drawing V and VI, but gives more time to the drawing of the human figure and to practice in original composition.

123. FREE-HAND DRAWING VIII. Senior year, second semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 121. Mr. Harris.

In this course Free-hand Drawing VII is continued.

126. PERSPECTIVE. Freshman year, second semester. Six hours for nine weeks. One semester credit. Prerequisite: Arch. 101 and 111. Simultaneously with Arch. 104, 107. Mr. Smith.

This course, consisting of drawing-room exercises and examinations, covers the study and practical application of the theory of perspective as related to architectural practice. In the latter part of the course drawing-room exercises are given to train the student to visualize in perspective objects represented in orthographic projection.

129. SHADES AND SHADOWS. Freshman year, second semester. Six hours for nine weeks. One semester credit. Prerequisites: Arch. 101 and 111. Simultaneously with Arch. 104, 107. Mr. Smith.

The course consists of a series of drawing-room exercises and exami-

nations, applying the principles of descriptive geometry in casting conventional architectural shadows. In these exercises the student is required to give careful consideration to the elemental architectural forms and principles of rendering used in his study of this subject. Text: McGoodwin's *Architectural Shades and Shadows.*

135. MATERIALS OF CONSTRUCTION I. Sophomore year, first semester. Class work, two hours. Two semester credits. Mr. Smith.

This is a recitation course covering the study of the properties and uses of the various building materials, together with the conditions and limitations under which they may be used in different types of building construction. Text: Kidder's *Building Construction and Superintendence,* Vols. I and II.

138. MATERIALS OF CONSTRUCTION II. Sophomore year, second semester. Class work, two hours. Two semester credits. Prerequisite: Arch. 135. Mr. Smith.

In this course Materials of Construction I is continued.

141. ELEMENTS OF DESIGN. Sophomore year, first semester. Class work, one hour. One semester credit. Prerequisites: Arch. 104, 107, 114, 126, and 129. Simultaneously with Arch. 142. Professor Baker.

The course comprises lectures, recitations, and examinations on the five orders and their derivative forms, with reference to their employment in architectural composition. The fundamental principles of composition are discussed as a preparation for the more extensive course in design. Text: Pierre Esquie's *Traite Elementaire d'Architecture Comprenant l'Etude Complete des Cinq Ordres.*

142. DESIGN I. Sophomore year, first semester. Drafting room, nine hours. Three semester credits. Prerequisites: Arch. 104, 107, 114, 126, and 129. Simultaneously with Arch. 141. Professor Baker.

Beginning with the application of the principles studied in Elements of Design, this course is outlined to develop the student's understanding of architectural composition and his ability to present architectural conceptions, thus laying the foundation for his esthetic training. By means of problems in original design, accompanied by a constant study and analysis of the best historical examples, the student is led to develop his sense of proportion and conception of beauty, at the same time acquiring through the training of hand and eye a facility in architectural composition and rendering. In this course each student receives individual instruction, accompanied by frequent criticisms of students' work before the entire class.

144. DESIGN II. Sophomore year, second semester. Drafting room, nine hours. Three semester credits. Prerequisite: Arch. 142. Professor Baker.

In this course Design I is continued.

145. DESIGN III. Junior year, first semester. Drafting room, fifteen hours. Five semester credits. Prerequisites: Arch. 117 and 144. Professor Baker.

This is a continuation of Design I and II. At frequent intervals during the year time problems or rapid design sketches are required to test the student's development and to give him practice in clear and concise expression. It is also required that at least one problem be presented in perspective.

147. DESIGN IV. Junior year, second semester. Drafting room, fifteen hours. Five semester credits. Prerequisite: Arch. 145. Professor Baker.

In this course Design III is continued.

148. DESIGN V. Senior year, first semester. Drafting room, twenty-four hours. Eight semester credits. Prerequisites: Arch. 120 and 147. Professor Baker.

In this course Design IV is continued.

150. DESIGN VI. Senior year, second semester. Drafting room, twenty-seven hours. Nine semester credits. Prerequisite: Arch. 148. Professor Baker.

In this course Design V is continued. A major portion of the semester is devoted to the preparation of a thesis.

153. HISTORY OF ARCHITECTURE I. Sophomore year, first semester. Class work, two hours. Two semester credits. Prerequisite: Arch. 114. Mr. Harris.

This is a lecture and recitation course covering the history of architecture from the dawn of civilization to the end of the Hellenistic age. Throughout the courses in the history of architecture the relation of architecture to the development of civilization is constantly emphasized. The lectures are given with the aid of lantern slides and written papers, with sketches, are required of each student.

156. HISTORY OF ARCHITECTURE II. Sophomore year, second semester. Class work, two hours. Two semester credits. Prerequisite: Arch. 153. Mr. Harris.

This course continues History of Architecture I and covers the period from the end of the Hellenistic age to the end of the Roman Empire.

159. HISTORY OF ARCHITECTURE III. Junior year, first semester. Class work, two hours. Two semester credits. Prerequisites: Arch. 117 and 156. Mr. Harris.

This course continues History of Architecture II and covers the period from the end of the Roman Empire to the Renaissance.

160. HISTORY OF ARCHITECTURE IV. Junior year, second semester. Class work, three hours. Three semester credits. Prerequisite: Arch. 159. Mr. Harris.

This course continues History of Architecture III and covers the period from the dawn of the Renaissance to modern times.

168. WORKING DRAWINGS AND SPECIFICATIONS I. Junior year, first semester. Drafting room, six hours. Two semester credits. Prerequisites: Arch. 104, 107, and 138. Professor Baker and Mr. Smith.

This is a course designed to give the student experience in the execution of working drawings as required in actual practice, together with a simultaneous study of the specifications that must accompany such drawings. Special emphasis is laid upon the uses of various building materials and their influence upon architectural design. From time to time the class visits buildings under construction as well as the offices of successful practicing architects.

169. WORKING DRAWINGS AND SPECIFICATIONS II. Junior year, second semester. Drafting room, six hours. Two semester credits. Prerequisite: Arch. 168. Professor Baker and Mr. Smith.

In this course Working Drawings and Specifications I is continued.

171, 172. DOMESTIC ARCHITECTURE. Junior year, first semester. Class work, two hours. Two semester credits. Prerequisites: Arch. 141, 142, and 156. Professor Baker.

This is a course of lectures, recitations and drawing-room exercises covering the history and development of the modern house. Following a historical survey a study is made of the problems of location, plan, and

design; types of construction, systems of sanitation, heating, and lighting. Throughout the course the student, along with the study of plans and designs and actual visits to houses, is required to solve problems.

174. HEAT, LIGHT, AND SANITATION. Junior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Physics 211. A course conducted by members of the departments of the College specializing in each of the respective subjects, each occupying a period of two hours a week for six weeks.

This course is planned to give the student in architecture a comprehensive view of and a limited practice in the solution of the larger and more fundamental problems of heat, light, and sanitation.

175. HISTORY OF ORNAMENT. Junior year, second semester. Class work, one hour. One semester credit. Prerequisites: Arch. 117 and 159. Mr. Harris.

The course takes up the study of the development of architectural ornament through the different styles, together with its relation to color as used in decoration. The instruction is given by means of lectures and required problems which are criticised before the class.

177. THEORY OF ARCHITECTURE. Junior year, second semester. Class work, one hour. One semester credit. Prerequisite: Arch. 159. Simultaneously with Arch. 147. Professor Baker.

This course is devoted to a more advanced analysis of the basic principles of architectural composition and their application to the problems in design. The course requires, by means of lectures and required papers, research and reference to both historical and modern examples of architecture.

178. PEN AND PENCIL RENDERING. Junior year, second semester. Drafting room, three hours. One semester credit. Prerequisite: Arch. 117. Mr. Harris.

This course in rendering with the pen and pencil is designed to give the student greater facility of expression and to impress upon him the importance of the line, textures, and light values. Simple out-of-doors sketching is required and the student is encouraged to continue such work from time to time, and to bring his sketches to the class for criticism.

180. COLOR. Junior year, second semester. Drafting room, three hours. One semester credit. Prerequisite: Arch. 117. Professor Baker.

The purpose of this course is to instill in the student an appreciation of color harmony and color values, as well as to give him practice in the handling of the medium as applied to architectural rendering. The instruction is conducted by means of lectures, together with the execution of color studies, outlined to prepare the student for the later course in Color Rendering.

183. CIVILIZATION AND ART I. Senior year, first semester. Class work, three hours. Three semester credits. Prerequisites: His. 123 and Arch. 160. Professor Baker.

This course comprises a survey of civilization from earliest history, laying special emphasis on the Hellenistic, Roman and Gothic periods, and tracing the economic, political, racial and religious phases of history simultaneously with the artistic developments of each epoch. The course consists of lectures, recitations, written papers and reseach, the accomplishment of which is greatly aided by a free use of lantern slides, photographs, and library references.

185. CIVILIZATION AND ART II. Senior year, second semester. Class work, three hours. Three semester credits. Prerequisite: Arch. 183. Professor Baker.

This continues Civilization and Art I to the close of the Renaissance.

188. COLOR RENDERING. Senior year, first semester. Drafting room, three hours. One semester credit. Prerequisites: Arch. 120 and 180. Professor Baker.

The purpose of this course is to familiarize the student with the applications of color harmony and color values to architectural rendering and to give him experience in the execution of architectural subjects in connection with landscape. As in Pen and Pencil Rendering, out-of-doors sketching is required and the student is encouraged to continue such work and to bring his sketches to the classroom for criticism.

190. OFFICE PRACTICE. Senior year, second semester. Class work, one hour. One semester credit. Prerequisite: Senior standing. Professor Baker.

This course is designed to acquaint the student with the relations between the architect and the contractor, the client, the building trades, the recognized architectural societies, and the community. The problems of building laws, labor laws, contracts and bonds are also discussed. The work includes lectures, recitations, research, and reports.

Civil Engineering

Professor CONRAD
Assistant Professor FRAZIER
Instructor FURR

The instruction in civil and highway engineering is given by means of lectures and recitations, and by the practice in the field, in the drafting room, and in the laboratory. The heaviest technical work of the curriculum falls in the junior and senior years, during which, in addition to studies in other departments, courses are given in civil engineering drawing and in the analysis of stresses in framed structures, structural design, drainage and irrigation engineering, construction and design in masonry and concrete, railways, highway engineering, astronomy, and geodesy. During the entire senior year considerable time is devoted to thesis work.

The seminar, coming once each week, affords the students an opportunity to become acquainted with modern engineering practice through discussions and references to current periodicals.

In addition to the laboratory equipment found in other engineering departments, which is available to civil engineering students as well, the Department of Civil Engineering possesses a good assortment of transits, levels, plane tables, tapes, and chains. The department also owns a precise level, a direction theodolite, a repeating theodolite, a base-line outfit. The department has installed a recording gauge which will make a continuous record of the stage of the Kansas river, to be used in computing the flood discharge of that stream. This information will be of great value in future years as a basis for designing works for flood protection.

COURSES IN CIVIL ENGINEERING

FOR UNDERGRADUATES

101. SURVEYING I RECITATION. Freshmen or sophomore year, both semesters. Class work, two hours a week for about one-half of the semester. One semester credit. Prerequisite: Plane Trigonometry (Math. 101). Assistant Professor Frazier and Mr. Furr.

This is a brief course in the use and care of engineer's surveying instruments. Text: Pence and Ketchum's *Surveying Manual.*

105. SURVEYING I LABORATORY. Freshman or sophomore year, both semesters. Field work, six hours a week during the second half of the semester. One semester credit. Prerequisite: Plane Trigonometry (Math. 101). Assistant Professor Frazier and Mr. Furr.

The time is devoted to exercises in practical problems involving the use of the transit and level. Special emphasis is given to methods of keeping field notes. Text: Pence and Ketchum's *Surveying Manual.*

110. SURVEYING II RECITATION. Sophomore year, first semester. Class work, two hours. Two semester credits. Prerequisite: Surveying I. Mr. Furr.

The course comprises the study of land topographic and hydrographic surveying. Text: J. B. Johnson's *Theory and Practice of Surveying.*

115. SURVEYING II LABORATORY. Sophomore year, first semester. Field and drafting-room work, three hours. One semester credit. Prerequisite: Surveying I Laboratory. Mr. Furr.

Exercise in plane and topographic surveying, including both field work and plotting. Text: J. B. Johnson's *Theory and Practice of Surveying.*

120. MASONRY AND FOUNDATIONS. Sophomore year, second semester. Class work, two hours. Two semester credits. Prerequisite: Engineering Physics I (Physics 211). Professor Conrad.

A course devoted to a study of the principles underlying the design and construction of foundations, the stresses in plain masonry structures, and the method of designing such structures.

125. CIVIL ENGINEERING DRAWING I. Sophomore year, second semester. Drafting room, six hours. Two semester credits. Prerequisite: Mechanical Drawing I (Ap. Mech. 160, 165). Assistant Professor Frazier.

A course devoted to the application of stereotomy, shades and shadows, isometric drawing, and perspective and copying working drawings of engineering structures. The principles are explained to the students by such short lectures as seem necessary for the purpose. No textbook is used.

130. ELEMENTS OF IRRIGATION AND DRAINAGE RECITATION. Elective, first semester. Class work, two hours a week for the first half of the semester. One semester credit. No prerequisite. Assistant Professor Frazier.

This course comprises a brief treatment of the subjects from the agriculturist's point of view. Texts: Elliott's *Engineering for Land Drainage,* and Fortier's *Use of Water in Irrigation.*

135. ELEMENTS OF IRRIGATION AND DRAINAGE LABORATORY. Elective, first semester. Field work, six hours a week for the second half of the semester. One semester credit. No prerequisite. Assistant Professor Frazier.

Practice work in the field and drawing room is devoted to the laying out and plotting of simple farm drainage and irrigation systems. Same texts as in C. E. 130.

140. FARM SANITATION AND WATER SUPPLY. Elective, second semester. Class work, two hours. Two semester credits. No prerequisite. Professor Conrad.

A study of sources of water supply, installation of cisterns on the farm, and farm sanitation. No text is used, the instruction being given by lectures, bulletins and library references.

145. RAILWAY ENGINEERING I. Junior year, first semester. Class work, two hours. Two semester credits. Prerequisites: Surveying II and Civil Engineering Drawing I (C. E. 110, 125). Assistant Professor Frazier.

This is a short course in the theory of railway engineering based on Wellington's mechanical theory. Considerable time is also devoted to the study of track construction and maintenance, and to the design of yards and terminals. Texts: Raymond's *Elements of Railroad Engineering,* and Allen's *Railroad Curves and Earthwork, with Tables.*

150. SURVEYING III RECITATION. Junior year, first semester. Class work, two hours. Two semester credits. Prerequisite: Surveying II. Mr. Furr.

This course comprises a study of city and mine surveying, computation of volumes, and railroad curves. Texts: J. B. Johnson's *Theory and Practice of Surveying,* and Allen's *Railroad Curves and Earthwork, with Tables.*

155. SURVEYING III LABORATORY. Junior year, first semester. Field and drafting-room work, three hours. One semester credit. Prerequisite: Surveying II Laboratory. Mr. Furr.

The field exercises are devoted to practice work in topographic surveying and railroad curves. Time in the drafting room is devoted principally to topographic mapping. Texts same as in C. E. 150.

160. DRAINAGE AND IRRIGATION I. Junior or senior year, second semester. Class work, three hours. Three semester credits. Hydraulics (Ap. Mech. 130) must be taken with this course or precede it. Professor Conrad.

In this course a study is made of the application of engineering principles to the design and construction of drainage and irrigation works. Considerable attention is paid to the development of ground-water supplies for irrigation. Texts: Elliott's *Engineering for Land Drainage,* and Newell and Murphy's *Principles of Irrigation Engineering.*

170. THESIS. Senior year, continuing through both semesters. Professor Conrad. All candidates for the degree of bachelor of science in civil engineering are required, during their senior year, to prepare a thesis. This thesis may be a report on a proposed design, an original investigation, or a library research. Civil engineering students may, with the approval of the head of the department, take their thesis work outside of the department. The thesis subject may be selected and approved by the head of the department in which the work is done before October first next preceding the commencement at which the candidate proposes to graduate.

FOR GRADUATES AND UNDERGRADUATES

201. BRIDGE STRESSES. Senior year, first semester. Class work, four hours. Four semester credits. Prerequisite: Applied Mechanics II (Ap. Mech. 110). Professor Conrad.

This course involves a study of the algebraic and graphical methods of computing the stresses in bridges, leading up to the subject of Bridge Design in the following semester. Text: Merriman and Jacoby's *Roofs and Bridges,* Part I.

205. CIVIL ENGINEERING DRAWING II. Senior year, first semester. Drafting room, six hours. Two semester credits. Prerequisite: Civil Engineering Drawing I (C. E. 125). Professor Conrad.

This course is devoted to graphic statics and the design of simple roof trusses in timber and steel. Text: Merriman and Jacoby's *Roofs and Bridges*, Part II.

210. ASTRONOMY AND GEODESY RECITATION. Senior year, first semester. Class work, three hours. Three semester credits. Prerequisite: Surveying III. Assistant Professor Frazier.

A brief course in the elements of practical astronomy followed by a study of the precise methods of surveying and leveling. Text: J. B. Johnson's *Theory and Practice of Surveying*.

215. ASTRONOMY AND GEODESY LABORATORY. Senior year, first semester. Field work, three hours. One semester credit. Prerequisite: Surveying III Laboratory. Professor Conrad.

The work is devoted to simple astronomical observations, principally for determining the true meridian; to base line measurements and triangulation work. Each student will also be required to run a short circuit with the precise level.

220. WATER SUPPLY. Senior year, first semester. Class work, two hours. Two semester credits. Prerequisite: Hydraulics (Ap. Mech. 130). Professor Conrad.

The course deals with the water supply for cities from the standpoints of consumption, collection, storage, distribution, and purification.

225. SEWERAGE. Senior year, first semester. Class work, two hours. Two semester credits. Prerequisite: Hydraulics (Ap. Mech. 130). Assistant Professor Frazier.

A study is made of the problems met in the design and construction of sewer systems and disposal plants for cities of moderate size. Text: Folwell's *Sewerage*.

230. HIGHWAY ENGINEERING I RECITATION. Senior year, first semester. Class work, two hours. Two semester credits. Prerequisite: Applied Mechanics II (Ap. Mech. 110). Mr. Furr.

A study of the principles underlying the location, construction and maintenance of all ordinary types of roads and pavements. Text: Blanchard and Drown's *Textbook of Highway Engineering*. (For the laboratory work in connection with this course, see Ap. Mech. 250.)

240. BRIDGE DESIGN RECITATION. Senior year, second semester. Class work, three hours. Three semester credits. Prerequisite: Bridge Stresses (C. E. 201). Professor Conrad.

This course comprises a study of the designing of pin connected and riveted simple trusses for highway and railroad traffic; the design of through and deck-plate girders is also taken up. Text: Merriman and Jacoby's *Roofs and Bridges*, Part III.

245. BRIDGE DESIGN LABORATORY. Senior year, second semester. Drawing, three hours. One semester credit. Prerequisite: Bridge stresses (C. E. 201). Bridge Design (C. E. 240) must accompany this course. Professor Conrad.

This course comprises general drawings for a highway truss bridge, a railroad truss bridge and a railroad deck plate girder. Text: Merriman and Jacoby's *Roofs and Bridges*, Part III.

250. CONCRETE DESIGN RECITATION. Senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Applied Mechanics II (Ap. Mech. 110). Professor Conrad.

An application of the principles of reinforced concrete to the design of chimneys, buildings, retaining walls, dams and bridges. Text: Taylor and Thompson's *Concrete, Plain and Reinforced.*

255. CONCRETE DESIGN LABORATORY. Senior year, second semester. Drafting-room work, three hours. One semester credit. Prerequisite: Applied Mechanics II (Ap. Mech. 110). Professor Conrad.

In this course the students make drawings of reinforced concrete retaining walls, dams, slab and girder bridges and arch bridges. Text: Taylor and Thompson's *Concrete, Plain and Reinforced.*

260.—RAILWAY ENGINEERING II RECITATION. Optional, senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Railway Engineering I (C. E. 145). Assistant Professor Frazier.

This course comprises the study of railway operation and maintenance.

265. RAILWAY ENGINEERING II LABORATORY. Optional, senior year, second semester. Field and drafting room, six hours. Two semester credits. Prerequisite: Railway Engineering I (C. E. 145). Assistant Professor Frazier.

In the field, reconnoissance and survey of a short railroad is made, and the office work consists in making the maps, profiles and estimates from the survey. Text: Allen's *Railroad Curves and Earthwork.*

270. HIGHWAY ENGINEERING II RECITATION. Optional, senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Highway Engineering I (C. E. 230). Mr. Furr.

This course consists in a study of highway laws, highway administration in the various states, and highway economics.

275. HIGHWAY ENGINEERING II LABORATORY. Optional, senior year, second semester. Field and drafting room, six hours. Two semester credits. Prerequisite: Highway Engineering I (C. E. 230). Mr. Furr.

In the field, a reconnoissance and survey for a highway a few miles long is made. The work in the drafting room consists in making the maps, profiles and estimates from the survey.

280. DRAINAGE AND IRRIGATION II RECITATION. Optional, senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Drainage and Irrigation I. Professor Conrad.

A continuation of the former course in Drainage and Irrigation, dealing with the design of irrigation structures and the management of irrigation projects.

285. DRAINAGE AND IRRIGATION II LABORATORY. Optional, senior year, second semester. Field and drafting room, six hours. Two semester credits. Professor Conrad.

The field work consists in making the survey for a drainage or irrigation project. In the office the maps, estimates and designs will be made, using the survey as a basis.

Electrical Engineering

Professor REID
Assistant Professor KLOEFFLER
Instructor ————

Instruction in this department is given by means of textbooks, lectures, reference work, and laboratory periods. The class work is carefully illustrated by means of demonstration apparatus and the projection lantern.

The electrical laboratory for the work of the third year is provided with standard instruments of measurements, including standards of resistance, self-induction, capacity, etc. A complete line of standard makes of ammeters, voltmeters, wattmeters, and galvanometers is also provided. The different laboratories of the department are supplied with electric current from the following sources: 120-volt storage-battery circuit; 110-volt direct-current circuit; 110-volt alternating-current circuit; 220-volt direct-current circuit. Voltages up to 60,000 can be produced in the dynamo laboratory for testing purposes.

The modern equipment contained in the telephone laboratory has been made possible through the liberal coöperation of various telephone companies. It includes a Western Electric demonstration panel, containing all parts and circuits for connecting two subscribers through the A board and B board of the multi-office exchange; a Swedish-American magneto wall switchboard; a demonstration outfit of the Automatic Telephone Company type, including line switches, first and second selectors and connector switches; Kellogg Switchboard & Supply Company's switchboard panel, and two demonstrating panels of the Stromberg-Carlson type, one containing all the parts and circuits for the magneto switchboard and the other the same for common battery board. A complete line of bridging magneto and common battery wall telephone sets of all above-mentioned makes, including two of Leigh Cracraft type, will be found in the laboratory. In addition there are series telephone sets, desk telephones, various individual telephone parts and potentiometer boards, etc., for making transmission efficiency tests.

The electrical engineering laboratory is provided with a number of standard commercial machines, among them a 30-kilowatt 2,300-volt polyphase alternating-current generator, a 15-kilowatt 125-volt alternating-current generator, which may be connected as a single-phase, two-phase, three-phase, six-phase or twelve-phase machine; a 7½-kilowatt synchronous converter, which may be used as a one-, two-, three-, or four-phase motor; single- and three-phase induction motors; a 5-horsepower phase wound induction motor; a 20-horsepower auxiliary pole 220-volt direct-current motor, with a speed range from 250 to 1,000 R. P. M.; a 26-horsepower 220-volt direct-current motor; a 15-kilowatt direct-current generator, a Wood arc machine, a 4½-kilowatt 125-volt direct-current generator and several smaller machines; a 60-cell 160-ampere-hour storage battery, current transformers, arc lamps, constant potential transformers, 20,000- and 60,000-volt testing transformers, marble and slate switchboards, a Tirrel regulator, speed controllers, and a full line of ammeters, voltmeters, wattmeters, etc., for testing purposes.

Recent additions to the laboratory include a 3-movement oscillograph with photographing attachments, with which simultaneous waves of three quantities may be observed and photographed; and a phase-changing set consisting of two 7½-kilowatt alternating-current generators and two 15-horsepower direct-current motors, speed variable from 600 to 1,800 revolutions per minute. All four machines are mounted on the same bedplate, and by means of flanged couplings can be run in any combination of two, three or four machines. The generator armature windings are brought out to twelve terminals and may be connected for single-, two- and three-phase Y, or delta six-phase and twelve-phase, and when running in synchronism the armatures of the two machines may be turned, with reference to each other, through 180 degrees, so that any phase difference that is desired may be obtained. The generators may be used in parallel, as synchronous motors, and in any other desired combinations.

The equipment includes also two compound-wound direct-current generators on the same sub-base, to illustrate generators in parallel operation. Edison 3-wire system, "pump-back" factory efficiency tests, etc.; a 10 kw. special rotary converter, designed for use in single-, three-, or six-phase operation, having amortisseur winding, speed-limiting and oscillating devices and commutating poles. Three 5 kw. transformers are accessories of this machine. A pair of 6 kw. compound-wound generators will be used to furnish the laboratory with a 110-220-volt 3-wire system from the 220-volt lines supplied by the power plant, and to illustrate commercial use of such systems. The Electric Controller and Manufacturing Company, of Cleveland, have donated a valuable automatic motor starter and controller, such as is used with motors driving machine tools.

COURSES IN ELECTRICAL ENGINEERING

FOR UNDERGRADUATES

101. DIRECT-CURRENT MACHINES I RECITATION. Junior year, first semester. Recitations or lectures, three hours. Three semester credits. Prerequisites: Calculus II (Math. 116) and Engineering Physics II (Physics 212). Professor Reid.

The work consists of a detailed study of the fundamental principles of magnetic and electric circuits and their application to the various types of direct-current machines. Numerous problems involving the application of the principles are given as a part of the course. The class work is planned to coördinate with the work in the electrical engineering laboratory. Text: Franklin and Estey's *Elements of Electrical Engineering*, Vol. I.

105. DIRECT-CURRENT MACHINES I LABORATORY. Junior year, first semester. Laboratory work, three hours. One semester credit. This course should accompany or follow Direct-current Machines I Recitation. Assistant Professor Kloeffler.

A series of experiments is outlined which is designed to necessitate careful, accurate measurement. The student is obliged to make all electrical connections with the necessary instruments in the circuit, and to record the required data. From the laboratory records a written report upon each experiment or test must be submitted. The laboratory exercises include tests for armature and field resistance, potential curves, machine characteristics, motor and generator efficiencies. Text: Swenson and Frankenfield's *Testing of Electro-magnetic Machinery*, Vol. I.

110. DIRECT-CURRENT MACHINES II RECITATION. Junior year, second semester. Lectures or recitations, three hours. Three semester credits. Prerequisite: Direct-current Machines I. Assistant Professor Kloeffler.

This course is a continuation of Direct-current Machines I. It involves a detailed study of the various types of direct-current machinery with respect to theory and operation. The latter part of the course is devoted to a special examination of the different methods of testing generators and motors, and to the special application of the different classes of machines to commercial uses. Text: Franklin and Estey's *Elements of Electrical Engineering*, Vol. I.

115. DIRECT-CURRENT MACHINES II LABORATORY. Junior year, second semester. Laboratory work, three hours. One semester credit. This course should accompany or follow Direct-current Machines II Recitation. Assistant Professor Kloeffler.

Special attention is given in this course to the different methods of determining generator and motor efficiencies and to the proper tabulation and interpretation of results. Text: Swenson and Frankenfield's *Testing of Electro-magnetic Machinery*, Vol. I.

120. INSTRUMENTS AND CALIBRATION RECITATION. Junior year, first semester. Lectures and recitations, one hour. One semester credit. Prerequisites: Calculus II (Math. 116) and Engineering Physics II (Physics 212). Assistant Professor Kloeffler.

This course includes a study of the different types of electrical measuring instruments and their application to electrical engineering testing. Text: Jansky's *Electrical Meters*, supplemented by lectures and notes.

125. INSTRUMENTS AND CALIBRATION LABORATORY. Junior year, first semester. Laboratory work, three hours. One semester credit. This course should accompany or follow Instruments and Calibration Recitation. Assistant Professor Kloeffler.

The laboratory work in this subject includes the calibration of both direct and alternating-current measuring instruments and their uses in measuring current, potential, power, resistance, inductance, and capacity.

130. ELECTRICAL ENGINEERING M-I RECITATION. Senior year, first semester. Lectures or recitations, three hours. Three semester credits. Prerequisites: Engineering Physics II (Physics 212) and Calculus II (Math. 116). Assistant Professor Kloeffler.

This course covers the subject of direct-current machines with reference to the fundamental laws of the electric circuit, the principles of direct-current machinery, and the more important commercial tests. Text: Bailey's *Dynamo-Electric Machinery*.

135. ELECTRICAL ENGINEERING M-I LABORATORY. Senior year, first semester. Laboratory, three hours. One semester credit. This course should accompany or follow Electrical Engineering M-I Recitation. Assistant Professor Kloeffler.

Practice is given in the proper use of electrical measuring instruments. The experiments include a variety of tests requiring accurate observation, and a knowledge of the theory of dynamo machines. The various standard characteristics and efficiency tests are given. A written report on each test is required.

140. ELECTRICAL ENGINEERING M-II RECITATION. Senior year, second semester. Lectures and recitations, three hours. Three semester credits. Prerequisite: Electrical Engineering M-I. Professor Reid.

The work covers briefly the important principles of alternating-current phenomena. The leading types of alternating-current machinery

and apparatus are discussed with reference to their operation and their adaptability to different classes of service. Text: Bailey's *Dynamo-Electric Machinery.*

145. ELECTRICAL ENGINEERING M-II LABORATORY. Senior year, second semester. Laboratory work, three hours. One semester credit. Assistant Professor Kloeffler.

This course includes practice in the use of alternating-current instruments; standard tests of alternators, motors, and transformers; and methods of operating the different types of alternating-current machinery.

150. ELECTRICAL MACHINE DESIGN I. Senior year, first semester. Laboratory work, three hours. One semester credit. Prerequisite: Direct-current Machines II. Assistant Professor Kloeffler.

The purpose of the course is to acquaint the student with the principles of commercial design of direct-current machinery. Each student is required to make the necessary calculations and drawings for a direct-current generator. Text: Gray's *Electrical Machine Design.*

155. ELECTRICAL MACHINE DESIGN II. Senior year, second semester. Laboratory, six hours. Two semester credits. Prerequisites: Alternating-current Machines II, and Electrical Machine Design I. Assistant Professor Kloeffler.

This course embraces the elementary principles underlying the design of alternating-current apparatus. Students are required to make calculations and drawing for an alternating-current machine. Text: Gray's *Electrical Machine Design.*

160. ELECTRICAL ENGINEERING C RECITATION. Senior year, second semester. Recitations or lectures, two hours. Two semester credits. Prerequisite: College Physics. Mr. ———.

This work is designed to cover briefly the fundamental principles of direct-current and alternating-current electricity. Emphasis is laid upon the proper installation and operation of the different classes of machines, and the use of electricity for lighting and power. Text: Morecroft's *Continuous and Alternating Machines.*

165. ELECTRICAL ENGINEERING C LABORATORY. Senior year, second semester. Laboratory work, three hours. One semester credit. Mr. ———.

The laboratory practice is designed to give the student a knowledge of the most important commercial tests. The proper use of electrical instruments is emphasized. A written report of each laboratory test is required.

195. THESIS. Senior year, continuing through both semesters. Professor Reid and Assistant Professor Kloeffler.

The subject for thesis work is selected in consultation with the head of the department, at the beginning of the first semester of the senior year. The work is continued during the second semester. Every opportunity is given the student to work out original ideas as to design and operation of electrical apparatus and machinery.

FOR GRADUATES AND UNDERGRADUATES

201. ALTERNATING-CURRENT MACHINES I RECITATION. Junior year, second semester. Recitations or lectures, two hours. Two semester credits. Prerequisites: Calculus II (Math. 116) and Direct-current Machines II. Professor Reid.

The work consists of a mathematical treatment of alternating-current phenomena. A study is made of the vector method of treating alternating-current problems. The solution of problems involving single and

polyphase circuits forms an important part of the course. Text: Franklin and Estey's *Elements of Electrical Engineering*, Vol. II.

205. ALTERNATING-CURRENT MACHINES I LABORATORY. Junior year, second semester. Laboratory work, three hours. One semester credit. This course should accompany or follow Alternating-current Machines I Recitation. Professor Reid.

It is the aim of this course to provide a series of experiments illustrating the theoretical work of the lecture room. Practice is given in the accurate measurement of capacity and inductance, and the effect of each upon the circuit. The latter part of the course is devoted to a study of polyphase circuits.

210. ALTERNATING-CURRENT MACHINES II RECITATION. Senior year, first semester. Recitations or lectures, four hours. Four semester credits. Prerequisite: Alternating-current Machines I. Professor Reid.

This is a continuation of Alternating-current Machines I. The course consists of a study of the theory of alternating-current machinery, alternators, synchronous motors, induction motors, transformers, and the various devices used in connection with alternating-current work. A study is also made of the application of the different types of machinery to industrial uses. Text: Franklin and Estey's *Elements of Electrical Engineering*, Vol. II.

215. ALTERNATING-CURRENT MACHINES II LABORATORY. Senior year, second semester. Laboratory work, six hours. Two semester credits. This course should accompany or follow Alternating-current Machines II Recitation. Professor Reid.

A series of experiments involving special and commercial tests of alternators, synchronous motors, transformers, and the different types of alternating-current machinery and apparatus.

220. TELEPHONY RECITATION. Senior year, first semester. Class work, two hours. Two semester credits. Prerequisites: Calculus II (Math. 116) and Engineering Physics II (Physics 212). Assistant Professor Kloeffler.

This course consists of a consideration of the principles of acoustics and alternating-current phenomena involved in telephone practice. A detailed investigation is made of telephone apparatus and circuits, with reference to their adaptation to various kinds of telephone service. This is followed by a study both of the design and maintenance of telephone lines and central-office apparatus, and of central-office methods, the selection of apparatus, and methods of handling telephone traffic. Text: McMeen and Miller's *Telephony*.

225. TELEPHONY LABORATORY. Senior year, first semester. Laboratory, three hours. One semester credit. This course should accompany or follow Telephony Recitation. Assistant Professor Kloeffler.

This course includes the study and measurement of telephone parts, the actual wiring of telephone circuits on the magneto, common battery and automatic systems, location of line trouble and transmission efficiency tests on various types of apparatus and circuits.

230. GENERATION AND DISTRIBUTION OF ELECTRICAL ENERGY. Senior year, second semester. Recitations or lectures, three hours. Three semester credits. Prerequisite: Alternating-current Machines II. Professor Reid.

This course is designed to cover station operation and management, methods of power transmission, and systems of distribution. Each student is assigned an important electrical power station, upon which a detailed written report is required. Text: Ferguson's *Elements of Electrical Transmission*.

235. ILLUMINATING ENGINEERING. Senior year, second semester. Lectures and recitations, two hours. Two semester credits. Prerequisites: Calculus II (Math. 116) and Engineering Physics II (Physics 212). Assistant Professor Kloeffler.

This course is devoted to a study of photometry and light standards and the principles of illumination. The different types of incandescent and arc lamps are discussed with reference to their efficiency and adaptability to different classes of lighting. Systems of street illumination are also studied.

240. ELECTRIC RAILWAYS. Senior year, second semester. Recitations or lectures, two hours. Two semester credits. Prerequisite: Alternating-current Machines II (Elect. Eng. 210). Professor Reid.

A study is made of the development of electric traction; traffic conditions and train schedules; speed-time curves; power generations and distribution for electric railways; signal systems; types of cars and locomotives in use; various control systems; and adaptability of electric traction to steam roads. Text: Harding's *Electric Railway Engineering.*

Farm Engineering

Professor EKBLAW
Instructor SANDERS
Instructor COLLINS

This department gives instruction in such branches of engineering as are directly related to agriculture. It also correlates and gives general supervision to such courses presented in other engineering departments as are open to students in agriculture and agricultural engineering, in order that the agricultural application and uses of engineering principles, methods, and materials may be kept clearly before the student.

In all the courses given the time is carefully apportioned between the classroom and the laboratory, in order to present the subject in the clearest and most forceful way. The practical application of theoretical principles is emphasized.

The various courses in rural architecture, farm machinery, and tractors, are under the direct supervision of this department. The student is taught the requirements of farm buildings, is trained to plan their arrangement, and to select and use the proper construction materials in the most advantageous way. The farm machinery laboratory equipment is unusually ample and complete; all kinds of the most modern implements, to the value of nearly $10,000, are available, whereby their construction, adjustment, operation, and care may be fully covered, not only in laboratory study, but in field work and draft tests as well. The study of traction engines is arranged to cover thoroughly the construction, operation and repair of the numerous modern tractors, which are part of the regular equipment; traction tests in conjunction with various types of farm power machinery are also made. The tractor laboratory is also equipped with four tractor power units mounted on bases, with various types of tractor ignition apparatus, and with complete apparatus for power and draft tests. All farm machinery and tractor equipment is kept up to date through a system of exchange with the manufacturers whereby old machines are replaced, when advisable, by new ones. Dur-

ing the college year 1917-1918, there were twenty gas and steam tractors in use in the tractor laboratory.

The comparatively recent development of this work and its rapidly growing importance, renders investigational study very valuable and special attention is given to the courses covering this phase of the subject.

COURSES IN FARM ENGINEERING

FOR UNDERGRADUATES

102. RURAL ARCHITECTURE. Elective, both semesters. Lectures, recitations, drafting-room practice, six hours. Three semester credits. Professor Ekblaw.

This course includes lectures on the requirements, details of arrangement, and materials of construction for barns, storage and work buildings for the farm. The preparation of specifications, bills of material and estimates of costs is an essential part of the course. In the drafting-room plans are prepared for typical farm buildings.

106. FIELD MACHINERY RECITATION. Sophomore year and elective, first semester. Class work, one hour. One semester credit. Professor Ekblaw and Mr. Collins.

The fundamentally important definitions and principles relating to farm machinery are first given, this being followed by material concerning the development, construction, operation and use of soil preparation, seeding, cultivating, harvesting and miscellaneous machinery. The importance of proper selection and care of farm machinery is emphasized.

107. FIELD MACHINERY LABORATORY. Sophomore year and elective, first semester; laboratory, three hours. One semester credit. Mr. Collins.

A detailed study of the machines taken up in the classroom is conducted both in the laboratory and in the field.

111. POWER MACHINERY RECITATION. Elective, second semester. Class work, one hour. One semester credit. Prerequisite: Field Machinery. Professor Ekblaw and Mr. Collins.

This course continues the study of field machinery with special reference to those machines requiring mechanical power for their operation, including engine plows, hay balers, feed mills, corn shellers, ensilage cutters, and threshing machines.

112. POWER MACHINERY LABORATORY. Elective, second semester. Laboratory, three hours. One semester credit. Mr. Collins.

Laboratory and field instruction is given and tests are conducted upon the machines discussed in the classroom.

116. TRACTORS AND TRUCK RECITATION. Elective, both semesters. Lectures and recitations, two hours. Two semester credits. Prerequisite: None. Mr. Sanders and Mr. Collins.

This course covers the study of the construction and operation of tractors and trucks, with special reference to machines using internal combustion engines as power units.

117. TRACTORS AND TRUCKS LABORATORY. Elective, both semesters. Laboratory, three hours. One semester credit. Mr. Sanders and assistants.

A study is made of the construction of steam and gas tractors and trucks and practice is given in the operation and testing of these machines under belt, road and field conditions.

120. FARM EQUIPMENT RECITATION. Elective, both semesters. Lectures and recitations, one hour. One semester credit. Professor Ekblaw.
A study of handy farm practices and important items of equipment for the farmstead is made in this course.

121. FARM EQUIPMENT LABORATORY. Elective, both semesters. Laboratory, three hours. One semester credit. Professor Ekblaw.
Practice is given in rope work, including knots, splices and halters; belt lacing and splicing; soldering; pipe fitting; and repairing of farm machinery.

175. THESIS. Senior year, continuing through both semesters. Professor Ekblaw, Mr. Sanders, Mr. Collins.
Original problems relating to subjects taught in this department are assigned for investigation, after consultation with the head of the department, at the beginning of the first semester of the senior year.

FOR GRADUATES AND UNDERGRADUATES

201. ADVANCED FARM MACHINERY. Elective, both semesters. Laboratory, six hours. Two semester credits. Prerequisites: Field Machinery and Power Machinery. Professor Ekblaw and Mr. Collins.
Draft tests are made on various types of farm machines. A study is made also of the cost of operating these machines.

205. FARM MACHINERY RESEARCH. Elective, both semesters. Six to fifteen hours laboratory or reading. Two to five semester credits. Assignment by permission. Prerequisites: Field Machinery and Power Machinery and such other preparation as may be necessary to conduct properly the investigation assigned. Professor Ekblaw.
Farm Machinery offers a broad field for original investigation along the lines of draft requirements, power consumption and cost of operating. Students admitted to this course are assigned to one project.

210. ADVANCED TRACTORS AND TRUCKS. Elective, both semesters. Laboratory, six hours. Two semester credits. Prerequisite: Tractors and Trucks. Professor Ekblaw and Mr. Sanders.
Draft, power, and fuel economy tests are made upon standard types of tractors and trucks.

215. TRACTOR RESEARCH. Elective, both semesters. Six to fifteen hours laboratory, computation, or reading. Two to five semester credits. Prerequisites: Tractors and Trucks, and such other preparation as may be necessary to conduct properly the problem assigned. Professor Ekblaw and Mr. Sanders.
Intensive studies are made of problems relating to tractor operation and construction.

220. ADVANCED RURAL ARCHITECTURE. Optional, senior year, both semesters. Drafting-room practice, six hours. Two semester credits. Prerequisite: Rural Architecture. Professor Ekblaw.
Detailed studies and plans are made of special projects involving building arrangement and construction.

General Engineering

Dean POTTER

101. ENGINEERING LECTURES. Freshman year, continuing through both semesters. Lectures, one hour a week. Dean Potter, other members of the engineering faculty, and visiting practicing engineers.

These lectures are designed to acquaint students who are beginning the study of engineering and architecture with the fundamental principles of their profession and to give them a general survey of the field of engineering.

105. SEMINAR. Sophomore, junior, and senior years. Required throughout each year. Lectures, papers, and discussions, one hour a week. Members of the engineering faculty.

This work differs for the various curricula, and as far as possible is conducted by the student branches of the professional engineering societies. In the case of electrical engineering students the work is conducted by the student branch of the American Institute of Electrical Engineers; the student branch of the American Society of Mechanical Engineers has charge of the work for students in mechanical engineering; The Kansas State Agricultural College Civil Engineering Society and the Architects' Club conduct the seminars for students in civil engineering and architecture, respectively. Students are required to present abstracts and reviews of articles appearing in the journals of their respective societies or in the technical press of their profession or to prepare original articles. On alternate weeks these individual groups unite in the general Engineering Society, under whose auspices lectures are given by practicing engineers and by members of the Engineering and College faculty on topics of general interest to engineering students.

Shop Practice

Associate Professor CARLSON
Instructor HOUSE
Instructor LYNCH
Instructor JONES
Instructor GRANT
Instructor YOST
Instructor PARKER
Instructor BALL
Assistant HOLMES
Assistant ———
Assistant BUNDY

The work in the shops is planned to meet the needs of three classes of students: (1) those in the short courses in engineering and agriculture who expect to make use of the knowledge gained in their subsequent work in the shops and on the farms; (2) those in the manual-training option of the course in general science who need to secure a sufficient knowledge of the principles underlying shop work, and sufficient skill in the performance of various operations, to be able to instruct others; and (3) those in the courses in engineering whose need is to secure a thorough knowledge of the methods of performing various kinds of shop work; of the machines best suited for the different purposes; of the amount of work that may be expected of the different machines and of the workmen under different conditions.

The equipment of the shops is set forth to a certain extent below:

WOOD SHOP. This room is 40 by 90 feet; it contains 252 separate sets of tools, and benches for forty-eight students in each class. In this room is also installed an automatic band-saw filer and setter, and two grindstones driven by an individual motor.

PATTERN SHOP. This room is 45 by 81 feet and contains eight K. S. A. C. 12-in. by 32-in. safety wood turning lathes, with eight more in the process of construction; one 18-inch pattern maker's lathe, with tools and chucks; eight pattern makers' benches complete, with necessary small tools, core-box planes, electric glue-heating fixture, and other tools and apparatus for pattern work.

WOODWORKING MACHINERY ROOM. This room is 35 by 42 feet, and contains one 24-inch wood planer, one friezer, one 34-inch band saw, one jig saw, one 20-inch variety saw, one power mortiser, one sandpapering machine, one 8-inch jointer, one foot mortiser; a stock and tool room for holding the material, and small tools and gauges used in the wood shop.

MACHINE SHOP. This room is 40 by 170 feet, and contains thirteen engine lathes, as follows: One 14-inch Hendey-Norton lathe; two 14-inch Flather lathes; one 13-inch Lodge & Davis lathe; one 16-inch Lodge & Shipley combination engine and turret lathe; two 14-inch Reed lathes; five 14-inch K. S. A. C. lathes; one 28-in. by 20-ft. American lathe, equipped with blocks to raise it to 60-inch swing; one K. S. A. C. speed lathe; one Brown & Sharp No. 3-A Universal Milling Machine; one Brown & Sharpe No. 2 universal milling machine; one No. 2 Brown & Sharpe universal grinder; one K. S. A. C. (Hendley-Norton pattern) shaper; one K. S. A. C. (Pratt & Whitney pattern) shaper; one Gray 26-in. by 6-ft. planer; one Niles 51-inch vertical turning and boring mill; one Baker Bros. Key seater; one Barnes 34-inch self-feed drill press; one Rogers 12-inch sensitive drill press; two K. S. A. C. 12-inch sensitive drill presses; one K. S. A. C. (Bemis-Miles pattern) 20-inch double-traverse quick-return shaper; two Morse & Dexter valve reseating machines; one Walker universal grinder; one K. S. A. C. special drill grinder; one bolt and pipe machine, taking pipe up to two inches; one power hack saw; one Emerson direct-connected motor polishing machine; one Bignall & Keeler pipe machine, taking pipe up to eight inches; a complete set of sheet-metal worker's tools; benches and tools for fifty students, and a tool room completely stocked with the necessary tools. A time clock (calculagraph) is installed near the machine shop office for recording the attendance of the students and workmen.

Adjacent to the machine shop is a room 18 by 20 feet, which is used as a stock and storage room for the rough and finished parts of the 1½-hp. gas engine and 12-in. by 32-in. wood-turning lathes, which are constantly in the process of construction as problem work for the students.

BLACKSMITH SHOP. This room is 50 by 100 feet and is equipped with twelve K. S. A. C. downdraft forges and thirty-three Sturtevant downdraft forges for students' use, and two large special Sturtevant forges for general use. Each forge has an anvil and a complete set of forging tools, and is supplied with forced draft and power exhaust. In addition to the general tools for a fully equipped blacksmith shop there is also installed a 12-inch K. S. A. C. sensitive drill press, punch and shear, K. S. A. C. (Erie pattern) 400-pound steam hammer, emery grinder, tire bender, tire shrinker, and a number of pieces of special apparatus built by the department.

IRON FOUNDRY. This room is 27 by 100 feet. It is equipped with a 1½-ton Colliau Cupola; 4-ton, 25-foot span K. S. A. C. traveling crane; core oven, 5 by 6 by 7 feet (arranged so it can be heated with either coke or gas); one car, track and turntable; one 2-ft. by 3-ft. K. S. A. C. rumbler; one K. S. A. C. emery grinder; one K. S. A. C. molding machine; one Arcade squeezer-type molding machine; one air-driven sand riddler; one hammer core machine; an exceptionally large number of flasks, both wood and iron; ladles, and necessary small tools.

BRASS FOUNDRY. This room is 24 by 34 feet. It is equipped with one 21-in. by 36-in. brass furnace, one 11-in. by 20-in. brass furnace, crucibles, flasks, molding tubes, benches, cases, racks and necessary tools for bench and floor molding.

AMPHITHEATER. This room is 24 by 54 feet. It is adjacent to the blacksmith shop and iron and brass foundries, and is equipped with forge, anvil, forge tools, bench, molding trough and molding tools, blackboard, etc., for lectures and demonstration work.

LOCKER ROOM. This room is 36 by 40 feet. It is conveniently located and is equipped with 244 special metal lockers for the use of students taking work in the machine shop, blacksmith shop, foundry and engineering laboratory. A portion of this is made a separate locker room and bathroom for the use of the shop foreman, and contains seven metal lockers.

COURSES IN SHOP PRACTICE

FOR UNDERGRADUATES

101. WOODWORK. Freshman year, both semesters. Laboratory, three hours. One semester credit. Prerequisite: None. Mr. Parker and Mr. Ball.

A course for engineering students, the first part of which consists of exercises to give familiarity with hand and bench tools. The latter part of the course is devoted to such work as will acquaint the student with the methods of operating the various woodworking machines.

105. WOODWORK I. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: None. Mr. Parker and Mr. Ball.

A beginning course to give practice with the woodworking bench tools on the various common woods, and to teach the proper methods of finishing woods with stains, varnish, paint, etc. Considerable emphasis is placed upon the proper use and care of tools.

110. WOODWORK II. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Woodwork I (Shop 105). Mr. Parker and Mr. Ball.

A continuation of Woodwork I, with practice in the use of the rabbet, router and matching planes, and with the plow dado and fillister on such work as will give the necessary practice. Considerable emphasis is laid upon the proper use and care of the tools and on the use of wood finishes.

115. WOODWORK III. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Woodwork II (Shop 110). Mr. Parker and Mr. Ball.

A course in mill work, where practice is given on such articles as bring into use all of the woodworking machinery.

120. WOODWORKING FOR GRAMMAR GRADES. Elective, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: None. Mr. Parker and Mr. Ball.

A course designed for those who are preparing to teach manual training. This course takes up the beginning work, and the exercises given are such as would be suitable for the grammar grades.

125. WOODWORKING I FOR HIGH SCHOOLS. Elective, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: Woodworking for Grammar Grades (Shop 120.)

A continuation of Woodworking for Grammar Grades, with problems suitable for students in the high schools. Special attention is given to the study of woods and methods of finishing them, as well as to the use and care of tools.

130. WOODWORKING II FOR HIGH SCHOOLS. Elective, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: Woodwork I for High Schools (Shop 125).

This is a continuation of Woodworking I for High Schools, with advanced work in cabinet construction by the use of woodworking machinery, and such bench work as necessary. Special emphasis is placed upon the quantity as well as the quality of the work, in order that a proper use may be made of time. Assignments are given which cover woodworking machinery, tools and sharpening, and the drawing up of sketches for a completely equipped woodworking shop.

135. WOODTURNING. Elective, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: Woodworking II for High Schools (Shop 130). Mr. Ball.

This work is such as will give the student a thorough training in handling the lathe and turning tools. Those taking this work are expected to arrange their assignments so that a portion of the time can be devoted to assisting with the teaching of the more elementary classes in the wood shop. This training will be found valuable to those who have had no teaching experience.

140. ADVANCED WOODWORK. Junior year, first semester. Laboratory, six hours, supplemented by lectures. Two semester credits. Prerequisite: Woodwork (Shop 101). Mr. Parker and Mr. Ball.

A combined course in bench and machine work in making some of the most common building details, such as porch newels and rails, plain and fancy molding cornices, etc. The lecture work consists of a detailed study of the wood finishes, tools and machines used in building construction.

145. PATTERN MAKING. Sophomore year, second semester. Laboratory, three hours. One semester credit. Prerequisite: Foundry Practice (Shop 160). Mr. Ball.

A series of exercises embodying the principles governing the construction of plain and split patterns, including core prints and core boxes, after which practical patterns are made of machine parts.

150. FORGING I. Freshman year, both semesters and summer school. Laboratory, three hours. One semester credit. Prerequisite: None. Mr. Lynch and Mr. Bundy.

A course in the forging of iron and steel, designed to teach the principles and operations of drawing, bending, upsetting, welding, twisting, splitting, and punching, and the proper methods of making forgings and tools. Tools required: a two-foot rule and a pair of five-inch outside

calipers, a center punch, and a ball pein hammer weighing with handle about two pounds.

155. FORGING II. Sophomore year, both semesters and summer school. Laboratory, three hours. One semester credit. Prerequisite: Forging I (Shop 150). Mr. Lynch and Mr. Bundy.

Advanced work in the forging of iron and in the manufacture of steel tools. Instruction is given in hardening, tempering, casehardening and annealing, heat treating and testing of tool steels. Tools required: Same as in Forging I.

160. FOUNDRY PRACTICE. Sophomore year, both semesters. Laboratory, three hours. One semester credit. Prerequisite: None. Mr. Grant.

Practice is given in floor, bench and machine molding, in core making, and in casting in iron, copper, brass, and special alloys. A study is also made of modern foundry construction, equipment, materials, and methods.

165. METALLURGY. Sophomore year, second semester. Lectures and recitations, two hours. Two semester credits. Professor Carlson.

A course dealing with the manufacture and use of iron, steel, copper and their alloys, as well as with their proper selection and use in the manufacturing industries.

170. MACHINE TOOL WORK I. Junior or senior year, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: Foundry Practice (Shop 160). Mr. Jones and Mr. Holmes.

Practice is given in chipping, filing, shaper and planer work, scraping, drilling, and turning on the lathe. Tools required: A four-inch scale, or B. & S. slide caliper, one pair five-inch outside calipers, one pair five-inch inside calipers, one center drill, and one B. & S. center gage.

195. THESIS. Senior year, continuing through both semesters. Professor Carlson.

A thesis gives an opportunity for the student to work out problems of interest and value to himself under his own initiative, but subject to the supervision of the instructors. The shops have ample facilities for carrying on work of this character, of a constructive or investigative nature, and every possible aid is given those who select theses along this line.

FOR GRADUATES AND UNDERGRADUATES

205. ADVANCED PATTERN MAKING. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Pattern Making (Shop 145). Professor Carlson and Mr. Ball.

A continuation of Pattern Making, with more advanced work, including match-board work, patterns for molding machines, and general pattern work.

210. ADVANCED FOUNDRY PRACTICE. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Foundry Practice (Shop 160). Professor Carlson and Mr. Grant.

A continuation of Foundry Practice, including green and dry sand and loam molding. A study is also made of the different mixtures of iron, of handling the cupola and brass furnace, of difficult molding and core work, and of making steel castings.

215. FORGING III. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Forging II (Shop 155). Mr. Lynch and Mr. Bundy.

A continuation of Forging II, with more advanced work in the working of iron and steel and in studying the effect of the different heat

treatments upon steel. Opportunity will be given for work with the oxyacetylene and thermit processes of welding.

220. FORGING IV. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Forging III (Shop 215). Professor Carlson and Mr. Lynch.

Opportunity is offered for work in steel and iron, oxyacetylene welding, steam hammer work, drop forge work and other lines, depending upon the object in view and the previous training of the student.

225. MACHINE TOOL WORK II. Junior year, both semesters and summer school. Laboratory, six hours. Two semester credits. Prerequisite: Machine Tool Work I (Shop 170). Professor Carlson, Mr. Jones, and Mr. Yost.

Progressive problems in turning and calipering, in boring, in reaming and taper turning and in threading on the lathe, exercise in chucking, the use of forming tools, and gear cutting. A study is made of cutting edges and tool adjustments best suited to the different metals, and of cutting speeds and feeds. Tools required: same as for Machine Tool Work I.

230. MACHINE TOOL WORK III. Senior year, both semesters and summer school. Laboratory, three hours. One semester credit. Prerequisite: Machine Tool Work II (Shop 225). Professor Carlson, Mr. Jones, and Mr. Yost.

This course takes up work on the turret lathe, boring mill and grinder. Practical work is also given with the jigs and templets, and a study is made of the rapid production of duplicate parts, of belts, lacings and other methods of belt connection, and of compound and differential indexing.

235. MACHINE TOOL WORK IV. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Machine Tool Work III (Shop 230). Professor Carlson and Mr. Jones.

The time of this course is devoted to the shop phases of efficiency engineering, including time studies and routing of materials. Complete machines and machine parts are constructed from drawings and blue prints. A study is made of the different machine tools from assigned catalogue work, with regard to the economical and efficient production of different classes of products.

240. MACHINE TOOL WORK V. Elective, both semesters. Laboratory, three hours. One semester credit. Prerequisite: Machine Tool Work IV (Shop 235). Professor Carlson and Mr. Jones.

This course is devoted entirely to a systematic study to determine the various time elements that are required in the efficient production of standard machine parts which are being made in the shops.

245, 250. FACTORY ENGINEERING. Senior year, first semester. Lectures and recitations, one hour; drafting-room, three hours. Two semester credits. Prerequisites: Business Organization (Econ. 204) and Applied Mechanics II (Ap. Mech. 110). Professor Carlson.

A course dealing with the problems of the factory executive such as the selection, installation and arrangement of direct and indirect equipment, the standardization of machines and tools, stock and store methods, production orders, routing and dispatching, time study and rate setting, instruction and operation cards, wage systems, cost systems and the various factors that have to do with the design and control of factories.

255. FACTORY DESIGN. Senior year, second semester. Drafting, six hours. Two semester credits. Prerequisite: Factory Engineering (Shop 245, 250). Professor Carlson.

The knowledge gained in the shops and laboratories and in the course in factory engineering is used in the design of a complete factory.

260. ADVANCED SHOP PRACTICE. Elective, first semester. Laboratory, nine hours. Three semester credits. Professor Carlson and assistants.

Opportunity is offered those having the necessary preliminary training to specialize to a limited degree along certain lines of Shop Practice, such as the heat treatment of steel, oxyacetylene welding, jig and die work, cutting speeds and feeds, shop management and systems.

265. SHOP PRACTICE RESEARCH. Elective, both semesters. Laboratory, nine hours. Three semester credits. Professor Carlson.

A course for those who wish to investigate some phase of shop practice work in which they are greatly interested. The wonderful improvements in the methods of present-day production amply justify investigative work along this line, and every possible aid will be accorded those wishing to take this work.

Steam and Gas Engineering

Professor POTTER
Assistant Professor SIMMERING
Instructor MACK
Instructor ———
Assistant ———
Fellow ———

The object of the instruction in this department is to give to the student the fundamental principles underlying the design, construction, selection, operation and testing of steam boilers, steam engines, and steam turbines; gas producers; gas and petroleum engines; compressed-air and refrigerating machinery; condensers and evaporators. These subjects are developed by courses in engineering thermodynamics and in steam and gas engineering, and are followed in the fourth year by courses in power-plant engineering, in refrigeration, and in heating and ventilation. The classroom instruction of every course consists of lectures and recitations, which are paralleled by work in the drafting-room and laboratory, and supplemented by numerous practical problems, trade catalogues, notes, and inspection trips requiring written reports.

STEAM ENGINEERING LABORATORY

In addition to the equipment installed especially for experimental purposes, all the heating, power, ventilating, and pumping equipment of the College subserves the further purpose of experimental work.

There are available for the boiler tests three 125-horsepower high-pressure fire-tube boilers equipped with under-feed, chain-gate, and side-feed stokers; three high-pressure water-tube boilers, one being equipped with a Roney stoker and the others with under-feed stokers. Besides the high-pressure boilers there are eight low-pressure boilers equipped with under-feed stokers. All of these boilers have full equipment of auxiliaries and are provided with pyrometers, draft gauges, flue-gas samplers, and other instruments for research and laboratory work.

The steam engineering laboratory contains fourteen steam engines with different types of valve gears, including plain slide valves, balanced

valves, double valves, piston valves, Corliss valves. These engines range in power from 6 to 250-horsepower. There are also three steam turbines equipped with surface condensers, dry vacuum pumps, wet vacuum pumps, and circulating pumps. A compound reciprocating steam engine is also equipped so that it can be operated condensing or noncondensing. The engines in this laboratory are equipped with electric generators or with absorption brakes.

Three ammonia refrigerating machines are available for laboratory work only and a fourth refrigerating machine, which serves the College, is also used for tests and research in refrigeration. One of the laboratory refrigerating machines serves a thermal testing room, equipped for low temperature experiments.

The laboratory is also provided with various types of steam pumps, steam traps, steam and ammonia indicators, gauges, injectors, planimeters, pyrometers, and apparatus for testing gauges, indicators, and lubricants.

GAS ENGINEERING LABORATORY

The apparatus for gas engineering instruction and research includes a Smith suction gas producer which supplies gas to a 25-horsepower Foos gas engine. This gas engine is equipped with the necessary cylinder heads and other auxiliaries, so that it can be operated with producer gas, natural gas, water gas and with light and heavy liquid fuels. Besides the Foos experimental engine, the gas engine laboratory includes about thirty different sizes and makes of gas and oil engines, ten of which belong to the College and the others are loaned by manufacturers for teaching and for research work.

A Westinghouse air-pump, a complete compressed-air plant driven by an electric motor, and several fans, are available for experiments with air.

The gas engineering laboratory also includes several types of coal calorimeters, a Junkers and a Sargeant gas calorimeter, apparatus for proximate analysis of fuels, oil-testing equipment, a bearing tester, several different types of pyrometers, a variety of gas-engine indicators, Venturi and Pitot tubes.

The automobile equipment includes a gasoline auto-truck, a steam automobile, several types of automobile motors, differentials, transmissions, clutches, carburetors, magnetos, starting devices, and miscellaneous automobile parts.

COURSES IN STEAM AND GAS ENGINEERING

FOR UNDERGRADUATES

101. STEAM AND GAS ENGINEERING I RECITATION. Junior or senior year, first semester. Lectures and recitations, four hours. Four semester credits. Prerequisites: Kinematics (Ap. Mech. 180) and Calculus II (Math. 116). Professor Potter and Assistant Professor Simmering.

A study of heat power engineering, including steam engines and valve gears; the thermodynamics of gases and vapors; gas and vapor cycles. Texts: Furman's *Valve Gears*, Vol. I, and Hirshfeld and Barnard's *Heat Power Engineering*.

105. STEAM AND GAS ENGINEERING I LABORATORY. Junior or senior year, first semester. Laboratory, three hours. One semester credit. Taken with Steam and Gas Engineering I Recitation. Assistant Professor Simmering and Assistant ———.

The study and calibration of steam gauges, indicators and planimeters; valve setting and steam engine operations; study of calorimeters, flow meters, and feed-water heaters; determination of the indicated and brake horsepower, mechanical efficiency and the steam consumption of high-speed automatic cut-off, Corliss, simple and compound engines; tests of DeLaval, Kerr and Terry steam turbines. Text: Carpenter and Diederich's *Experimental Engineering* is used in this and subsequent laboratory courses.

110. STEAM AND GAS ENGINEERING II RECITATION. Junior or senior year, second semester. Lectures and recitations, three hours. Three semester credits. Prerequisite: Steam and Gas Engineering I. Professor Potter and Assistant Professor Simmering.

A continuation of the study of heat power engineering, including steam turbines; internal-combustion engines; fuels and combustion; boilers and boiler auxiliaries; gas producers; natural and artificial gas; condensers; evaporators; compressed air and refrigerating machinery. Texts: Hirshfeld and Barnard's *Heat Power Engineering,* and Sterling's *Internal Combustion Engine Manual.*

115. STEAM AND GAS ENGINEERING II LABORATORY. Junior or senior year, second semester. Laboratory, three hours. One semester credit. Taken with Steam and Gas Engineering II Recitation. Assistant Professor Simmering and Assistant ———.

The proximate analysis of coal; determination of the calorific values of solid, liquid and gaseous fuels; evaporative tests of steam boilers; testing of internal combustion engines, including a study of the various auxiliaries for gas and oil engines; tests of compressed air and refrigerating machinery.

120. STEAM AND GAS ENGINEERING C RECITATION. Junior or senior year, second semester. Lectures and recitations, two hours. Two semester credits. Prerequisites: Engineering Physics II (Physics 212) and Calculus II (Math. 116). Professor Potter and Assistant Professor Simmering.

A descriptive study of steam boilers, steam engines, steam turbines, gas and oil engines, including the various auxiliaries. Text: Allen and Bursley's *Heat Engines.*

125. STEAM AND GAS ENGINEERING C LABORATORY. Junior or senior year, second semester. Laboratory, three hours. One semester credit. Taken with Steam and Gas Engineering C Recitation. Assistant Professor Simmering and assistant.

The study and calibration of steam gauges, indicators and planimeters; calorimeters; evaporative tests of steam boilers; determination of the heating value of liquid and gaseous fuels; tests of steam engines; valve setting; tests of steam turbines; tests of internal-combustion engines; operation and testing of refrigerating machines.

140. FARM MOTORS RECITATION. Junior year, both semesters, and summer school. Lectures and recitations, two hours. Two semester credits. Mr. Mack and assistants.

A descriptive study of steam engines, boilers, internal-combustion engines and automobiles, with special reference to their utilization on the farm.

145. FARM MOTORS LABORATORY. Junior year, both semesters, and summer school. Laboratory, three hours. One semester credit. Mr. Mack and assistants.

A study of steam gauges, lubricators; construction of steam and internal-combustion engines; valve setting; operation and testing of steam engines, internal-combustion engines and traction engines.

170. DAIRY REFRIGERATION RECITATION. Elective, first semester. Lectures and recitations, one hour. One semester credit. Assistant Professor Simmering.

The elementary theory and principles of operation of various refrigerating and ice-making machinery and of cold storage, with special reference to the dairy industry, are considered.

175. DAIRY REFRIGERATION LABORATORY. Elective, first semester. Laboratory work, three hours. One semester credit. Assistant Professor Simmering and Mr.———

Study and operation of various types of refrigeration systems; steam-engine operation and testing of refrigeration machines.

180. HEATING AND VENTILATION A. Senior year, second semester. Lectures and recitations, two hours. Two semester credits. Prerequisite: Engineering Physics II. Assistant Professor Simmering.

The fundamental principles of heating and ventilation are studied. Special attention is given to the application of the various systems of heating and ventilation for dwellings and public buildings.

195. THESIS. Senior year, continuing through both semesters. Professor Potter and Assistant Professor Simmering.

The laboratories of the department are well furnished with apparatus suitable for experimental and research work in the field of heat-power engineering. The subject of the investigation should be selected in consultation with the head of the department, at the beginning of the first semester.

FOR GRADUATES AND UNDERGRADUATES

201. POWER-PLANT ENGINEERING RECITATION. Senior year, first semester. Lectures and recitations, three hours. Three semester credits. Prerequisite: Steam and Gas Engineering II. Professor Potter and Assistant Professor Simmering.

A detailed study is made of the complete power plant including steam-electric, gas-electric and hydro-electric plants. Text: Gebhardt's *Steam Power Plant Engineering* and notes.

205. POWER-PLANT ENGINEERING LABORATORY. Senior year, first semester. Laboratory, six hours. Two semester credits. Taken with Power-plant Engineering Recitation. Assistant Professor Simmering.

The first half of the semester will be devoted to complete power-plant testing; application of Clayton's Analysis to steam-engine performance; operation of gas producers, and advanced laboratory work on internal combusition engines. The remainder of the time will be devoted to the design of a complete power plant.

210. REFRIGERATION, HEATING, AND VENTILATION RECITATION. Senior year, second semester. Lectures and recitations, two hours. Two semester credits. Prerequisite: Steam and Gas Engineering II. Assistant Professor Simmering.

This course is planned to acquaint the student with the fundamental principles of refrigerating systems, and the application of refrigeration to ice making, cold storage, and the cooling of air liquids and solids; also the fundamental principles of heating and ventilation, including the direct and indirect systems, hot-air, hot-water and steam systems of heating. Text: Hoffman's *Heating and Ventilation* and notes on refrigeration.

215. REFRIGERATION, HEATING, AND VENTILATION LABORATORY. Senior year, second semester. Laboratory, three hours. One semester credit.

Taken with Refrigeration, Heating and Ventilation. Assistant Professor Simmering.

The laboratory work will include tests of refrigerating machinery, and of the thermal conductivity of insulating materials; tests on fans and blowers, radiators and house-heating boilers. The remainder of the time will be devoted to the design of heating and ventilating systems for buildings.

FOR GRADUATES

301. ADVANCED THERMODYNAMICS. Elective, first or second semester. Lectures and recitations, two hours. Two semester credits. Professor Potter and Assistant Professor Simmering.

A study is made of the advanced phases of engineering thermodynamics, including research work along fundamental properties of gases and vapors. Reports are made of recent investigations along thermodynamic lines.

305. ENGINEERING RESEACH. Elective, first or second semester. One semester credit for each three hours of laboratory work. Professor Potter and Assistant Professor Simmering.

The laboratory work is correlated with the work of the Engineering Experiment Station. Investigations on lubricants, fuels, combustion, internal-combustion engines, steam engines, steam turbines, steam boilers, gas producers, refrigeration, heating and ventilation, compressed air and similar subjects are carried on.

Short Courses in Mechanic Arts

The following short courses are intended for men who wish to gain a practical knowledge of the work indicated. The Short Course in Shop Work is offered twice during the year; the other short course is given but once.

Short Course in Traction Engines

This course is intended for those who have not the time nor the means to take any of the regular engineering courses in the College, but who wish to obtain a practical working knowledge of stationary and traction steam and gas engines. The work of the course is shown in the following tabulation:

The Arabic numeral immediately following the name of a subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

FIRST YEAR		SECOND YEAR	
Gas Engines Steam and Gas 1, 2	3(1-4)	Gas Engines and Automobiles Steam and Gas 5	4(0-8)
Gas Traction Engines I Farm Eng. 10, 11	5(1-8)	Gas Traction Engines II Farm Eng. 15	4(0-8)
Power Farming Machinery Farm Eng. 2	2(0-4)		
Blacksmithing I Shop 1	2(0-4)	Blacksmithing II Shop 3	2(0-4)
Machine Shop I Shop 23	2(0-4)	Machine Shop II and III Shop 24, 25	4(0-8)
Mechanical Drawing I Ap. Mech. 1	2(0-4)	Carburetion and Ignition Steam and Gas 23	4(4-0)
Iron and Steel Shop 13	1(1-0)		
Special Lectures Steam and Gas 25	1(1-0)		

Electives, 3 to 6 credits from the following list must be taken:

Steam Traction Engines I
Farm Eng. 22 ..... 4(0-8)

Foundry Work I
Shop 9 ..... 2(0-4)

Machine Shop II and III
Shop 24, 25 ..... 4(0-8)

Blacksmithing II
Shop 3 ..... 2(0-4)

Concrete Construction
Ap. Mech. 20, 25..... 4(2-4)

Carpentry I
Shop 15 ..... 2(0-4)

Live Stock
An. Husb. ..... 3(1-4)

Electives, 2 to 4 credits from the following list must be taken:

Steam Traction Engines II
Farm Eng. 24 ..... 2(0-4)

Mechanical Drawing II
Ap. Mech. 5 ..... 2(0-4)

Machine Shop IV
Shop 26 ..... 2(0-4)

Blacksmithing III
Shop 5 ..... 2(0-4)

Carpentry II
Shop 17 ..... 2(0-4)

Concrete Construction
Ap. Mech. 20, 25..... 4(2-4)

Electricity
Elect. Engr. 1 ..... 2(2-0)

Short Course in Shop Work

This is a course designed for men who wish to gain a working knowledge of machines, tools and methods used in commercial and repair shops. The subjects taught are shown below.

The Arabic numeral immediately following the name of a subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

First Year

Blacksmithing I and II
Shop 1, 3 ..... 4(0-8)

Foundry Work I
Shop 9 ..... 2(0-4)

Machine Shop I, II and III
Shop 23, 24, 25..... 6(0-12)

Carpentry I
Shop 15 ..... 2(0-4)

Gas Engines
Steam and Gas 1, 2.... 3(1-4)

Mechanical Drawing I
Ap. Mech. 1..... 2(0-4)

Iron and Steel
Shop 13 ..... 1(1-0)

Special Lectures
Steam and Gas 25..... 1(1-0)

Electives, 2 credits from the following list may be taken:

Machine Shop IV
Shop 26 ..... 2(0-4)

Power Farming Machinery
Farm Eng. 2 ..... 2(0-4)

Carpentry II
Shop 17 ..... 2(0-4)

Traction Engines
Farm Eng. 20 ..... 2(0-4)

Second Year

Blacksmithing III
Shop 5 ..... 2(0-4)

Foundry Work II
Shop 11 ..... 2(0-4)

Machine Shop IV and V
Shop 26, 27 ..... 4(0-8)

Pattern Work
Shop 21 ..... 2(0-4)

Gas Engines and Automobiles
Steam and Gas 5..... 4(0-8)

Mechanical Drawing II
Ap. Mech. 5 ..... 2(0-4)

Electives, 3 to 6 credits from the following list must be taken:

Machine Shop VI and VII
Shop 28, 29 ..... 4(0-8)

Carpentry III
Shop 19 ..... 2(0-4)

Blacksmithing IV
Shop 7 ..... 2(0-4)

Concrete Construction
Ap. Mech. 20, 25..... 4(2-4)

Gas Traction Engines I
Farm. Eng. 10, 11..... 5(1-8)

Electricity
Elect. Eng. 1..... 2(2-0)

Steam Traction Engines I
Farm. Eng. 22 ..... 4(0-8)

Short Courses in Road Building

This course, a tabulation of which is shown below, is designed for county engineers and surveyors. This work can not be given unless as many as twelve men apply for it. All those who contemplate taking this work are, therefore, advised to write to the head of the Department of Civil Engineering of their intention at least one month prior to the opening of the course. If it is probable that there will not be a sufficient number of applicants to justify the College in giving the course, all prospective students can then be notified and the expense of a trip to Manhattan and the resultant disappointment can be avoided. Applicants for the course must possess a working knowledge of the elements of algebra, trigonometry and physics.

The Arabic numeral immediately following the name of a subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

Surveying C. E. 1, 2	4(2-4)
Highway Engineering C. E. 5	3(3-0)
Road Machinery and Materials Ap. Mech. 10	3(0-6)
Bridge and Culvert Construction C. E. 10, 11	5(3-4)
Concrete Construction Ap. Mech. 20, 25	4(2-4)
Mechanical Drawing I Ap. Mech. 1	2(0-4)

Subjects Taught in Mechanic Arts Short Courses

ELECTRICITY

Elec. Engr. 1. ELECTRICITY. Recitations or lectures two hours. Two credits. Mr. ———.

An elementary course in the practical applications of electricity to the electrical machines and apparatus which are now to be found in the small isolated plant, the rural or small town house and store, the electrical equipment of automobiles (with the exception of the ignition), and other electrical devices concerning which the general public now should be informed. This course will treat of the care and operation of dynamos, motors and generators; of storage batteries, lead and nickel iron or Edison types, for both stationary and portable use; of the proper methods of wiring houses and other buildings, and the different classes of approved material for this purpose; methods of outside wiring between buildings; and general uses of electric light and power.

FARM ENGINEERING

Farm Eng. 2. POWER FARMING MACHINERY. Laboratory, four hours. Two credits. Mr. Collins.

This course takes up the study of those machines that are used with the tractor, including the engine plows, feed mills, corn shellers, hay balers, ensilage cutters, husker-shredders, and threshing machines.

Farm Eng. 10, 11. GAS TRACTION ENGINES I. Class work, one hour; laboratory, eight hours. Five credits. Mr. Sanders, Mr. Collins, and assistants.

A study of gas traction engines, including motors, frames, transmission systems, cooling systems, ignition systems, lubricating systems, and carburetors; operation, care, repair and testing of gas traction engines.

Farm Eng. 15. GAS TRACTION ENGINES II. Laboratory, eight hours. Four credits. Prerequisite: Gas Traction Engines I (Farm Eng. 10, 11). Mr. Sanders and assistants.

Operation, care and testing of various types of gasoline and kerosene traction engines, including belt tests, road tests and field tests.

Farm Eng. 20. TRACTION ENGINES. Laboratory, four hours. Two credits. Mr. Sanders, Mr. Collins, and assistants.

A study of gas traction engines or of steam traction engines, including care and operation of various types.

Farm Eng. 22. STEAM TRACTION ENGINES I. Laboratory, eight hours. Four credits. Mr. Sanders and assistants.

A study of steam traction engines, including boilers, engines, pumps, injectors, gearing, clutches, reversing mechanisms and other details. Operation, care and repair of steam traction engines.

Farm Eng. 24. STEAM TRACTION ENGINES II. Laboratory, four hours. Two credits. Prerequisite: Steam Traction Engines I (Steam and Gas 19). Mr. Sanders, Mr. Collins, and assistants.

A continuation of Steam Traction Engines I, including belt and road work; tests on steam traction engines.

Farm Eng. 30. SPECIAL LECTURES. Class work, one hour. One credit.

These lectures are given by the various heads of departments and others to acquaint students with the general trend of engineering and agriculture.

MECHANICAL DRAWING AND MATERIALS OF CONSTRUCTION

Ap. Mech. 1. MECHANICAL DRAWING I. Drafting-room practice, four hours. Two credits. Assistant Professor Pearce, Mr. Robert, and assistants.

An elementary course in mechanical drawing designed to teach students to read and interpret simple working drawings, and to make working drawings of simple objects or designs. Some attention is devoted to the use of the triangle, T-square and drawing instruments, and to the principles of orthographic projection.

Ap. Mech. 5. MECHANICAL DRAWING II. Drafting-room practice, four hours. Two credits. Assistant Professor Pearce, Mr. Robert, and assistants.

A continuation of work of Mechanical Drawing I, with practice in the making of working sketches and drawings of simple machine parts from the objects.

Ap. Mech. 10. ROAD MACHINERY AND MATERIALS. Laboratory practice, six hours. Three credits. Professor Conrad and Assistant Professor Wendt.

A study of the use of various road-building machines and testing of macadam and bituminous road materials.

Ap. Mech. 20. CONCRETE CONSTRUCTION RECITATION. Class work, two hours. Two credits. Assistant Professor Wendt.

Instruction is given in the principles governing the selection and preparation of materials, the proper proportioning of materials for different conditions, the construction of forms, mixing and handling concrete,

elementary reinforced concrete construction, finishing concrete surfaces, stucco and plaster work, and waterproofing and coloring concrete. A brief study is made of the application of these principles to the making of concrete foundations, building blocks and bricks, posts, sidewalks, floors, tanks, cisterns, silos and bridges and culverts. Text: Seaton's *Concrete Construction for Rural Communities.*

Ap. Mech. 25. CONCRETE CONSTRUCTION LABORATORY. Four hours. Two credits. Assistant Professor Wendt and assistants.

Laboratory and field work is given in hand and machine mixing and handling of concrete and in the construction of forms for such objects as machine and building foundations, floors, sidewalks, fence posts and building blocks. Tests are made on concrete cylinders and beams to illustrate the effect of different methods of treatment on the strength and reliability of plain and reinforced concrete.

ROAD BUILDING

C. E. 1. SURVEYING RECITATION. Class work, two hours. Two credits. Assistant Professor Frazier.

This is a brief course in the care and use of engineers' surveying instruments. The greater part of the time is devoted to exercises and practical problems involving the use of the transit and level.

C. E. 2. SURVEYING LABORATORY. Field and drafting-room work, four hours. Two credits. To accompany Surveying Recitation (C. E. 1). Assistant Professor Frazier.

C. E. 5. HIGHWAY ENGINEERING. Class work, three hours. Three credits. Mr.———

The work in the classroom is devoted to a study of the theory and practice of economic highway and pavement construction and maintenance, including a study of the needs of traffic, of its effect on the road surface, and of the materials of construction.

C. E. 10. BRIDGE AND CULVERT CONSTRUCTION RECITATION. Class work, three hours. Three credits. Professor Conrad.

This is an elementary course in the design and construction of highway bridges and culverts.

C. E. 11. BRIDGE AND CULVERT CONSTRUCTION LABORATORY. Drafting-room work, four hours. Two credits. To accompany the class work in Bridge and Culvert Construction (C. E. 10). Professor Conrad.

SHOP WORK

Shop 1. BLACKSMITHING I. Laboratory, four hours. Two credits. Mr. Lynch and Mr. Bundy.

A beginning course in forging operations, including drawing, upsetting, bending, twisting, hot and cold punching, and welding, together with instructions in the use of the fire, and in the selection and care of tools. The exercises given are such as to be of practical value to the man on the farm. Tools required: a two-foot rule, a pair of five-inch outside calipers, a center punch and a ball pein hammer weighing with handle about two pounds.

Shop 3. BLACKSMITHING II. Laboratory, four hours. Two credits. Prerequisite: Blacksmithing I (Shop 1). Mr. Lynch and Mr. Bundy.

A continuation of Blacksmithing I, with additional exercises in the working of iron and machine steel. Some practice will be given in hardening and tempering tool steel, in making some of the tools used in the shops, and in plow work.

Shop 5. BLACKSMITHING III. Laboratory, four hours. Two credits. Prerequisite: Blacksmithing II (Shop 3). Mr. Lynch and Mr. Bundy.
More advanced work in iron and steel forging, plow work and blacksmithing repair work.

Shop 7. BLACKSMITHING IV. Laboratory, four hours. Two credits. Prerequisite: Blacksmithing III (Shop 5). Mr. Lynch and Mr. Bundy.
A continuation of Blacksmithing III, with more difficult work.

Shop 9. FOUNDRY WORK I. Laboratory, four hours. Two credits. Mr. Grant.
This course consists of bench and floor molding with a great variety of patterns and different kinds of sand and facings; also of open sand work, sweep molding, machine molding, core making, setting of cores, gates and risers, and casting in different materials. Special emphasis in all cases is laid upon the practical side of the work.

Shop 11. FOUNDRY WORK II. Laboratory, four hours. Two credits. Prerequisite: Foundry Work I (Shop 9). Mr. Grant.
A continuation of Foundry Work I, with instruction and practice in making brass, copper, aluminum and steel castings.

Shop 13. IRON AND STEEL. Lectures and recitations, one hour. One credit. Professor Carlson.
An elementary course dealing with the manufacture and use of iron, steel and other metals used in machine construction.

Shop 15. CARPENTRY I. Laboratory, four hours. Two credits. Mr. Parker and Mr. Ball.
A practical course in woodworking to give an understanding of the proper use and care of tools and material. The work includes making tool boxes, singletrees, doubletrees, feed boxes, wheelbarrows, porch swings and other similar objects. All work is done from blue prints and drawings.

Shop 17. CARPENTRY II. Laboratory, four hours. Two credits. Prerequisite: Carpentry I (Shop 15). Mr. Parker and Mr. Ball.
A continuation of Carpentry I, with considerable work with paints, varnishes and wood finishes. Some practice is given with the square as used for cutting rafters, in framing operations, and in other work especially useful to the man on the farm.

Shop 19. CARPENTRY III. Laboratory, four hours. Two credits. Prerequisite: Carpentry II (Shop 17). Mr. Parker and Mr. Ball.
Advanced carpentry with some practice on the woodworking machinery and woodturning lathes.

Shop 21. PATTERN WORK. Laboratory, four hours. Two credits. Prerequisite: Carpentry II (Shop 17). Mr. Ball.
A course for shop mechanics who wish to become acquainted with the principles of pattern construction in wood.

Shop 23, 24, 25, 26, 27, 28, 29. MACHINE SHOP I TO VII. Laboratory, four hours in each course. Two credits in each course. Mr. Jones, Mr. Yost, and Mr. Holmes.
These courses in machine shop are such as to give a good general knowledge of a variety of machine operations, such as chipping, filing, scraping, drilling, shaper and planer work, lathe work in cutting various threads, key seating, soldering, brazing, babbitting, lacing belts, aligning shaftings and pulleys, cutting and threading pipe.
In order to give very practical work along this line there is being built in the shops a large number of 1½ horsepower gasoline engines and 12 in. by 32 in. woodturning lathes. Work is also given in the repair

of various classes of machinery. Tools required: A four-inch scale, or B. & S. slide caliper, one pair five-inch outside calipers, one pair five-inch inside calipers, one center drill, and one B. & S. center gage.

STEAM AND GAS ENGINES

Steam and Gas 1, 2. GAS ENGINES. Class work, one hour, laboratory, four hours. Three credits. Mr. Mack and assistants.

A study of gasoline and kerosene engines; four-stroke and two-stroke cycle engines, gas-engine fuels, carburetors, ignition systems, lubrication, governing; selection, erection and operation of stationary gasoline and kerosene engines; fundamental parts of automobiles.

Steam and Gas 5. GAS ENGINES AND AUTOMOBILES. Laboratory, eight hours. Four credits. Prerequisites: Machine Shop I (Shop 23) and Blacksmithing I (Shop 1). Mr. Mack and assistants.

A detailed study of gas-engine operation and care, with special attention to ignition systems, carburetors and testing. Automobile parts, including engines, differentials, transmissions, lubricating systems, clutches, systems of ignition, starters and carburetors; tests of ignition and equipment and carburetors.

Steam and Gas 23. CARBURETION AND IGNITION. Class work, four hours. Four credits. Prerequisites: Gas Engines (Steam and Gas 1, 2). Mr. Mack.

A detailed study of ignition systems, fuels and carburetors as applied to traction engines and automobiles.

Engineering in the Summer School

The College has been unable to supply from its regular graduates all of the teachers in manual training required by the high schools of the State and in order to encourage the introduction of manual training and industrial drawing in all grades, summer courses in mechanical drawing, manual training and shop practice are offered for high-school and grade teachers.

Various courses required in the several engineering curricula are also offered in the Summer School. This enables teachers who wish to take an engineering curriculum to get a considerable start on the work during their summer vacations, and also enables College students who are irregular to make up their back courses.

For full information in regard to the courses offered, see the section of this catalogue devoted to the Summer School. A special circular giving further details of this work may be had upon application to the President of the College.

Division of Home Economics

MARY PIERCE VAN ZILE, *Dean*

The philosophy which long ruled our educational policy has been so modified by research in the sciences and by development of the industries, arts, and professions that it is now recognized that any perfected educational system must include technical training. It must encourage the student's natural desire for productive work—work in which there is a living connection between theory and practice. These broader views have been accepted by college and university men, and the result is noted in the success attained by combining industrial, technical, and scientific work with the general studies. The result is evidenced in the new courses of study for our young men and women. It is safe to assume that there are now but few educators who are so conservative as not to be in sympathy with the collegiate education in home training which is furnished by courses in home economics.

The courses are designed to fit young women to be home makers and capable women in whatever sphere their life work may be. The training is both specific and general. While it emphasizes primarily the practical and material side of life, it does not stop here. The young women are constantly reminded that life is not drudgery; that technical knowledge and scientific skill even fail to include the full meaning of education in its highest sense. They are taught that any training that fails to develop harmoniously body, mind, and spirit is inadequate and incomplete. They are brought face to face with ideals as well as with actualities, and are made to see that, while skillful labor gives dignity to life, grace, refinement, and self-poise are the highest requisites for true service.

The training given is as varied as it is broad. It includes a knowledge of the laws of health, an understanding of the sanitary requirements of the home; the study of values, both absolute and relative, of the various articles (including food) that are used in the home; the wise expenditure of money, time, and energy; the scientific principles underlying the selection and preparation of food; the right care of children; and the ability to secure efficient service from others. Instruction is methodical and thorough, and is suited to the circumstances of the students. Experience shows that such training teaches contentment, industry, order, and cleanliness, and fosters a woman's independence and feeling of responsibility.

The work in home economics includes:

A four-year curriculum, leading to the degree of bachelor of science.

A three-year curriculum, in the School of Agriculture.

A one-year curriculum in lunch-room management, for which a certificate is granted.

A housekeepers' course, fifteen weeks in length, for which a certificate of proficiency is granted.

CURRICULUM IN HOME ECONOMICS

The training in the four-year curriculum is both general and specific. Since scientific training is fundamental in the intelligent and successful administration of the home, strong courses in the sciences are given as a foundation for the special training in home economics. To the end that well-rounded culture may be attained, courses in English, history, economics, sociology, and psychology receive due prominence. The time of the student is about equally divided among the purely technical subjects, the fundamental sciences, and the cultural studies. The courses in the related subjects are given in the different departments of the College, while the technical courses are given by the home economics departments. In the junior and senior years opportunity is given for choice of electives, which makes it possible for students to specialize in some chosen line. To this end electives are to be chosen in groups combined logically in courses approved by the faculty or by the student's dean.

The four-year curriculum is recommended for all who desire to teach home economics, or to undertake any phase of institutional work.

The College does not assume the responsibility of insuring employment to graduates, but the latter rarely experience difficulty in obtaining remunerative positions as instructors in domestic science or in domestic art, as dietitians, or as professional housekeepers.

Curriculum in Home Economics

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
College Rhetoric I Eng. 101	3(3-0)	College Rhetoric II Eng. 104	3(3-0)
Chemistry HE-I Chem. 103	5(3-4, 2)	Chemistry HE-II Chem. 104	5(3-4, 2)
Household Physics Physics 101	3(3-0)	Foods I Dom. Sc. 101	3(1-6)
Design *or* Design *a* Home Art 101 *or* 106	3(1-6)	Costume Design Dom. Art 106	3(1-6)
Survey of Home Economics Home Econ. 101	1(1-0)	Clothing I Dom. Art. 101	2(0-6)
Library Methods Lib. Ec. 101	1(1-0)	Current History Hist. 126	1(1-0)
Physical Education W-I Phy. Educ. 151A	1(0-3)	Physical Education W-II Phy. Educ. 152A	1(0-3)

SOPHOMORE

First Semester		Second Semester	
Organic Chemistry HE Chem. 121	5(3-4, 2)	Household Microbiology Bact. 121	5(3-6)
German I * *or* French I * Mod. Lang. 101 *or* 151	3(3-0)	German II * *or* French II * Mod. Lang. 106 *or* 156	3(3-0)
General Zoölogy Zoöl. 105	5(3-6)	Embryology and Physiology Zoöl. 108	5(3-6)
Clothing II Dom. Art. 111	3(1-6)	Textiles Dom. Art 116	3(2-3)
Physical Education W-III Phy. Educ. 153	1(0-3)	Physical Education W-IV Phy. Educ. 154	1(0-3)

JUNIOR

First Semester		Second Semester	
English Literature HE-I Eng. 177	3(3-0)	English Literature HE-II Eng. 180	3(3-0)
Human Nutrition Chem. 130	3(3-0)	Dietetics Dom. Sci. 201	5(3-6)
Foods II Dom. Sci. 106	5(3-6)	Household Management Dom. Sci. 206	2(2-0)
Psychology Educ. 101	3(3-0)	Gardening Hort. 213	3(3-0)
German Readings * *or* French Readings * Mod. Lan. 111 *or* 161	3(3-0) *or*		
Elective	2(-)	Elective	3(-)

SENIOR

First Semester		Second Semester	
American History I Hist. 101	3(3-0)	American Government Hist. 151	3(3-0)
Economics Econ. 101	3(3-0)	Sociology Econ. 201	3(3-0)
Sanitation and Public Health Dom. Sci. 211	3(3-0)		
Marketing and Serving Dom. Sci. 216	1(0-3)		
Elective	6(-)	Elective	10(-)

ADAPTATION CURRICULA FOR CLASSES OF 1919 AND 1920

The class of 1920 will be required to complete the sophomore year as provided in this curriculum, except that in the second semester Foods I and II (5 semester credits) and Psychology (3 semester credits) are required instead of Household Microbiology (5 semester credits) and Textiles (3 semester crcdits); the junior year as provided in this curriculum except that in the first semester Foods III (3 semester credits), Textiles (3 semester credits), and Elective (2 semester credits) are required instead of Foods II (5 semester credits) and Psychology (3 semester credits), and in the second semester Household Microbiology (5 semester credits) and Advanced Dressmaking or Millinery (2 semester credits) are required instead of Dietetics (5 semester credits) and Household Management (2 semester credits); the senior year as provided in this curriculum, except that in the first semester Dietetics and Therapeutics (5 semester credits) and Elective (4 semester credits) are required instead of Economics (3 semester credits) and Elective (6 semester credits), and in the second semester Household Administration (2 semester credits), Interior Decoration and Furnishings (2 semester credits), Economics (3 semester credits), and Elective (6 semester credits) are required instead of Sociology (3 semester credits) and Elective (10 semester credits).

The class of 1919 will be required to complete the junior year as provided in this curriculum, except that in the first semester Human Physiology (3 semester credits), Foods III (3 semester credits), and Advanced Dressmaking or Millinery (2 semester credits) are required instead of Human Nutrition (3 semester credits) and Foods II (5 semester credits), and in the second semester Human Nutrition (3 semester credits), Sanitation and Public Health (3 semester credits), Textiles (3 semester credits) and Elective (4 semester credits) are required instead of Dietetics (5 semester credits), Household Management (2 semester credits), Gardening (3 semester credits), and Elective (3 semester credits); the senior year as provided in this curriculum, except that in the first semester Dietetics and Therapeutics (5 semester credits) and Elective (4 semester credits) are required instead of Sanitation and Public Health (3 semester credits) and Elective (6 semester credits), and in the second semester Household Administration (2 semester credits), Interior Decoration and Furnishings (2 semester credits), Household Chemistry (3 semester credits), and Elective (6 semester credits), are required instead of Sociology (3 semester credits) and Elective (10 semester credits).

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* Students who have offered high-school German or French for College entrance are required to take but two semesters of foreign language. The courses which they take will depend on their preparation.

Electives—Curriculum in Home Economics

First Semester		Second Semester	
Tailoring Dom. Art 216	2(0-6)		
Millinery Dom. Art 211	2(0-6)		
Hospital Garments Dom. Art 231	2(0-6)		
Institutional Management I Dom. Sci. 221	3(1-6)		
Dietetics Seminar Dom. Sci. 231	2(2-0)		
Modern Problems of the Household Dom. Sci. 236	2(2-0)		
		Clothing III Dom. Art 206	2(0-6)
		Art and Fine Needlework Dom Art 227	2(0-6)
		Institutional Management II Dom. Sci. 226	3(2-3)
		Problems in Child Welfare Home Econ. 201	3(3-0)
		Special Investigations in Foods Dom. Sci. 241	1(0-3)
		Home Nursing Dom. Sci. 112	3(2-3)
		Institutional Furnishings Home Art 203	3(1-6)
Interior Decoration and Furnishing Home Art 201	3(0-9)	Art Appreciation Home Art 206	3(3-0)
Organic Chemistry I Chem. 220	5(3-6)	Organic Chemistry II Chem. 221	5(3-6)
Physiological Chemistry Chem. 231	5(3-6)	Household Chemistry Chem. 265	3(1-6)
German Comedies Mod. Lang. 206	3(3-0)	German *or* French Short Stories Mod. Lang. 201 *or* 251	3(3-0)
German Classics Mod. Lang. 226	3(3-0)	German Prose I Mod. Lang. 221	3(3-0)
Scientific German I Mod. Lang. 236	3(3-0)	Scientific German II Mod. Lang. 241	3(3-0)
Business English Eng. 122	3(3-0)	Methods of Teaching English Eng. 134	3(3-0)
Oral English I Eng. 128	3(3-0)	Oral English II Eng. 131	3(3-0)
The Short Story Eng. 251	3(3-0)		
Nineteenth Century Literature Eng. 277	3(3-0)	American Literature Eng. 280	3(3-0)
Current Literature Eng. 282	2(2-0)	The Novel Eng. 285	2(2-0)
Educational Administration Educ. 105	3(3-0)	Educational Psychology Educ. 109	3(3-0)
History of Education Educ. 113	3(3-0)	Educational Sociology Educ. 118	3(3-0)
Home Economics Education Educ. 121	2(2-0)	Special Methods in the Teaching of Home Economics Educ. 132	3(3-0)
Supervised Observation and Teaching in Home Economics Educ. 141	2(0-4, 2)	Rural Education Educ. 201	3(3-0)
Photography Physics 120	2(1-3)	Harmonics Physics 222	2(2-0)
American History II Hist. 202	3(3-0)	American History III Hist. 203	3(3-0)
English History Hist. 121	3(3-0)		
Modern Europe Hist. 223	3(3-0)	History of the Home Hist. 225	3(3-0)
Teachers' Course in History Hist. 127	2(2-0)	Comparative Government Hist. 252	2(2-0)
Extempore Speech I Pub. Spk. 201	2(2-0)	Extempore Speech II Pub. Spk. 202	2(2-0)
Household Entomology Ent. 106	2(2-0)	Water Purification and Sewage Disposal Bact. 221	3(1-6)
Hygienic Bacteriology Bact. 206	4(2-6)	Institutional Accounting Math. 131	3(3-0)

First Semester		Second Semester	
Rural Architecture Farm Eng. 102	3(1-6)	Home Architecture Arch. 190	3(1-6)
Color Rendering Arch. 188	1(0-3)	Pen and Pencil Rendering Arch. 178	1(0-3)
Woodwork Shop 102	1(0-3)		
School Music Methods I Music 120	2(-)	School Music Methods II Music 121	2(-)
Voice Music 130	2(2-0)	Voice Music 130	2(2-0)
Piano Music 140	2(2-0)	Piano Music 140	2(2-0)
Violin Music 135	2(2-0)	Violin Music 135	2(2-0)
History of Music I Music 110	1(1-0)	History of Music II Music 111	1(1-0)
Harmony I Music 101	2(2-0)	Harmony II Music 102	2(2-0)
Plane Trigonometry Math. 101	3(3-0)	Teachers' Course in Mathematics Math. 122	3(3-0)
College Algebra Math. 104	3(3-0)		

NOTE.—Students intending to teach should elect the educational subjects to the extent of the requirements of the State Board of Education for the State teachers' certificate.

Students who wish to prepare for positions as institutional managers should elect Institutional Management, Institutional Furnishings, Business English, and Accounting.

Students who wish a more general training for home making or who expect later to specialize in any phase of home economics should elect Child Welfare, Home Nursing, Home Decoration, Home Architecture, Clothing III, and Household Entomology.

Domestic Art

Professor BIRDSALL
Assistant Professor COWLES
Instructor FECHT
Instructor JONES*
Assistant HARRISON
Assistant HUNT
Assistant PALMER
Assistant MCDONALD

The object of the instruction in domestic art is to give young women a practical knowledge of the selection of materials, the growing of textile fibers, and the processes used in their manufacture into fabrics. The course also offers instruction in hand and machine sewing; principles of drafting and designing patterns; dressmaking, tailoring, millinery, costume design, art needlework, history of costume and textiles, together with courses in education which teach how these subjects should be presented to the various grades of schools in relation to other work. The student furnishes all her materials.

COURSES IN DOMESTIC ART

FOR UNDERGRADUATES

101. CLOTHING I. Freshman year, second semester. Laboratory, six hours. Two semester credits. Professor Birdsall, Assistant Professor Cowles, Miss Palmer, Miss Jones, Miss Harrison, Miss McDonald, and Miss Fecht.

This course includes practice in hand and machine sewing; the making of simple articles, repairing garments, drafting by straight-line system, cutting and making undergarments and shirt waist. Appropriate materials and trimmings are discussed. Reference and notebook work is required.

* Resigned July 1, 1918.

106. COSTUME DESIGN. Freshman year, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Design. Miss Hunt and Miss McDonald.

This course includes a survey of the ancient Egyptian, Grecian, Roman, and early and modern French costumes. Its aim is to give the student information regarding these different periods. The adaptation of these costumes to present fashions is discussed.

Laboratory.—A study of the principles of design, color harmony, and the application of art in dress; original problems and their direct application to design for textiles, embroideries and costumes in pencil, pen, ink and water color; costumes for reproduction in materials in direct relation to dressmaking are comprised in this course.

111. CLOTHING II. Sophomore year, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Costume Design. Professor Birdsall, Assistant Professor Cowles, Miss Fecht, Miss Harrison, Miss Jones, Miss Palmer, and Miss McDonald.

In this course a study of the various textile fibers is included and clothing is considered in its relation to hygiene and economics. Reference and notebook work is required.

Laboratory.—This course begins with modeling in crinoline, establishing the principal lines for measurements, and developing an appreciation of the relation of the lines of patterns to different forms. This is followed by practice in taking measurements, in drafting foundation patterns by the straight-line system and making variations of all kinds from these. Emphasis is laid upon the development of one pattern from another and of the complex design from the simple. Designs are worked out upon the paper patterns and are adapted in the making of a cloth dress. Notebook work is required.

116. TEXTILES. Sophomore year, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Organic Chemistry. Miss Fecht.

This course considers the textile industry from primitive ages to modern times. The original purpose of the industry, that of furnishing covering for the body, and the later variations from this exclusive purpose, are treated, together with their effect on the composition and design of fabrics. The combination of art, science and mechanics that makes possible the elaborateness of modern textiles is given careful attention.

Laboratory.—The behavior of textile fibers toward various chemical reagents is studied. Physical and microscopic tests are made for the identification of fibers. Bleaching and dyeing; laundry processes as they affect color, shrinkage, strength, etc.; and analysis of mixed goods are likewise considered in the laboratory work.

FOR GRADUATES AND UNDERGRADUATES

206. CLOTHING III. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Clothing II. Miss Harrison, Miss Jones, and Miss McDonald.

This course emphasizes the artistic in lines and decoration, deals with the design and adaptation of materials for the individual and occasion, and lays special stress on self-expression through dress. It also presents the use of commercial patterns, and includes practice in cutting, fitting, finishing and draping of such materials as silks, satins, chiffons and laces.

211. MILLINERY. Elective, first semester. Laboratory, six hours. Two semester credits. Prerequisite: Clothing II. Professor Birdsall and Miss Palmer.

This course includes a discussion of practical and artistic principles of millinery; preparation of various materials for trimming; practice in making bows, rosettes, and other forms of hat decoration; making wire and buckram frames; use of velvet, silk and straw; renovating and the use of old materials.

216. TAILORING. Elective, first semester. Laboratory, six hours. Two semester credits. Prerequisite: Clothing II. Professor Birdsall.
This course includes discussions of material suitable for tailored suits; sponging, cutting, fitting and finishing a coat and shirt.

227. ART AND FINE NEEDLEWORK. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: Clothing II. Professor Birdsall and Miss Jones.
This course includes the following: stitches in crochet, knitting, cross-stitch, French embroidery, Roman cut work; their application to undergarments, waists, collars, and household linens. Instruction in needlework is applied to handmade garments, which include a lingerie waist, and children's and infants' clothing.

231. HOSPITAL GARMENTS. Elective, first semester. Laboratory, six hours. Two semester credits. Prerequisite: Clothing II. Professor Birdsall.
This course takes up the making of garments used in hospitals, such as hospital bed shirts, operating gowns, and pajamas.

Domestic Science

Professor HAGGART
Associate Professor SHEETS
Assistant Professor COX
Assistant Professor KENNEDY
Assistant Professor BARTLETT
Assistant Professor LEVERETT
Instructor SKINNER
Instructor GREEN
Instructor CAPE
Assistant BARTHOLOMEW*
Assistant PERRY
Assistant RICHARDS

Technically, domestic science is an application of the sciences and arts to the problems of the home. Since the home is dependent upon the sciences of physics, chemistry, physiology, and bacteriology, direct use of the principles of these sciences is made in the courses in foods, dietetics, sanitation and public health, home nursing and household management. Science, applied science, and practice are presented in their proper relations, so that the student who completes these courses gains not only a theoretical knowledge of the principles underlying the profession of homemaking, but experience in applying them.

COURSES IN DOMESTIC SCIENCE

FOR UNDERGRADUATES

101. FOODS I. Freshman year, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisites: Entrance credit in Physics, and Chemistry I. Assistant Professors Cox and Bartlett, and Miss Skinner.
The application of heat to various food principles is the basis of study in this course. The economic uses of the various foodstuffs is emphasized as is also the study of commercially prepared food products.

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* Resigned July 1, 1918.

Laboratory.—Experimental and practical cookery illustrating this course forms the basis of the laboratory work.

106. FOODS II. Junior year, first semester. Class work, three hours; laboratory, six hours. Five semester credits. Prerequisite: Organic Chemistry; Household Microbiology, and Human Physiology to accompany subject. Professor Haggart, Assistant Professor Cox, and Misses Skinner, Green, Cape, and Perry.

This course emphasizes the classification, composition, occurrence, general properties and nutritive value of foodstuffs. Food values in relation to cost are considered. Reference work is required and the text used is Sherman's *Food Products.*

Laboratory.—Experimental cookery is continued with emphasis on the proteins, dough and batter mixtures, together with preservation of food.

112. HOME NURSING. Elective, both semesters. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Human Physiology and Household Microbiology. Assistant Professor Kennedy.

This course puts special emphasis on the prevention of disease and on the building up of the highest degree of health as the principal function of the home nurse. The care of the sick in the home and the rendering of first aid in emergencies are discussed and demonstrations are given.

FOR GRADUATES AND UNDERGRADUATES

201. DIETETICS. Junior year, second semester. Class work, three hours; laboratory, six hours. Five semester credits. Prerequisites: Foods I and II and Human Nutrition. Associate Professor Sheets, Assistant Professor Cox, and Miss Cape.

This course is an application of the principles of human nutrition as applied to the feeding of individuals under different physiological conditions.

206. HOUSEHOLD MANAGEMENT. Junior year, second semester. Class work, two hours. Two semester credits. Prerequisites: Foods I and II. Professor Haggart and Miss Bartholomew.

This course has been arranged for the purpose of providing instruction in the problems and technical procedures of the modern household. Such topics as the following are discussed, both from the ideal and the practical standpoint: the organization of the household; the choice of a home and its furnishings; income as determining the type of a household; the budget and its apportionment; the household accounts; household services; apportionment of time; motion studies as applied to household activities; home life and its standards. There are lectures and class discussions, and reference work is required. The students are required to live for a definite period in the practice house.

211. SANITATION AND PUBLIC HEALTH. Senior year, both semesters. Class work, three hours. Three semester credits. Prerequisite: Household Microbiology. Assistant Professor Kennedy.

This course includes a study of conditions which determine the healthfulness of the household and the application of principles of sanitation to its care. Public health movements in relation to the home are investigated and the relation of home sanitation to the community is emphasized. Lectures are given and reference work is required.

216. MARKETING AND SERVING. Senior year, first semester. Laboratory, three hours. One semester credit. Prerequisites: Dietetics, and Home Management. Misses Cape and Bartholomew.

This course includes the planning, marketing, preparation and serv-

ing of meals based upon dietetic and economic standards. The application of the results of motion studies and efficient kitchen planning are emphasized.

221. INSTITUTIONAL MANAGEMENT I. Elective, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Dietetics. Miss Richards.

This course is a study of the food problem of institutions and includes the study of marketing, preparation of food, and cost of service.

Laboratory.—The preparation of food for institutional use and practical experience in the cafeteria of the Department are included in the laboratory work.

226. INSTITUTIONAL MANAGEMENT II. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: Institutional Management I. Assistant Professor Leverett.

This course includes a study of the various types of institutions, their aim, support, control, needs, equipment and methods of purchasing supplies, together with a study of the essential characteristics, preparation and duties of the manager. Lectures are given, followed by discussions. Reference and observation work is required.

Laboratory.—Experience is given in general cafeteria management.

231. DIETETICS SEMINAR. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: Dietetics. Associate Professor Sheets.

The purpose of this course is to familiarize the student with the current literature of nutrition and the recent advancements in that science.

236. MODERN PROBLEMS OF THE HOUSEHOLD. Elective, first semester. Class work, two hours. Two semester credits. Prerequisites: Economics, and Home Management. Professor Haggart.

This course includes a study of the economic relations of the family and of the modern social and industrial conditions which affect it.

241. SPECIAL INVESTIGATIONS IN FOODS. Elective, second semester. One semester credit. Hours to be arranged. Miss Skinner.

Special problems are assigned to students for individual consideration.

Home Art

Assistant Professor HOLMAN, in Charge
Instructor AVERILL

Taste is cultivated through the impressions received in everyday surroundings and not through the occasional visits to art galleries. We are not so sensitive to discords in color and line as we are to discords in sound, because we have not trained our eyes as we have our ears. "The study of design furnishes a means of exercising and thus developing good taste in connection with the things which make up environment of everyday life and of awakening appreciation in nature and in art." Home decoration is a study of the factors which produce beautiful surroundings that make for enjoyment and peace. Each course consists of lectures, studio laboratory work, field observation work, and reading.

COURSES IN HOME ART

FOR UNDERGRADUATES

101. DESIGN. Freshman year, first semester. Class work, one hour; studio, six hours. Three semester credits. Assistant Professor Holman and Miss Averill.

A study is made of the principles which control the use of color and the selection and arrangement of elements in the production of objects themselves and in their uses as parts of a whole. Many exercises are given in which clothing and home furnishings are scored as to design. A natural motif is adapted to material, function and form.

106. DESIGN A. Freshman year, first semester. Class work, one hour; studio, six hours. Three semester credits. To be taken as a substitute for Design by students who have had color and design work in high school. Assistant Professor Holman and Miss Averill.

A further study is made of harmonies, adaptation of natural motifs, and design as applied to fabrics and other materials. Art masterpieces and articles of common use are studied according to the principles of design and color.

FOR GRADUATES AND UNDERGRADUATES

201. INTERIOR DECORATION AND FURNISHING. Elective, first semester. Studio, nine hours. Three semester credits. Prerequisite: Color and Design. Assistant Professor Holman and Miss Averill.

This is a study of color, form and arrangement of home furnishings. Wall coverings, carpets, pictures, furniture, etc., are discussed and studied so that the student may recognize and appreciate what is appropriate and beautiful. A study is made of fine arts, of handicrafts, and of the history of furnishings. Problems in spacing and coloring of side walls are discussed and are developed in water color and decorating materials.

203. INSTITUTIONAL FURNISHINGS. Elective, second semester. Class work, one hour; studio, six hours. Three semester credits. Prerequisite: Design. Assistant Professor Holman and Miss Averill.

A study is made of the fundamental principles of design, including color, form, and arrangement. These principles are applied to problems involving the selection and use of the following: wall, floors, furniture, finishes, coverings, linen, china, and silver.

206. ART APPRECIATION. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Design or Design A. Assistant Professor Holman.

A general survey is made of art periods as an index to what the art quality is. An examination is made of the religious, political, and social aspects of art expression. Architecture, furniture, textiles, sculpture, pictures, and the lesser art objects are compared as to their art quality. The modern fields of landscape, architecture, furnishings, clothing, advertising, etc., are surveyed. The principles controlling art expression are applied to these modern fields of life.

Home Economics

Dean VAN ZILE
Assistant Professor HALM

In the general field of home economics there are certain subjects falling into the well-defined fields of domestic art, domestic science, and home art. These have been described in foregoing sections. There are also certain larger and more general subjects which do not fall within these groups. These are discussed, in part at least, in the courses outlined below.

COURSES IN HOME ECONOMICS

FOR UNDERGRADUATES

101. THE SURVEY OF HOME ECONOMICS. Freshman year, both semesters. Class work, one hour. One semester credit. Assistant Professor Halm.

The course deals with the problems of the development of education for women, the place of home economics training, different phases of the work, the practical and educational purposes in its teaching, and the study of the different vocations in the field of home economics.

Educ. 121. HOME ECONOMICS EDUCATION. Elective, first semester. Class work, two hours. Two semester credits. Assistant Professor Halm.

See the work outlined under Education. This course is there described in detail.

Educ. 132. SPECIAL METHODS IN THE TEACHING OF HOME ECONOMICS. Elective, second semester. Class work, three hours. Three semester credits. Assistant Professor Halm.

See the work outlined under Education. This course is there described in detail.

Educ. 141. SUPERVISED OBSERVATION AND TEACHING IN HOME ECONOMICS. Elective, both semesters. Laboratory work, six hours. Two semester credits. Assistant Professor Halm.

See the work outlined under Education. This course is there described in detail.

FOR GRADUATES AND UNDERGRADUATES

201. PROBLEMS OF CHILD WELFARE. Elective, second semester. Class work, three hours. Three semester credits. Prerequisites: Physiology, and Psychology. Dean Van Zile.

A study is made of the rational care of the child and of the principles of child welfare. It includes the factors that influence physical fitness, the daily routine of the infant, and the constructive and preventive measures in physical and mental development of the child.

Housekeepers' Course in Home Economics

There are large numbers of young women who, from lack of time, are unable to take an extended course, but who recognize the need for special training in home making. The twentieth century demands of home managers an understanding of the sanitary requirements of the home, a knowledge of values, absolute and relative, of the articles used in the house, quick attention to details, good judgment in buying, and a ready adaptation of means to the end in view. The purpose of the housekeepers' course is to furnish this training. The teaching in this course is no less accurate than in the regular course, but is necessarily different. Given to students without scientific training, the instruction must be more largely a presentation of facts, without an elaboration of the underlying principles. The work is intensely practical, and the hundreds of young women who take this course go back to their homes with a broader view of life, and a knowledge and training that will enable them to meet their responsibilities. This course is given during the first fifteen weeks of each semester.

REQUIREMENTS FOR ADMISSION

Young women between the ages of eighteen and twenty-one are admitted upon presentation of common-school diploma, grammar-school certificate, or high-school diploma. Young women over twenty-one years of age are admitted without examination.

HOUSEKEEPERS' COURSE

Cookery	Floriculture
Sewing	Design in the Home and in Clothing
Hygiene	Housewifery

1. COOKERY. Both semesters. Laboratory, eight hours.
Stoves, stove construction, stove management and fuels are the first topics considered, and this discussion is followed by experiments illustrating the effect of heat upon starch and proteins. The necessary elementary principles involved are then applied to the cooking of cereals, vegetables, beverages, breads, meats, soups, simple cake mixtures and puddings, and to the canning and preserving of fruits and vegetables. Special attention is given to the planning and serving of meals.

2. SEWING. Both semesters. Laboratory, ten hours.
This course includes practice in hand and machine sewing and dressmaking. The fundamental stitches are applied to simple articles and to the repairing of garments. Practice is given in the use of the sewing machine, and in the adaptation of commercial patterns. Suitable materials and trimmings are discussed, and undergarments, a shirt waist and a cloth dress are made. Notebook work is required.

3. HYGIENE. Both semesters. Class work, three hours.
This course takes up the study of elementary hygiene as applied to the individual, the house and the community, with the idea that the prevention of disease is the most important duty of the home nurse. It includes also the giving of intelligent assistance to the physician and contributing to the comfort of the sick. This involves also the ability to recognize and report symptoms correctly, to give baths, to change bedding, to disinfect, and to render first aid in common emergencies in the home.

4. DESIGN IN THE HOME AND IN CLOTHING. Both semesters. Laboratory, six hours.
This course makes a study of the design principles used in dress, and in the problems of the home. Suitable lines and colors for dress are discussed and many practical problems are given. In home decoration the study involves the choice and arrangement of furniture, the choice of wallpaper and of rugs, the use of color in the home, and the choice and arrangement of pictures.

5. FLORICULTURE. Both semesters. Class work, two hours.
Lectures in the classroom are supplemented by practical exercises in the greenhouse, dealing with the propagation and culture of flowers. Soil requirements, the planting of seeds, transplanting, cultivation, the making of cuttings, the selection of varieties adapted to the purpose of window gardening, lawn planting and cutting are discussed in the lectures. An opportunity to become acquainted with the species recommended and with the operations necessary for their successful culture is afforded in the laboratory practice.

6. HOUSEWIFERY. Both semesters. Laboratory, three hours.
This course includes a study of processes and methods in housekeeping.

One-year Course in Lunch-room Management

It is the purpose of this course to offer training to mature women, who are fitted by education and ability to carry on some form of lunch-room management. The positions open to such women will be *commercial* ones only, as the Department reserves the right to recommend only the members of the College institutional classes for positions in educational institutions and hospitals.

The positions open to women who complete this one-year course will be in cafeterias, tea rooms, and other commercial establishments which serve food.

This course covers one year, and certificates will be granted on the successful completion of the work.

REQUIREMENTS FOR ADMISSION

The course is open to women twenty-five years of age or older. Applications for entrance must be made in writing and applicants will be chosen by the faculty of the Department according to training and ability. The number in the class is limited to twenty, in order to give each member the personal training necessary. At the close of the first semester those who possess qualifications peculiarly adapted for the work of lunch-room management will be selected to continue the course.

HOW TO APPLY FOR ENTRANCE

A student desiring admission to this course is asked to write a letter to the Dean of the Division of Home Economics, stating her general qualifications and training. After consideration by the faculty of the Department of Domestic Science, the candidates for this course will be chosen and notified before July 15.

Each student enrolling in this course is required to furnish herself with three gingham dresses and six white aprons. (Samples of goods and patterns may be obtained from the department.) Students are required to wear this uniform, as personal neatness counts for much in this work.

LUNCH-ROOM MANAGERS' COURSE

Principles of Cookery
4 (0-12)
Food Production and Marketing
3 (3-0)
Business English LR
3 (3-0)
Cafeteria Practice LR-I
2 (0-6)
Sanitation and Hygiene
1 (1-0)
Furnishing and Decorating
1 (0-3)

Institutional Cookery
5 (1-12)
Accounting
2 (0-2)
Lunch-room Management
2 (2-0)
Cafeteria Practice LR-II *or* Tea-room Service
4 (0-12)
Lunch-room Promotion
1, for half semester
Meal Planning
1, for half semester

1. PRINCIPLES OF COOKERY. First semester. Laboratory, twelve hours. The purpose of this course is to teach the principles of cookery by means of the preparation of different foods. This course includes both

plain and fancy cookery. In the laboratory a standard system of measurement is taught, and special attention is given to training in accuracy, neatness and economy in handling utensils and materials. Standard servings and the cost of prepared foods are carefully estimated.

2. FOOD PRODUCTION AND MARKETING. First semester. Class work, three hours.

This course covers the main points in source, production and manufacture of foods. Special stress is laid on marketing and buying for the lunch room. Food values are emphasized.

3. SANITATION AND HYGIENE. First semester. Class work, one hour.

This course covers the sanitary control of eating-houses and food supply, together with the personal hygiene of the worker.

4 and 5. CAFETERIA PRACTICE LR-I, LR-II. First and second semesters, respectively. Laboratory, six and twelve hours, respectively.

This course is planned that the student may become thoroughly familiar with the cafeteria. Experience is had in serving, checking and other details.

6. BUSINESS ENGLISH LR. First semester. Class work and practice, three hours.

This course is designed to meet the needs of those who are especially preparing themselves to manage lunch rooms. Essential forms of business correspondence, contract forms, the best forms of making and displaying notices and posters, the best current literature in home economics, and well-directed cultural reading are given their proper emphasis.

7. FURNISHING AND DECORATING. First semester. Laboratory, three hours.

Color, form and arrangement as applied to wall and floor coverings, furniture, linen, china and silver are studied.

8. INSTITUTIONAL COOKERY. Second semester. Class work, one hour; laboratory, twelve hours.

This course applies the principles of cookery to the preparation of large quantities of food for use in the cafeteria. The course is given in the kitchen laboratory of the cafeteria.

9. ACCOUNTING. Second semester. Class work, two hours.

This is a course in the elements of bookkeeping and of business practice as applied to the accounts of lunch rooms, tea rooms, and cafeterias.

10. TEA-ROOM SERVICE. Second semester. Laboratory, twelve hours.

During the second semester the students carry on a tea room in the dining room of the Department. So far as it is practicable, students are given an opportunity to do catering. Careful attention is given to service and cost of maintenance.

11. LUNCH-ROOM MANAGEMENT. Second semester. Class work, two hours.

The course covers the field of organization, equipment, service and general management of lunch rooms.

12. MEAL PLANNING. Second semester. Class work, one hour for half the semester.

The planning of meals according to dietary standards is taught in this course. Practice is given in planning menus for cafeterias and tea rooms.

13. LUNCH-ROOM PROMOTION. Second semester. Class work, one hour for half the semester.

The purpose of the course is to show the practical application of the principles of advertising and publicity to the enterprises treated in the course in lunch-room management. The several kinds of advertising are taken up in their relation to the line of business which the students plan to enter. The principles of typographical design as adapted to menu cards and other necessary printed material receive careful attention.

Home Economics in the Summer School

In addition to instruction in various branches of home economics available to teachers during the regular College year, the College offers several courses in this subject in the Summer School. Instruction in these courses is intended to present correctly that which may be introduced successfully into graded schools and high schools. Students will be enrolled upon presentation of a teacher's certificate, or of a certified statement showing that two years' high-school work or its equivalent has been completed.

A special circular giving in detail the courses offered in the Summer School may be had by applying to the Vice President of the College. See, also, the article on Summer School in this catalogue.

Division of General Science

JULIUS TERRASS WILLARD, *Dean*

In the class of colleges to which this institution belongs the classical studies of the older type of college are replaced by work in the sciences and in vocational subjects. A sound basis for technical training includes thorough training in mathematics, physical science, and biological science. It is believed also that education should include some preparation for the discharge of one's duties to the State and to the community in which he lives. It should afford him that discipline and culture which alone can give him a grasp of the relations among things, a breadth of view, a tolerant attitude, and hence an influence over his associates and fellow citizens of every station in life.

It is the province of the departments grouped in this division of the College to give this basic, scientific, cultural, and disciplinary training. Their work is not only foundational, but it penetrates through all the characteristic vocational courses of the institution, as the structural steel of the modern skyscraper penetrates the entire building and forms a secure framework and support for the parts more readily visible. These departments thus give unity to all of the four-year courses of study, although presenting but two courses that are distinctive of their own work. These, however, by means of electives and options, are susceptible of manifold modification and application.

CURRICULUM IN GENERAL SCIENCE

The curriculum in general science includes fundamental training in English, mathematics, science, history, economics, military science, and physical training required in the several specialized vocational courses now offered by the College and chosen by the great body of our students. Its required subjects constitute the central educational basis of the institution. By means of a number of groups of electives, it gives an opportunity to students to advance themselves still further in these fundamental lines and to give special attention to some instead of taking the vocational subjects characterizing other courses. This opportunity meets the needs of several types of young people, among whom are: (1) Those who have not yet fully decided as to their vocation, but who wish an education that is strong and well balanced in respect to modern science and cultural subjects, as a foundation for further education or as a preparation for sound citizenship and intellectual satisfaction in life. (2) Those who are looking forward to teaching in the high schools of the State. The electives offered allow one to give special attention to mathematics, physical science, biological science, agriculture, domestic science and art, history, economics, English, and professional educational sub-

jects. (3) Those who are fitting themselves for research work in the sciences, especially as applied to agriculture, engineering, and other industries.

The elective groups offered in this curriculum are to a considerable extent made up of studies required in one or more of the specialized curricula. They provide also, however, advanced work not included in other curricula. The scientific work in connection with the Agricultural and Engineering Experiment Stations, and several fields of State investigation and service, calls for the operation of unusually well-equipped departments in the sciences, and excellent facilities for practical training in this work are thus afforded.

While the curriculum in general sciences offers a wide choice of electives, these may not be selected aimlessly, or with the idea of choosing the easiest, or of obtaining credit for miscellaneous subjects taken elsewhere or in other curricula. The studies of the freshman and sophomore years are basic and are required of all, without exception. They insure a broad and adequate foundation for subsequent work in the several lines of electives. The electives are to be chosen in groups, approved by the faculty or by the Dean of the Division of General Science, and in such a manner as to give logical coherence to the curriculum as a whole. The elective portion of the curriculum, as thus made up, will consist for the most part of several groups of two or more full studies or their equivalent. It is possible to include some single subjects that may be advantageously taken without others. Special combinations in sewing, cooking, and shop work have been planned to meet the needs of prospective teachers of manual training. Students changing from other curricula to that in general science receive credit for work done in the other curricula in so far as it may be fitted into the general plan of this one.

The curriculum in general science is thus many in one. Such various combinations of groups are possible that it is not practicable to print all of them in extended form. There are, therefore, formally presented herewith the required subjects of the curriculum in their specified order by years and semesters, together with a considerable number of groups of electives.

CURRICULUM IN INDUSTRIAL JOURNALISM

Knowledge is power only as it comes into the possession of those who can use it; it gives pleasure in direct proportion to the extent of its diffusion. A discovery is of but little value as long as the discoverer is the only one who knows of its existence, and the printed page is by far the most effective means of extending knowledge concerning it. Magazines and newspapers never sleep, nor do they take vacations, and their power to elevate mankind is incalculable. But printed knowledge becomes effective only as it is read, and to be widely read in this day it must stand out from the great mass of other matter and gain the attention and hold the interest of the reader. To do this its points must be sharp and easily seen, and the style must be attractive. On the other hand, if the presentation is not essentially true, the more attractive it is the worse it is and the greater the harm that follows wide reading of it.

The curriculum in industrial journalism endeavors to give young men and women training which will enable them to write both truthfully and effectively, particularly upon industrial subjects. To such subjects the modern newspaper and the general magazine are giving constantly more attention, while there are also 500 agricultural publications and a greater number of class and trade publications which are largely or exclusively concerned with matters relating to industrial life. The training given by the College has enabled a goodly number of alumni to do successful work upon these publications.

The aim of the curriculum is to present such subjects as will enable the writer to see his work in proper perspective, to obtain authoritative knowledge of some field of industrial activity, and to write acceptably. The curriculum consequently offers, in the first place, fundamental studies of literary, social and scientific character. Because of the materials with which journalism deals, it is highly desirable that the student obtain a clear knowledge of the social sciences and be able to read at least one current foreign language. Every student in the course is strongly urged to elect German or French. In the second place, the student is required to elect subjects in agriculture, mechanic arts, applied science, or home economics, depending on what portion of the field of industrial journalism he desires to enter, it being expected that every student graduated from the curriculum shall have special knowledge of some prominent line of industry. In the third place, the theory and practice of journalism are presented in a series of courses extending throughout the sophomore, junior, and senior years, and opportunity is offered for taking additional electives in journalism simultaneously with the required courses.

The College thus affords preparation for work in a wide and inviting field. Our unprecedented industrial achievements have been made by the application of discoveries in physical and biological science. Much of discovery and much of application are yet to come, and one who can write truthfully and attractively of that which is, and of that which comes, will find ample reward.

Curriculum in General Science

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Plane Trigonometry Math. 101	3(3-0)	College Algebra * Math. 104	3(3-0)
General Botany I Bot. 101	3(1-4, 2)	General Botany II Bot. 105	3(1-6)
Current History Hist. 126	1(1-0)	Current History Hist. 126	1(1-0)
Library Methods Lib. Ec. 101	1(1-0)	Elective †	2(-)
Military Science I (Men) Mil. Tr. 101	1(0-3)	Military Science II (Men) Mil. Tr. 102	1(0-3)
Physical Education M-I Phys. Ed. 103	(0-2) *or*	Physical Education M-II Phys. Ed. 104	(0-2) *or*
Physical Education W-I Phys. Ed. 151A	1(0-3)	Physical Education W-II Phys. Ed. 152A	1(0-3)

SOPHOMORE

First Semester		Second Semester	
English Literature I Engl. 171	4(4-0)	English Literature II Engl. 174	4(4-0)
English History Hist. 121	3(3-0)	Modern Europe Hist. 223	3(3-0)
General Physics I Physics 201	4(3-3)	General Physics II Physics 202	4(3-3)
General Zoölogy I Zoöl. 101	3(2-3)	General Zoölogy II Zoöl. 102	3(2-3)
Elective †	3(-)	Elective †	3(-)
Military Science III (Men) Mil. Tr. 103	1(0-3) *or*	Military Science IV (Men) Mil. Tr. 104	1(0-3) *or*
Physical Education W-III (Women) Phys. Ed. 153	1(0-3)	Physical Education W-IV (Women) Phys. Ed. 154	1(0-3)

JUNIOR

First Semester		Second Semester	
American Government Hist. 151	3(3-0)	American History I Hist. 101	3(3-0)
Psychology Educ. 101	3(3-0)	Economics Econ. 101	3(3-0)
Extempore Speech I Pub. Sp. 201	2(2-0)	General Microbiology Bact. 101	3(1-6)
Elective †	8(-)	Elective †	6(-)

SENIOR

First Semester		Second Semester	
Elective †	16(-)	Elective †	16(-)

* Students who offer but one unit of algebra for admission take a five-credit course in College Algebra, Math. 107. The additional credits are applied against electives.

† Electives are to be chosen, with the advice and approval of the Dean, in groups of not less than eight semester credits, or in courses which extend fields already entered in the required work.

ADAPTATION CURRICULA FOR CLASSES OF 1918, 1919 and 1920

On account of the change from the three-term to the semester calendar and the changes in the content of the curriculum in general science, the classes that had already entered upon the old curriculum will satisfy the requirements for graduation by completing curricula as follows:

Class of 1918.—Freshman, sophomore and junior years as published in the catalogue for 1913-'14; senior year, American History I, 3 hours, and electives, 29 hours.

Class of 1919.—Freshman and sophomore years as published in the catalogue for 1914-'15; junior and senior years in accordance with the new curriculum, except that two hours of electives will replace Extempore Speech I.

Class of 1920.—Freshman year of course in general science as published in the catalogue for 1915-'16; sophomore, junior and senior years as shown in this catalogue, excepting that in the sophomore year English Literature I, English Literature II, and three hours of elective are replaced by College Rhetoric II (3 hours), English Literature (5 hours), and Qualitative Analysis (3 hours).

Groups of Electives and Options for Students in the Division of General Science

In addition to the courses included in the following groups, others will be found described in the exposition of the work of the respective departments.

From any group elected a sufficient number of courses to constitute an effective block of knowledge must be taken. At least eight semester credits in any new field are usually required, but a smaller number will be honored if in a field already entered upon.

	First Semester		Second Semester	
1	Advanced Composition I Engl. 113	2(2-0)	Advanced Composition II Engl. 116	2(2-0)
	Business English Engl. 122	3(3-0)	Advertising English Engl. 125	3(3-0)
	Oral English I Engl. 128	3(3-0)	Oral English II Engl. 131	3(3-0)
	Composition and Literature I Engl. 151	2(2-0)	Composition and Literature II Engl. 154	2(2-0)
	Argumentation and Debate Engl. 119	3(3-0)	Methods of Teaching English Engl. 134	3(3-0)
	The Short Story Engl. 251	3(3-0)	Community English Engl. 254	2(2-0)
2	The English Bible Engl. 271	3(3-0)	The Shakespearian Drama Engl. 274	3(3-0)
	Nineteenth Century Literature Engl. 277	3(3-0)	American Literature Engl. 280	3(3-0)
	Current Literature Engl. 282	2(2-0)	The Novel Engl. 285	2(2-0)
	English Survey I Engl. 288	2(2-0)	English Survey II Engl. 290	2(2-0)
	Tennyson and Browning Engl. 293	3(3-0)	The Arts and Crafts Movement Engl. 295	2(2-0)
3	German I Mod. Lang. 101	3(3-0)	German II Mod. Lang. 106	3(3-0)
	German Readings Mod. Lang. 111	3(3-0)	German Short Stories Mod. Lang. 201	3(3-0)
	Scientific German I Mod. Lang. 236	3(3-0)	Scientific German II Mod. Lang. 241	3(3-0)
4	French I Mod. Lang. 151	3(3-0)	French II Mod. Lang. 156	3(3-0)
	French Readings Mod. Lang. 161	3(3-0)	French Short Stories Mod. Lang. 251	3(3-0)

	First Semester	Second Semester
5	Plane Analytical Geometry Math. 110 ..... 4(4-0) Calculus I Math. 113 ..... 5(5-0) Analysis of Statistics Math. 125 ..... 3(3-0) Differential Equations Math. 201 ..... 3(3-0)	Teachers' Course in Mathematics Math. 122 ..... 3(3-0) Calculus II Math. 116 ..... 3(3-0) Mathematics of Biology Math. 128 ..... 3(3-0) Institutional Accounting Math. 131 ..... 3(3-0)
6	Advanced Inorganic Chemistry Chem. 201 ..... 5(5-0) Inorganic Preparations Chem. 202 ... 2(0-6) *to* 4(0-12) Industrial Chemistry I Chem. 203 ..... 5(3-6)	Industrial Electro-Chemistry Chem. 205 ..... 2(2-0) Physical Chemistry Chem. 206 ..... 5(3-6) Industrial Chemistry II Chem. 204 ..... 5(3-6)
7	Organic Chemistry I Chem. 220 ..... 2(3-6)	Organic Chemistry II Chem. 221 ..... 5(3-6) Physiological Chemistry Chem. 231 ..... 5(3-6)
8	Quantitative Analysis I Chem. 150 ..... 2(0-6) Quantitative Analysis II Chem. 250 ..... 3(1-6) Advanced Qualitative Analysis Chem. 240 ..... 3(1-6)	Quantitative Analysis I Chem. 150 ..... 2(0-6) Quantitative Analysis III Chem. 251 ..... 3(1-6) Household Chemistry Chem. 265 ..... 3(1-6)
9	Household Physics Physics 101 ..... 3(3-0) Photography Physics 120 ..... 2(1-3) Molecular Physics Physics 221 ..... 4(3-3) Wireless Telegraphy Physics 130 ..... 2(1-3)	Agricultural Physics Physics 111 ..... 3(3-0) Harmonics Physics 222 ..... 2(2-0) Physical Measurements Physics 223 ..... 3(2-3) Special Methods in Teaching Physics Physics 224 ..... 3(2-3)
10	Agricultural Microbiology Bact. 106 ..... 3(1-6) Hygienic Bacteriology Bact. 206 ..... 4(2-6) Pathogenic Bacteriology II Bact. 116 ..... 4(2-6) Poultry Bacteriology Bact. 216 ..... 3(1-6)	Soil Microbiology Bact. 201 ..... 3(1-6) Pathogenic Bacteriology I Bact. 111 ..... 4(2-6) Dairy Bacteriology Bact. 211 ..... 3(1-6) Water Purification and Sewage Disposal Bact. 221 ..... 3(1-6)
11	Plant Pathology I Bot. 107 ..... 3(1-6) Plant Pathology II Bot. 201 ..... 1(0-3) Plant Genetics I Bot. 211 ..... 3(1-6) Economic Botany Bot. 219 ..... 3(1-6) Evolution of Plants Bot. 222 ..... 3(3-0)	Plant Physiology II Bot. 208 ..... 3(3-0) Plant Breeding Bot. 205 ..... 3(1-6) Plant Histology Bot. 215 ..... 2(0-6) Taxonomic Botany Bot. 225 ..... 3(1-6)

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First Semester		Second Semester	
Advanced Invertebrate Zoölogy Zoöl. 201	4(2-6)	Advanced Vertebrate Zoölogy Zoöl. 202	4(2-6)
Taxonomy of Invertebrates Zoöl. 205	3(0-9)	Taxonomy of Vertebrates Zoöl. 208	3(0-9)
Cytology Zoöl. 214	4(2-6)	Animal Ecology Zoöl. 211	3(1-6)
Parasitology Zoöl. 123	2(1-3)	Economic Zoölogy Zoöl. 126	3(1-6)

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Dynamic and Structural Geology Geol. 101	2(2-0)	Historical Geology Geol. 201	2(2-0)
		Engineering Geology Geol. 102	4(2-6)

14

General Entomology Ent. 101	3(2-3)	General Economic Entomology Ent. 206	3(2-3)
Insect Morphology I Ent. 211	3(1-6)	Principles of Taxonomy Ent. 216	1(1-0)
Advanced General Entomology Ent. 221	2(2-0)	Apiculture Ent. 111	3(2-3)

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American History II Hist. 202	3(3-0)	American History III Hist. 203	3(3-0)
American Industrial History Hist. 105	3(3-0)	European Industrial History Hist. 224	3(3-0)
Pan-America Hist. 207	2(2-0)	Immigration and International Relations Hist. 228	2(2-0)
Modern England and the British Empire Hist. 226	3(3-0)	Comparative Government Hist. 252	2(2-0)
The Ancient World Hist. 229	3(3-0)	Kansas History Hist. 230	2(2-0)
American Political History Hist. 206	2(2-0)	History of the Home Hist. 225	3(3-0)

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Business Law I Hist. 153	1(1-0)	Business Law II Hist. 154	1(1-0)
International Law Hist. 256	2(2-0)	Farm Law Hist. 155	2(2-0)

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Economics Econ. 101	3(3-0)	Agricultural Economics Econ. 102	3(3-0)
Principles of Sociology Econ. 201	3(3-0)	Marketing and Coöperation Econ. 216	2(2-0)
Business Organization Econ. 204	1(1-0)	Money and Banking Econ. 210	1(1-0)
Labor Problems Econ. 207	1(1-0)	Public Finance Econ. 213	1(1-0)

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Educational Administration Educ. 105	3(3-0)	Educational Psychology Educ. 109	3(3-0)
History of Education Educ. 113	3(3-0)	Educational Sociology Educ. 118	3(3-0)
Rural Education Educ. 201	3(3-0)		

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First Semester		Second Semester	
Agricultural Education		Special Methods in the Teaching of Agriculture	
Educ. 125	2(2-0)	Educ. 136	3(3-0)
		Supervised Observation and Teaching in Agriculture	
		Educ. 146	3(0-9)
Home Economics Education		Special Methods in the Teaching of Home Economics	
Educ. 121	2(2-0)	Educ. 132	3(3-0)
		Supervised Observation and Teaching in Home Economics	
		Educ. 141	2(0-6)
Industrial Education		Special Methods in the Teaching of Subjects in Industrial Arts	
Educ. 129	2(2-0)	Educ. 140	3(3-0)
		Supervised Observation and Teaching in Industrial Arts	
		Educ. 150	3(0-9)

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Elementary Journalism		Industrial Writing	
Ind. Jour. 107	2(2-0)	Ind. Jour. 113	2(2-0)
Journalism Practice I		Journalism Practice II	
Ind. Jour. 110	2(0-6)	Ind. Jour. 116	2(0-6)
Industrial Feature Writing		Technical Journalism	
Ind. Jour. 123	2(2-0)	Ind. Jour. 130	2(2-0)
Journalism Practice III		Journalism Practice IV	
Ind. Jour. 127	2(0-6)	Ind. Jour. 133	2(0-6)

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Materials of Journalism		Magazine Features	
Ind. Jour. 213	2(2-0)	Ind. Jour. 216	2(-)
History of Journalism		Journalism Surveys	
Ind. Jour. 219	2(2-0)	Ind. Jour. 222	2(0-6)

23

Voice

Two private lessons a week. Two semester credits.

Piano

Two private lessons a week. Two semester credits.

Violin

Two private lessons a week. Two semester credits.

Wind Instruments

Two private lessons a week. Two semester credits.

Harmony I		Harmony II	
Music 101	2(2-0)	Music 102	2(2-0)
Harmony III		Harmony IV	
Music 103	2(2-0)	Music 104	2(2-0)
Counterpoint		Musical Form and Analysis	
Music 107	2(2-0)	Music 109	2(2-0)
History of Music I		History of Music II	
Music 110	1(1-0)	Music 111	1(1-0)
School Music Methods I		School Music Methods II	
Music 120	2(-)	Music 121	2(-)
School Music Methods III		School Music Methods IV	
Music 122	2(-)	Music 123	2(-)
Choral Society		Choral Society	
Music 150	1(-)	Music 150	1(-)
Orchestra		Orchestra	
Music 151	1(-)	Music 151	1(-)
Military Band		Military Band	
Music 152	1(-)	Music 152	1(-)

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First Semester		Second Semester	
American History I Hist. 101	3(3-0)	American History II *or* III Hist. 202, 203	3(3-0)
American Government Hist. 151	3(3-0)		
Pan-America Hist. 207	2(2-0)		
English History Hist. 121	3(3-0)	Modern Europe Hist. 223	3(3-0)
Economics Econ. 101	3(3-0)	Agricultural Economics Econ. 102	3(3-0)
Business Organization Econ. 204	1(1-0)	Money and Banking Econ. 210	1(1-0)
Labor Problems Econ. 207	1(1-0)	Public Finance Econ. 213	1(1-0)
Principles of Sociology Econ. 201	3(3-0)	Marketing and Coöperation Econ. 216	2(2-0)
		Agricultural Land Problems Econ. 219	1(1-0)

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General Botany I Bot. 101	3(1-6)	General Botany II Bot. 105	3(1-6)
Plant Pathology I Bot. 107	3(1-6)	Plant Breeding Bot. 205	3(1-6)
Economic Botany Bot. 219	3(1-6)	Seed Identification and Weed Control. Agron. 105	2(1-3)
Farm Forestry Hort. 113	4(3-3)	Plant Propagation Hort. 101	3(2-2, 1)
		Gardening Hort. 213	3(3-0)
		Landscape Gardening I Hort. 216	4(2-6)
General Zoölogy I Zoöl. 101	3(2-3)	General Zoölogy II Zoöl. 102	3(2-3)
Parasitology Zoöl. 123	2(1-3)	Economic Zoölogy Zoöl. 126	3(1-6)
Embryology and Physiology Zoöl. 108	5(3-6)	General Microbiology Bact. 101	3(1-6)
Hygienic Bacteriology Bact. 206	4(2-6)	Water Purification and Sewage Disposal. Bact. 221	3(1-6)
General Entomology Ent. 101	3(2-3)	General Economic Entomology Ent. 206	3(2-3)
Horticultural Entomology Ent. 201	(2-0)	Apiculture Ent. 111	3(2-3)
Organic Chemistry Chem. 120	3(2-2, 1)		
Quantitative Analysis I Chem. 150	2(0-6)		
Chemistry of Silos and Fertilizers Chem. 252	3(1-6)	Dairy Chemistry Chem. 254	3(1-6)
Chemistry of Plant Products Chem. 253	3(1-6)	Chemistry of Meats Chem. 255	3(1-6)
Human Nutrition Chem. 130	3(3-0)	Household Chemistry Chem. 265	3(1-6)
Household Physics Physics 101	3(3-0)	Agricultural Physics Physics 111	3(3-0)
Photography Physics 120	2(1-3)	Wireless Telegraphy Physics 130	2(1-3)

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Household Physics Physics 101	3(3-0)	Foods I Dom. Sci. 101	3(1-6)
Organic Chemistry HE Chem. 121	5(3-4, 2)	Household Microbiology Bact. 121	5(3-6)
Foods II Dom. Sci. 106	5(3-6)	Dietetics Dom. Sci. 201	5(3-6)
Human Nutrition Chem. 130	3(3-0)		

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First Semester		Second Semester	
Design Home Art 101	3(0-9)	Clothing I Dom. Art 101	2(0-6)
Clothing II Dom. Art 111	3(1-6)	Costume Design Dom. Art 106	3(1-6)
Interior Decoration and Furnishing Home Art 201	3(0-9)	Textiles Dom. Art 116	3(2-3)
		Art Appreciation Home Art 206	3(3-0)

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General Botany I Bot. 101	3(1-6)	General Botany II Bot. 105	3(1-6)
Types and Classes of Live Stock An. Husb. 101	3(1-6)	Plant Propagation Hort. 101	3(2-2, 1)
Grain Crop Production Agron. 101	3(2-2, 1)	Forage Crop Production Agron. 102	3(2-2, 1)
Elements of Dairying Dairy Husb. 101	3(2-3)	Dairy Judging Dairy Husb. 104	1(0-3)
Organic Chemistry Chem. 120	3(2-2, 1)	Farm Poultry Production Poult. Husb. 101	2(1-2, 1)
Plant Pathology I Bot. 107	3(1-4, 2)	Principles of Feeding An. Husb. 104	3(3-0)
Soils Agron. 131	4(3-3)	Orcharding Hort. 107	2(1-2, 1)
Quantitative Analysis I Chem. 150	2(0-6)	Soil Fertility Agron. 132	3(2-2, 1)

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General Drawing Arch. 101	1(0-3)	Descriptive Geometry Arch. 104, 107	3(1-6)
Color Rendering Arch. 188	1(0-3)	Color Arch. 180	1(0-3)
Free-hand Drawing I Arch. 111	2(0-6)	Free-hand Drawing II Arch. 114	2(0-6)
Domestic Architecture Arch. 171, 172	3(1-6)	Heat, Light and Sanitation Arch 174	2(2-0)

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Wood Working for Grammar Grades Shop 120	2(0-6)	Wood Working I for High Schools Shop 125	2(0-6)
Wood Working II for High Schools Shop 130	2(0-6)	Wood Turning Shop 135	2(0-6)
Forging I Shop 150	1(0-3)	Forging II Shop 155	1(0-3)
Forging III Shop 215	1(0-3)	Forging IV Shop 220	1(0-3)
Foundry Practice Shop 160	1(0-3)	Pattern Making Shop 145	1(0-3)
Machine Tool Work I Shop 170	2(0-6)	Machine Tool Work II Shop 225	2(0-6)
Machine Tool Work III Shop 230	1(0-3)	Metallurgy Shop 165	2(2-0)
Farm Motors I Steam and Gas 140, 145,	3(2-3)	Farm Motors II Steam and Gas 150, 155,	3(2-3)
Concrete Construction Ap. Mech. 140, 145	2(1-3)	Surveying I C. E. 101, 105	2(1-3)
Mechanical Drawing I Ap. Mech. 160, 165	2(1-3)	Farm Sanitation and Water Supply C. E. 140	2(2-0)

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Organic Chemistry Chem. 120	3(2-2, 1)	Quantitative Analysis III Chem. 251	3(1-6)
Quantitative Analysis II Chem. 250	3(1-6)	Principles of Milling Mill. Ind. 101	1(0-3)
Grain Crop Production Agron. 101	3(2-2, 1)	Milling Practice I Mill. Ind. 201	3(1-6)
Grain Marketing Mill. Ind. 102	3(3-0)	Grain Products Mill. Ind. 103	2(2-0)
Wheat and Flour Testing Mill. Ind. 203	4(1-9)	Experimental Baking A Mil. Ind. 204	2(0-6)
		Milling Practice II Mill. Ind. 202	2(0-6)

Curriculum in Industrial Journalism

The Arabic numeral immediately following the name of a subject indicates the number of semester credits; the first numeral within the parentheses indicates the number of hours a week of recitation; the second shows the number of hours a week to be spent at the laboratory exercise; and the third, where there is such, indicates the number of hours a week required for outside work in connection with the laboratory.

FRESHMAN

First Semester		Second Semester	
College Rhetoric I Engl. 101	3(3-0)	College Rhetoric II Engl. 104	3(3-0)
Chemistry I Chem. 101	5(3-4, 2)	Chemistry II Chem. 102	5(3-4, 2)
Principles of Typography I Ind. Jour. 101	3(2-3)	Principles of Typography II Ind. Jour. 104	3(2-3)
Library Methods Lib. Ec. 101	1(1-0)	Current History Hist. 126	1(1-0)
Current History Hist. 126	1(1-0)		
Options	3(-)	Options	5(-)
Industrial Journalism Lecture	R	Industrial Journalism Lecture	R
Military Science I (Men) Mil. Tr. 101	1(0-3)	Military Science II (Men) Mil. Tr. 102	1(0-3)
Physical Education M-I Phys. Ed. 103	(0-2)*or*	Physical Education M-II Phys. Ed. 104	(0-2)*or*
Physical Education W-I Phys. Ed. 151A	1(0-3)	Physical Education W-II Phys. Ed. 152A	1(0-3)

SOPHOMORE

First Semester		Second Semester	
English Literature I Engl. 171	4(4-0)	English Literature II Engl. 174	4(4-0)
General Zoölogy I Zoöl. 101	3(2-3)*or*	General Zoölogy II Zoöl. 102 *if General Zoölogy I is chosen the first semester.*	3(2-3)
General Botany I Bot. 101	3(1-4, 2)	General Botany II Bot. 105	3(1-6)*or*
		General Microbiology Bact. 101 *if General Botany I is chosen the first semester.*	3(1-6)
Elementary Journalism Ind. Jour. 107	2(2-0)	Industrial Writing Ind. Jour. 113	2(2-0)
Journalism Practice I Ind. Jour. 110	2(0-6)	Journalism Practice II Ind. Jour. 116	2(0-6)
Options *	6(-)	Options *	6(-)
Industrial Journalism Lectures	R	Industrial Journalism Lectures	R
Military Science III (Men) Mil. Tr. 103	1(0-3)*or*	Military Science (Men) Mil. Tr. 104	1(0-3)*or*
Physical Training W-III (Women) Phy. Educ. 153	1(0-3)	Physical Training W-IV (Women) Phy. Educ. 154	1(0-3)

JUNIOR

First Semester		Second Semester	
Industrial Feature Writing Ind. Jour. 123	2(2-0)	Technical Journalism Ind. Jour. 130	2(2-0)
Journalism Practice III Ind. Jour. 127	2(0-6)	Journalism Practice IV Ind. Jour. 133	2(0-6)
Extempore Speech I Pub. Sp. 201	2(2-0)	Principles of Advertising Ind. Jour. 125	3(3-0)
Options and Electives *	10(-)	Options and Electives *	9(-)
Industrial Journalism Lectures	R	Industrial Journalism Lectures	R

* The options and electives are chosen with the advice and approval of the Dean. The options are in two general groups, of eighteen semester credits each, *i. e.* (1) social science, and (2) courses related to an industry or applied science. In the tabulated presentation of electives for students in the Division of General Science on preceding pages,

SENIOR

First Semester	Second Semester
Circulation and Advertising Promotion Ind. Jour. 201 ..... 3(3-0)	Editorial Practice Ind. Jour. 207 ..... 2(2-0)
Copy Reading Ind. Jour. 204 ..... 2(0-6)	Ethics of Journalism Ind. Jour. 210 ..... 2(2-0)
Electives and Options *.... 11(-)	Electives and Options *.... 11(-)
Industrial Journalism Lectures... R	Industrial Journalism Lectures... R

ADAPTATION CURRICULA FOR CLASSES OF 1918, 1919, and 1920

As the work already completed by the classes of 1918, 1919 and 1920 in the former curriculum in industrial journalism is somewhat different from that required by the present one, some modifications of the latter are necessary in order to adapt it to the existing conditions. Students will follow the new curriculum excepting as provided in the following paragraphs:

The class of 1918 will take Journalism Practice III and Journalism Practice IV instead of Copy Reading and two of the elective credits.

The class of 1919 will in the junior year take Elementary Journalism, Industrial Writing, Journalism Practice I and Journalism Practice II and two elective credits instead of Industrial Feature Writing, Technical Journalism, Journalism Practice III, Journalism Practice IV and Extempore Speech I. In the senior year Journalism Practice III and Journalism Practice IV will replace four elective credits.

The class of 1920 will take, in the sophomore year, College Rhetoric II (three semester credits) and English Literature (five semester credits) instead of English Literature I, and English Literature II. In the junior year they will replace Extempore Speech I by two credits on options.

Bacteriology

Professor Bushnell
Associate Professor Hunter†
Assistant Professor Gainey
Instructor Glasgow
Instructor Lienhardt
Assistant Pearce

The Department of Bacteriology occupies a part of the first and second floor of Veterinary Hall. The space is divided into offices and private laboratories, an experiment station and research laboratory, two large general laboratories, incubator or temperature room, washroom, and stock room. The laboratories are well lighted and equipped with gas, lockers, ice chests, sterilizers, wall cases, microscopes, and other modern facilities necessary for bacteriological work.

The instruction consists of lectures, recitations, demonstrations, and laboratory practice. Printed synopses of lectures and printed laboratory directions are furnished the students in some of the courses; in others textbooks are required. The Department library contains textbooks on bacteriology and allied subjects, also the current files of the important technical periodicals relating to bacteriology. These are at the constant disposal of the students for reference. To those who desire graduate work the Department offers excellent facilities.

Bacteriology is presented to the students as a biological science and as a practical factor in everyday life. In this subject only the simplest forms of life, consisting almost invariably of one-celled organisms, are

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groups will be found that will be accepted as the required options and electives. One of the groups 31, 32, 33, 35, 36 or 37 may be chosen as the option in an industry or applied science from which eighteen semester credits are to be chosen. From group 30 eighteen semester credits are to be chosen in satisfaction of the social science option. Electives are to be chosen in groups of usually not fewer than eight semester credits, or in courses which extend fields already entered upon in the required work or the options.

† Absent in Red Cross service.

studied. It is now possible to study these microscopical forms with ease and accuracy, thus paving the way for a more complete study and better understanding of cells in the aggregate. The second point of view from which this subject is approached is that of its practical application in agriculture, medicine, domestic science, and sanitation.

COURSES IN BACTERIOLOGY

FOR UNDERGRADUATES

101. GENERAL MICROBIOLOGY. Sophomore or junior year, second semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: Chemistry II. Professor Bushnell and Mr. Pearce.

This general introductory course consists of lectures, recitations and demonstrations covering the morphological and biological characters, the classification and the distribution of bacteria, factors necessary for the development of bacteria, culture media, cultural features, staining values, and fundamental principles of applied bacteriology.

Laboratory.—The student prepares culture media and becomes familiar with principles of sterilization and incubation, and with general laboratory technique. During the last half of the semester, organisms representing the different families and genera of Migula's classification are studied microscopically and culturally. Also preliminary quantitative and qualitative examinations are made of milk, water, soil, etc.

106. AGRICULTURAL MICROBIOLOGY. Junior year, first semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry. Professor Bushnell and Mr. Pearce.

This is a general course consisting of lectures, recitations and demonstrations. The relation of microörganisms to agriculture is particularly emphasized. First, information is given concerning the nature of microorganisms; their biological characteristics, classification and distribution in nature; their influence upon the plant food in the soil; their relation to certain fermentations, etc. Later some emphasis is placed upon the relation of microörganisms to disease; sources and modes of infection; use of germicidal agents and general hygienic measures.

Laboratory.—In the laboratory, the student becomes familiar with methods of cultivating and studying bacteria, yeasts and molds. Various known forms are studied; methods for the quantitative and qualitative analysis of water, milk, etc., are given some attention. Some time is given to methods of sterilization and the use of germicidal agents. The aim of this course is to give the student a general working knowledge of the subject and to point out its relation to agriculture and the problems of everyday life.

111. PATHOGENIC BACTERIOLOGY I. Sophomore year, second semester. Lectures, two hours; laboratory, six hours. Four semester credits. Prerequisite: Chemistry II. Doctor Lienhardt.

This is primarily a general introductory course, consisting of lectures, demonstrations and recitations covering the distribution, the morphological and biochemical features of microörganisms; factors necessary for the development and cultivation of bacteria and the fundamental principles of the science as applied to veterinary medicine.

Laboratory.—The student first becomes acquainted with the general laboratory technique, comprising the preparation of media, methods of sterilization, incubation, inoculation, plating, isolating, and staining of bacteria. Different cultures of microörganisms are studied morphologically, culturally and biochemically. A quantitative and qualitative

examination of different food substances is made in the latter part of the term.

116. PATHOGENIC BACTERIOLOGY II. Junior year, first semester. Lectures, two hours; laboratory, six hours. Four semester credits. Prerequisite: Pathogenic Bacteriology I. Doctor Lienhardt.

A study is made of the morphology, powers of resistance, pathogenesis, distribution, channels of infection and means of dissemination of pathogenic bacteria, especially those related to the specific infectious diseases of animals; epizoötic and epidemic diseases of unknown etiology are further treated. A detailed study is made of the manufacture, standardization, preparation for the market and use of vaccines, antitoxins and other biological products related to the diagnosis, prevention and treatment of specific infectious diseases; of susceptibility, immunity, and infection; of theories of immunity; of anaphylaxis, opsonins, precipitins, bacteriolysins, and agglutinins.

Laboratory.—A study is made of the microscopical and cultural character of pathogenic microörganisms; of laboratory animal inoculations, autopsy, and diagnosis; prevention and treatment of specific infectious diseases. Experimental production of opsonins, antitoxins, agglutinins, precipitins, and cytolysins; experiments showing the constitutions and mode of action of these antibodies; production of active and passive anaphylaxis, and of anaphylatoxin; methods for the production and standardization of biological products, such as diphtheria and tetanus antitoxin, bacterins, etc.; the application of the various phenomena of immunity in the diagnosis of infectious diseases; the identification of animal and vegetable proteins; complement fixation tests for glanders, opsonic technique, etc., comprise the laboratory work.

121. HOUSEHOLD MICROBIOLOGY. Sophomore year, second semester. Lectures, three hours; laboratory, six hours. Five semester credits. Prerequisite: Elementary Organic Chemistry. Professor Bushnell and Miss Glasgow.

This course consists of lectures, recitations and demonstrations relating to the classification, distribution and the relative importance of bacteria. The morphological and biochemical characters of microörganisms are considered, together with a study of those factors necessary for the proper development of bacteria, and the fundamental principles of the science as applied to household economics. It is designed to give the student a more thorough knowledge of those microörganisms which are of importance in the household. The significance of microbial findings in the analysis of water, milk and foods, also consideration of the conditions which tend to increase or decrease the bacterial content of food substances are studied in detail. Some time is given to the principles of sanitation as applied to public-health problems. The class work is a more theoretical consideration of the problems undertaken in the laboratory.

Laboratory.—General laboratory technique is first taken up, consisting of preparation of media, methods and principles of sterilization incubation, plating, isolating and staining of microörganisms. Studies consisting of the morphological, cultural and biochemical characteristics of different organisms are made. A study of microörganisms and their activities, both beneficial and harmful, in their relation to household economy; bacteriological study of water, milk, and foods; the determination of the potability of water; milk contamination, the effect of cooling upon the bacterial content of milk, pasteurization of milk, etc.; microscopical study of yeasts and molds; the spoilage of canned vegetables and fruits; methods of food preservation; the manufacture of vinegar; study of activities of various species of microörganisms, thermal death point, the germicidal action of various disinfectants, etc., are topics taken up in the laboratory work.

FOR GRADUATES AND UNDERGRADUATES

201. SOIL MICROBIOLOGY. Elective, second semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: General Bacteriology. Assistant Professor Gainey.

This is an introductory course covering the principles of soil microbiology as defined at the present time, and fitting the student for independent research on microbial investigations of soil, including the influence of microbial flora, of depth and character of soil, temperature, moisture, chemical reaction, aëration, and other factors; activities of soil microörganisms, ammonification, nitrification, denitrification, symbiotic and nonsymbiotic nitrogen fixation. Various texts are recommended as reference books.

Laboratory.—The laboratory work comprises the preparation of various special culture media and reagents necessary to conduct bacteriological analyses of the soil; qualitative analysis and the laboratory study of ammonification, nitrification, denitrification, symbiotic and nonsymbiotic nitrogen fixation; plot experiments and field work illustrating the influence of various factors upon the bacterial flora, and the inoculation of soil with symbiotic nitrogen-fixing bacteria.

206. HYGIENIC BACTERIOLOGY. Elective, first semester. Lectures, two hours; laboratory, six hours. Four semester credits. Prerequisite: General, Agricultural, or Household Microbiology. Professor Bushnell and Miss Glasgow.

Pathogenic bacteria, especially those related to disease of man; channels of infection, and means of dissemination of pathogenic bacteria; epidemics, their cause and control; isolation, disinfection, and quarantine; prophylaxis against specific infectious diseases and important precautions necessary in the control of communicable diseases are studied. Various books are recommended as textbooks.

Laboratory.—The laboratory work comprises microscopical and cultural study of pathogenic bacteria; technique involved in the diagnosis of *Bacterium tuberculosis* in sputum; the culture of pathogenic anærobic bacteria; the isolation and indentification of pathogenic bacteria from animal tissues, from pus and exudates; bacteriological examination of air, water, milk, sewage; interpretation of results, etc.

211. DAIRY BACTERIOLOGY. Elective, second semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: General, Agricultural, or Household Microbiology. Mr. Pearce.

Consideration is given to the bacterial flora of milk, butter, and cheese; to infectious diseases conveyed through dairy products; to bacterial contamination of milk by air, water, utensils, etc.; to normal and abnormal fermentations in milk, their significance and control.

Laboratory.—The preparation of culture media necessary for dairy bacteriological work; milk contamination; quantitative and qualitative bacteriological analyses of milk; the microscopical and cultural characters of the types of microörganisms representing the flora of milk, butter, and cheese; types of milk-fermenting organisms; the examination of cream, wash water, and separator slime; the effect of temperature on the growth of milk bacteria; pasteurization of milk; examination of milk for the presence of *Bacterium tuberculosis*, leucocytes and streptococci are taken up in the laboratory work. Various texts are recommended as reference books.

216. POULTRY BACTERIOLOGY. Elective, first semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: General or Agricultural Microbiology. Doctor Lienhardt.

Consideration is given to the various microbial diseases of poultry; etiology, sources and modes of infection; prevention and cure; to the

microbial content of freshly laid eggs, cold-storage eggs, and egg products, with conditions tending toward increase or decrease of this microbial content.

Laboratory.—Microörganisms pathogenic for poultry; artificial production, diagnosis and control of poultry diseases; microbial content of eggs and egg preparations produced and handled under various conditions, from the subject matter of the laboratory work.

221. WATER PURIFICATION AND SEWAGE DISPOSAL. Elective, second semester. Lectures, one hour; laboratory, six hours. Three semester credits. Prerequisite: General Microbiology, or Household Microbiology. Professor Bushnell.

The course comprises a study of the bacterial content of natural waters; of factors influencing the bacterial flora of water; of bacterial indicators of pollution; of the collection and transportation of water samples; of methods of water purification and sewage disposal; of the application of water sanitation to rural homes and municipalities.

Laboratory.—The laboratory work consists of quantitative and qualitative examinations, according to standard methods, of samples of water and sewage; methods involved in the enumeration and identification of intestinal bacteria in water; laboratory study of conditions influencing the bacterial content and potability of water. Printed laboratory directions are furnished.

FOR GRADUATES

301. RESEARCH BACTERIOLOGY. Elective, both semesters. Credit to be arranged. Prerequisite: The student must have credit in at least two of the outlined courses offered by the Department. Professor Bushnell.

Advanced students showing sufficient training, ability and interest in original research may be admitted to this course, upon approval of the head of the Department. The student will be under the direct supervision of a faculty member of the Department and in consultation with him the subject for investigation will be chosen and outlined.

Botany

Professor ROBERTS*
Assistant Professor MELCHERS
Assistant Professor DAVIS
Assistant Professor MILLER
Instructor PETERSEN
Instructor DOTY
Instructor HAYMAKER

The instruction given in the Department of Botany has a threefold purpose:

First, general training in botany as an observational science, familiarizing the students with the meaning and relations of the manifold forms of plants and the principles governing their life processes. For those who wish to pursue the subject of botany professionally, opportunities are offered to secure a broad and thorough training in the courses given by the department.

Second, the importance of a scientific knowledge of the laws of plant life being fundamental in agriculture, it is sought in the elementary courses to provide such training as will generally fit the minds of agricultural students to grasp the underlying meaning of familiar field work with crops; such training, moreover, as may be built upon in a carefully graded series of advanced courses.

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* Absent on leave, year 1917-'18.

The third phase of the work of the Department of Botany lies in the investigation of those economic problems in plant life which affect agriculture. Three distinct general lines of work in botany are being conducted in the Experiment Station: Experimental plant breeding; the investigation, prevention and control of plant diseases; and physiological investigations in drouth resistance.

The equipment for elementary instruction comprises forty compound and sixty-four simple microscopes, a series of Jung, Peter, Kony, and Frank botanical charts, a Bausch & Lomb projection apparatus, and a very full collection of preserved material for general morphology and plant pathology. For advanced work, Zeiss, Spencer and Bausch & Lomb microscopes with apochromatic lenses, a filar micrometer, Bausch & Lomb and Spencer camera lucidas, two Zeiss binocular microscopes, and Bausch & Lomb simple microscopes of the highest grade, provided with special camera lucida attachment, are furnished for the use of the members of the staff and graduate students. A Minot precision microtome, two Spencer microtomes, electric and gas, embedding and sterilizing ovens, and the usual supplies of reagents and glassware, are provided for histological studies.

In physiology, a complete equipment of the Ganong and the Cambridge lines of physiological apparatus and supplies is available.

A special laboratory is equipped for advanced work in plant genetics, and is provided with instruments of precision employed in quantitative work in plant-breeding investigations, including special forms of apparatus used for taking measurements of organs, a specially designed gravimeter, a Lovibond improved colorimeter, an Egli calculating machine, a comptograph adding machine, a Corelli polar planimeter, specific-gravity apparatus, numerous balances, the usual glassware, etc.

For investigations in plant pathology and plant physiology in the Experiment Station, a large laboratory is equipped with apparatus for studying normal and abnormal conditions in plants. The apparatus used for making determinations of fungous and bacterial diseases of plants, and for the study of the life histories of pathogenic organisms, consists in part as follows: three compound microscopes, a Bausch & Lomb binocular monobjective compound microscope, a Spencer binocular microscope, analytical balances, drying ovens, hot-air sterilizers, steam autoclave, steam still, a Frease electric incubator, a Thelco low temperature incubator, transfer chambers for isolating organisms, pathological tables, research desks, a large supply of glassware for culturing fungi, two soil and air thermographs, a herbarium containing the various genera and species of fungi, and a large and representative collection of preserved specimens illustrating the economic plant diseases.

For general botanical reference there is an excellent herbarium, especially complete for the state of Kansas, and a very full collection of economic fungi. A very good botanical library is available, containing the usual standard texts and reference works, and files of the principal foreign journals.

COURSES IN BOTANY

FOR UNDERGRADUATES

101. GENERAL BOTANY I. Freshman year, first semester. Class work, one hour; laboratory, six hours.* Three semester credits. Professor Roberts, Assistant Professors Melchers and Davis, Mr. Petersen, Mr. Doty, and Mr. Haymaker.

This is a general introduction to botany. A careful study is made of the morphology of the chief great groups of plants, of their elementary physiology and ecology, of the classification and geographic distribution of the plant kingdom, and its economic relation to man. Text: Ganong's *A Textbook of Botany for Colleges.*

Laboratory.—The aim of the laboratory work in this course is to give as thorough a study as may be of the morphology of the chief important groups in the plant kingdom, taken in the order of their relative complexity, and of their probable relations to one another as parts of an evolutionary series. Laboratory outlines are furnished by the Department.

105. GENERAL BOTANY II. Freshman year, second semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: General Botany I. Assistant Professors Melchers and Davis, Mr. Petersen, Mr. Doty, and Mr. Haymaker.

This is a course of lectures, combined with special study of a required text and with reference reading. The principal life functions of plants, responses of plants, such as photosynthesis, digestion, respiration, transpiration and growth, and the responses of plants to environmental conditions and physical stimuli, are studied. The anatomy of the plant, in so far as it relates to the functions concerned, will be studied in some detail. In this course the student gains a general introductory knowledge of the functions and reactions of plants, and learns to regard them from the dynamic standpoint, as working organisms. The latter part of the course is devoted to a systematic study of some of the more important plant families in which their floral structures are considered. Some time is given to the tracing out of unknown plants by means of a key. Text: Ganong's *A Textbook of Botany for Colleges.*

Laboratory.—A series of typical experiments is followed out in the laboratory and in the greenhouse. Each student is furnished with a set of the necessary apparatus, and learns to apply quantitative methods to the study of functions. Laboratory outlines are furnished by the Department.

107. PLANT PATHOLOGY I. Sophomore year, first semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: General Botany II. Assistant Professor Melchers and Mr. Haymaker.

The diseases affecting the chief economic crops of field, orchard and garden are studied in considerable detail. The etiology of the various diseases and their most evident symptoms are considered. The student learns to recognize at sight the principal plant diseases he is likely to encounter on the farm, in the nursery, and in market-garden work. Nonparasitic and bacterial diseases are considered to some extent, but the time is chiefly devoted to the more important diseases caused by the fungi, the life histories of which are studied in some detail. Preventive measures are considered in each case. An extensive collection of preserved pathological material is available. Text: *Fungous Diseases of Plants,* by H. M. Duggar.

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* Two of the required laboratory hours are employed in lecture and laboratory quizzes and reviews.

Laboratory.—Practical work in the recognition of all the more common diseases of the farm, orchard and garden is accompanied by detailed microscopic studies of disease tissues and identification of the fungous parasites which cause them. Laboratory outlines are furnished by the Department.

113. MEDICAL BOTANY. Sophomore year, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: High-school botany or its equivalent. Mr. Petersen.

This course involves a brief survey of the principal plants of the pharmacopœia. Special attention is given to poisonous plants and their identification. Instruction is by lectures.

Laboratory.—This comprises the study of plant products used as drugs, and a laboratory study of toxic plants. Laboratory outlines are provided by the Department.

FOR GRADUATES AND UNDERGRADUATES

201. PLANT PATHOLOGY II. Elective, first semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: Plant Pathology I. Assistant Professor Melchers.

The class work consists primarily of a series of lectures pertaining to mycology, considering the subject from the evolutionary standpoint. The classification of fungi causing plant diseases receives considerable attention, and the relationship of the fungi to one another is emphasized. This course is designed to train those who wish to become more familiar with the classification of the fungi, and their morphology; it is essential for those who wish to follow plant pathological work professionally.

Laboratory.—The laboratory work consists of a detailed study of the genera of pathogenic fungi. A large supply of plant-disease material in the Department furnishes a basis for these studies.

202. FRUIT CROP DISEASES. Elective, first semester. Class work, one hour; laboratory, three hours.† Two semester credits. Prerequisite: Plant Pathology I. Mr. Haymaker.

The class work consists of a series of lectures dealing with diseases affecting fruit crops of all kinds. Special emphasis is laid on measures and methods for controlling these diseases by means of spraying, sanitation and varietal resistance. The preparation and practical application of the standard sprays is considered. Text: *Manual of Fruit Diseases,* by Hesler and Whetzel.

Laboratory.—This consists of a detailed study of each disease affecting the major fruit crops, together with a detailed microscopic study of the organism causing the disease. The course is especially valuable for those studying horticulture, or those expecting to specialize in plant pathology.

203. FIELD CROP AND VEGETABLE DISEASES. Elective, second semester. Class work, one hour; laboratory, three hours.† Two semester credits. Prerequisite: Plant Pathology I. Assistant Professor Melchers.

The class work consists of a series of lectures dealing with the historical development of phytopathology, with special emphasis on literature pertaining to field-crop and vegetable diseases. The field symptoms are discussed, varietal susceptibility and resistance are considered, and control measures are advised.

Laboratory.—This consists of a detailed microscopic study of the plant diseases attacking field crops and vegetables, and is of value to those who

* Two of the required laboratory hours are employed in lecture and laboratory quizzes and reviews.

† One of the required laboratory hours is employed in lecture and laboratory quizzes and reviews.

wish to pursue agronomic or horticultural work, and is especially designed for those students who expect to specialize in plant pathology.

205. PLANT BREEDING. Junior year, second semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: General Botany II. Professor Roberts.

This subject involves a study of the present knowledge of variation and heredity, as applied to the breeding and improvement of economic plants. The history of the principal theories bearing upon genetic problems is reviewed, and the experimental data are critically considered. The principles underlying the behavior of hybrids are discussed. A survey is given of the practical results achieved in the breeding of plants, together with a scientific analysis of the methods used. Text: *Genetics*, by H. E. Walker, supplemented by lectures and reference reading.

Laboratory.—The course begins with a thorough study of the cell, followed by a study of the homeotypic and heterotypic mitoses, chiefly in *Lilium, Erythronium,* and *Ascaris.* This is succeeded by an examination of floral mechanisms, with reference to close- and cross-pollination, followed by biometric work in variation and correlation, and practical work in the calculation of the chief constants of the frequency polygon. The course closes with a laboratory study of Mendelian phenomena.

208. PLANT PHYSIOLOGY II. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: General Botany II. Assistant Professors Miller and Davis.

This course offers opportunity for advanced work through lectures, discussions and reference reading of the more special problems in plant physiology.

211. PLANT GENETICS I. Elective, first semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: Plant Breeding. Professor Roberts.

The work of Plant Breeding is continued, with special reference to the practical details, technique and history of the breeding of the principal economic plants. Extensive reference reading in the literature is required and a thesis involving a review of the work accomplished in some phase of genetics.

Laboratory.—Experimental work in hybridization, using a considerable variety of forms in order to acquire familiarity with the technique of crossing, and with the range of phaenotypic characters in the species available for investigation. Crosses are made of antithetic characters, using plant material of known behavior.

215. PLANT HISTOLOGY. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisite: General Botany II.

This course is planned to provide a thorough training in the principles and practice of microtechnical methods in botany, including the killing, fixing and embedding of plant material, microtome work, and the staining and mounting, by various methods, of a tolerably complete and characteristic series of permanent slides, representing the vegetative and reproductive tissues of typical plants, taken from all the principal groups. Text: Chamberlain's *Plant Histology.*

219. ECONOMIC BOTANY. Elective, first semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: General Botany II. Professor Roberts.

This course is designed especially for students intending to enter professional work in botany in experiment stations. It involves a study of the history of cultivated plants, with a course of lectures on the chief

* Two of the required laboratory hours are employed in lecture and laboratory quizzes and reviews.

groups of the higher plants containing economic species. In this connection a very broad survey is taken of the world's economic plants, considerable attention being given to the derivation of economic products, and to methods of cultivation and harvesting. The plants of tropical and subtropical agriculture and horticulture receive considerable attention. Forestry products are not considered. Instruction is imparted by lectures and reference reading. Text: *The Origin of Cultivated Plants*, by De Candolle.

Laboratory.—A microscopic study is made of economic plant products, such as fibers and textiles, food products, spices, etc. Laboratory outlines are furnished by the government.

222. EVOLUTION OF PLANTS. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Economic Botany. Professor Roberts.

Careful consideration is given to the lines along which evolution has proceeded in the plant kingdom, to the relationship of the more important phyla and to the probable derivation of the chief groups of plants. Instruction is imparted by means of lectures and reference readings. Text: *Evolution of Plants*, by Campbell.

225. TAXONOMIC BOTANY. Elective, second semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite; General Botany II. Mr. Petersen.

This course is designed to give biological students a broad training in the systematic relationships, chiefly of the flowering plants. Practice is acquired in the use of manuals or keys to floras, and the student is taught especially to recognize the morphological characters which distinguish the principal orders, families, and genera of the angiosperms. The course is designed to be a strictly practical one, its purpose being to equip the student with the necessary data for recognizing at sight a large number of the plants of the field.

Laboratory.—The identification, by means of standard manuals and floras, of a large number of native and exotic plants. Considerable field practice is required, and attention is directed to differences in structure which the same species may show under different environments. An endeavor is made to train the student's mind to a broad, comprehensive conception of species-characters, using manuals merely as convenient guides to this end. Laboratory guide, Gray's *Manual of Botany*, seventh edition, revised.

FOR GRADUATES

301. PLANT PATHOLOGY III. Elective, second semester. Laboratory, nine hours.* Three semester credits. Prerequisite: Plant Pathology II. Assistant Professor Melchers.

This course is a continuation of Plant Pathology II. Its purpose is to give the advanced student an opportunity for making a closer and more extended study of the pathogenic organisms which cause plant disease. The course will include a somewhat detailed study of the cryptogamic herbarium. Considerable attention will be devoted to the growing of pure cultures of pathogenic fungi, the making of inoculations, isolation of fungi, etc. The preparation of media of various kinds for the growing of fungi will receive considerable attention. The course is especially designed for those who intend to pursue plant pathology as investigators in experiment stations.

302. PLANT PATHOLOGY IV. Elective, first and second semesters. Laboratory, nine hours.* Three semester credits. Prerequisite: Plant Pathology III. Assistant Professor Melchers.

* Two of the required laboratory hours are employed in lecture and laboratory quizzes and reviews.

This course involves original research. Problems are chosen by the student along some line in which he is interested. A carefully worked out report, which summarizes the investigation undertaken, is required at the end of the semester.

303. PLANT GENETICS II. Elective, second semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: Plant Genetics I. Professor Roberts.

A more advanced study of fundamental problems in genetics. Such topics as the cytological basis of heredity, mutation and the questions of sex-inheritance and the inheritance of acquired characters receive extended treatment. A reading knowledge of German is required. Baur's *Experimentelle Vererbungslehre,* second edition, is read in class, and extensive topical reference reading is required in other German handbooks, and in the original literature.

Laboratory.—Experimental work in hybridization, carried on in the greenhouse, is continued in this course.

307. PLANT GENETICS III. Elective, second semester. Class work, one hour; laboratory, six hours.* Three semester credits. Prerequisite: Plant Genetics II. Professor Roberts.

The work of the preceding course is continued in general character, except that individual problems begin to be developed. A reading knowledge of German is required.

Laboratory.—Problems in plant genetics are taken up individually and hybrids are investigated experimentally.

Chemistry

Professor WILLARD
Associate Professor KING†
Associate Professor SWANSON
Associate Professor NEWMAN
Assistant Professor HUGHES
Assistant Professor BRUBAKER
Instructor HAMMOND
Instructor PRESTON
Instructor SMILEY
Instructor TITUS‡
Instructor FOWLER
Assistant WEST
Fellow HARRISS
Fellow WITHAM

All of the industries are becoming more and more dependent for their highest success upon intelligent application of the sciences, and the social sciences are making their greatest progress by tracing their phenomena back to the physical and chemical changes that accompany them. A study of chemistry and physics is therefore essential to any understanding of the processes of nature or of human industry. In the instruction in chemistry the aim is to insist upon a mastery of the chief concepts of the pure science through the agency of textbook drill, accompanied by demonstrations in the lecture room, and experimental observation by the student himself in the laboratory. As the course proceeds, illustrations of chemical principles are drawn from the industrial processes of the chemical, agricultural, domestic, and other arts, thus impressing upon the mind the practical nature of the study. The ultimate object of instruction in this science is to develop in the student the power to form

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* Two of the required laboratory hours are employed in lecture and laboratory quizzes and reviews.

† Absent on leave, 1917-'18.

‡ Transferred to the Experiment Station.

independent judgment upon the manifold problems of daily life in which chemistry plays a part.

The lecture rooms are amply equipped for experiments and demonstrations, and the laboratories are designed to accommodate 864 students each semester in freshman work and qualitative analysis. The laboratories for more advanced work provide space for 324 students, and are well supplied with general and special facilities. The State work in foods, feeding stuffs, and fertilizers, and the chemical investigations of the Experiment Station in soils, crops, animal nutrition, etc., afford unusually good opportunities for students to obtain experience in practical chemistry. In all of the laboratory work the student is required to give the designated amount of time, and at least a certain amount of work must be satisfactorily performed in order to obtain credit.

COURSES IN CHEMISTRY

FOR UNDERGRADUATES

101. CHEMISTRY I. Freshman year, both semesters and summer school. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisite: High-school Physics. See Chemistry HE-I and HE-II. Associate Professor King, Associate Professor Newman, Doctor Hammond, Mr. Preston, Mr. Smiley, Mr. Titus, Mr. Fowler, Mr. West, Miss Harriss, and Miss Witham.

This work begins the study of general chemistry, and is designed, with that of the succeeding semesters, to give the student a knowledge of the fundamental principles of chemistry. As all subsequent progress in this science requires a working knowledge of its principal theoretical conceptions, the principles of nomenclature, the significance of formulas, chemical equations, etc., much attention is given to these, while at the same time the practical uses of the substances, and the processes used in metallurgy, engineering, agriculture and other arts are emphasized. McPherson and Henderson's *A Course in General Chemistry* is used as a textbook, this semester's work covering the first 331 pages. The text is supplemented by lectures and is amply illustrated by experimental demonstrations.

Laboratory.—As far as time permits, the student performs independently experiments touching the preparation and properties of the more important substances. Preference is given to those operations which illustrate important principles, and the student is required, as far as possible, to study experiments in that light. In this, as in all other laboratory work in chemistry, the objects are to illustrate chemical phenomena, and to teach care in manipulation, attentive observation, logical deduction, and discrimination and accuracy in recording results and conclusions. The student is required to give the designated amount of time, and a minimum amount of work must be satisfactorily performed in order to obtain credit. *Laboratory Exercises in Elementary Chemistry,* by William McPherson, is used as the laboratory guide.

102. CHEMISTRY II. Freshman year, both semesters and summer school. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisite: Chemistry I. See Chemistry HE-I and HE-II. Teachers same as for Chemistry I.

The work in this course for the first half of the semester is a completion of the study of general chemistry begun the preceding semester. The second half of the semester is devoted to the study of the general principles of qualitative analysis as outlined in an *Elementary Treatise on Qualitative Analysis,* by William McPherson.

Laboratory.—In the laboratory the student studies the ordinary methods of separation and detection of the more common metals, nonmetals, acids, bases and salts. The teaching of analysis as such is a secondary object, although the student is held to the exact observation and careful reasoning required in ascertaining the composition of single substances and mixtures. The effect of the course is to broaden, strengthen and unify the students' ideas of general chemistry.

103 and 104. CHEMISTRY HE-I AND HE-II. Freshman year, both semesters and summer school. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisites and teachers same as for Chemistry I and II.

These courses cover the work in general chemistry and qualitative analysis. The relative amount of time spent upon these subjects is the same as with Chemistry I and II. Throughout the work, both in class and laboratory, special emphasis is placed upon those facts of everyday life in and about the home which possess special value to young women. Textbook: *Inorganic Chemistry for Colleges*, by Newell. The laboratory guide for the general chemistry is *A Laboratory Manual for General Chemistry*, by McPherson and Henderson, accompanied by mimeographed material on special subjects. The laboratory guide for the qualitative analysis is *Elementary Treatise on Qualitative Analysis*, by William Mcpherson.

105. CHEMISTRY AV-I. Freshman year, first semester. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Assistant Professor Brubaker.

This course deals with the fundamental laws and theories of chemistry, the elements and their inorganic compounds, and lays emphasis on the application of chemistry to the arts and industries. Both the metals and nonmetals are studied, but the treatment is less detailed than in Chemistry I and II.

Laboratory.—The laboratory work is intended to give the student training in manipulation and first-hand knowledge of the important laws of chemistry and the properties of substances studied by use of appropriate experiments which the student himself performs.

106. CHEMISTRY V-II. Freshman year, second semester. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisite: Chemistry AV-I. Assistant Professor Brubaker.

This course follows Chemistry AV-I and has the same general object, but deals with the organic compounds.

Laboratory.—The laboratory work consists in the preparation of certain organic compounds and qualitative study of their properties.

120. ORGANIC CHEMISTRY. Sophomore year, both semesters and summer school. Lectures and recitations, two hours; laboratory, three hours. Three semester credits. Prerequisite: A college course in general chemistry. Assistant Professors Hughes and Brubaker, and Doctor Hammond.

A systematic study is made of the simpler examples of the more important classes of organic compounds in their logical chemical relations. Such substances as touch the everyday affairs of life are treated in greater detail. Opportunity is thus afforded to consider the hydrocarbons, alcohols, organic acids, fats, soaps, sugars, starch, proteins, and other less-known substances. Compounds used for clothing, fuel, light, antiseptics, disinfectants, anæsthetics, poisons, medicines, solvents, etc., are included. While especial attention is given to the useful organic compounds, the study of others is not excluded, when they contribute to an understanding of the systematic relations existing among the several groups. Any serious study of the biological sciences, or of the arts connected with them, must require this as a foundation, and a knowledge

of the properties of organic compounds finds frequent application in engineering as well. The subject is amply illustrated by experiments in the lecture room. Text: Norris's *Organic Chemistry*, in part, accompanied by lectures amplifying certain parts of the subject.

Laboratory.—The laboratory work includes experiments and preparations touching the more important compounds studied in the lectures and recitations, especially fats, carbohydrates and proteins.

121. ORGANIC CHEMISTRY HE. Sophomore year, both semesters and summer school. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisites and teachers same as for Organic Chemistry.

The lectures and recitations in this course are the same as in Organic Chemistry, with additional emphasis placed on the organic compounds most intimately related to daily life in the home. Text: Norris's *Organic Chemistry*, in part, accompanied by lectures amplifying certain parts of the subject.

Laboratory.—The laboratory work includes preparations, and qualitative and quantitative experiments touching the more important compounds studied in the lecture and recitations. Especial emphasis is placed on the organic compounds found in fuels, foods, fabrics, disinfectants and other materials used in and about the home. Laboratory guide, *Experiments in Descriptive Organic Chemistry*, by Alice F. Blood.

130. HUMAN NUTRITION. Junior year, both semesters and summer school. Lectures and recitations, three hours. Three semester credits. Prerequisite: Acceptable courses in human physiology and organic chemistry. Professor Willard and Assistant Professor Hughes.

This is a course in the chemistry of foods and nutrition, and includes, among others, the following topics: The composition of the body; the composition of foods, and methods of investigation employed in their study; the changes that the several classes of foods undergo in cooking and digestion, and the functions that they perform in nutrition; daily food requirements, and the balancing of dietaries; food economy. *Chemistry of Food and Nutrition*, by H. C. Sherman, is used as textbook, but is supplemented by lectures.

150. QUANTITATIVE ANALYSIS I. Sophomore or junior year, both semesters. Laboratory, six hours. Two semester credits. Prerequisites: Chemistry I and II. Assistant Professor Brubaker.

This course is planned to give the student a knowledge of the simpler operations in gravimetric analysis and volumetric analysis and to lay the foundation for studies in which such knowledge is required. Particular emphasis is laid on the importance of exact quantitative work and its value in investigations connected with agriculture. Textbook: *Notes on Quantitative Chemical Analysis*, by C. W. Folk.

FOR GRADUATES AND UNDERGRADUATES

201. ADVANCED INORGANIC CHEMISTRY. Elective, first semester. Class work, five hours. Five semester credits. Given in 1918-'19 and alternate years thereafter. Prerequisite: Chemistry II or Chemistry HE-II. Associate Professor King.

The course consists of a thorough study of the facts of chemistry and their theoretical interpretations according to the views of the present day. Special stress is placed upon the properties of the elements as a basis for methods of classification, and upon the rarer elements and compounds. Text: *Modern Inorganic Chemistry*, by J. W. Mellor.

202. INORGANIC PREPARATIONS. Elective, first semester. One semester credit for each three hours of laboratory work. Prerequisite: Chemistry II or Chemistry HE-II. Associate Professor King.

Students of Advanced Inorganic Chemistry are advised to take this course. It consists in the preparation and purification of some typical inorganic compound, together with those of a more complex composition and compounds of the rarer elements.

203 and 204. INDUSTRIAL CHEMISTRY I and II. Elective, first and second semesters, respectively. Given in 1917-'18 and alternate years thereafter. Class work, three hours; laboratory, six hours. Five semester credits each semester. Prerequisite: Organic Chemistry. Associate Professor King and Mr. ———.

This course treats the more important technical processes. Considerable attention is given to general operations and the machinery employed. The more important commercial manufacturing industries are then taken up, including, with others, the production of alkalies, acids, glass, clay products, cement, paint, pigments, oils, varnish, soap, gas, paper, leather, petroleum, sugars, starch and the products of fermentation, and the destructive distillation of wood and coal. Textbook: *Manual of Industrial Chemistry*, by Rogers and Aubert.

205. INDUSTRIAL ELECTRO-CHEMISTRY. Elective, second semester. Offered in 1918-'19 and alternate years thereafter. Class work, two hours. Two semester credits. Prerequisite: College courses in general chemistry and physics. Assistant Professor Brubaker.

In this course will be treated briefly the principles of voltameters, electro-chemical methods of analysis, electroplating, electrotyping and the production of metallic objects by electrolytic methods. This will be followed by fuller treatment of electrolytic refining of metals, the manufacture of various industrial products by electrolytic methods, primary cells, the lead storage battery, the Edison storage battery, the electrometallurgy of iron and steel, and the fixation of atmospheric nitrogen. Textbook: Thompson's *Applied Electrochemistry*.

206. PHYSICAL CHEMISTRY. Elective, second semester. Given in 1918-'19 and alternate years thereafter. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisite: Chemistry II or Chemistry HE-II. Associate Professor King.

This course is especially adapted to meet the needs of students intending to specialize in soils, as well as those students in other divisions, who desire a broader knowledge of the more fundamental laws of chemistry. In this course emphasis is placed upon the study of gas laws, osmotic pressure, surface tension, solution, colloidal solutions, thermochemistry, equilibria, and electrical conductors.

Laboratory.—In the laboratory the subject matter discussed in the lectures is investigated experimentally.

220 and 221. ORGANIC CHEMISTRY I AND II. Elective and graduate, first and second semesters, respectively. Given in 1918-'19 and alternate years thereafter. Lectures and recitations, three hours; laboratory, six hours. Five semester credits, each course. Prerequisite: College course in organic chemistry. Assistant Professor Hughes and Dr. Hammond.

This course includes a careful, systematic study of aliphatic and aromatic compounds to such an extent as time permits. Text: Perkin and Kipping's *Organic Chemistry*.

Laboratory.—The laboratory work includes preparation and purification of a number of compounds selected from the aliphatic and aromatic series for the illustration of important synthetic reactions. In addition to the verification of the constants of these compounds the important qualitative tests are made which are characteristic of the classes of compounds. Laboratory guide, Jones's *A Laboratory Outline of Organic Chemistry*.

230. PRINCIPLES OF ANIMAL NUTRITION. Elective and graduate, second semester. Class work, three hours. Three semester credits. Prerequisite: Organic Chemistry. Assistant Professor Hughes.

This course gives a thorough study of the relations of animals to matter and energy, and the physiological principles involved. Study of the researches which have established the principles of nutrition constitute the ground work of the course.

231. PHYSIOLOGICAL CHEMISTRY. Elective and graduate, second semester. Lectures and recitations, three hours; laboratory, six hours. Five semester credits. Prerequisite: An acceptable course in organic chemistry. Assistant Professor Hughes.

This course is designed to meet the needs of students who expect to specialize in nutrition or one of the biological sciences. It is a systematic study of the synthetic and analytical chemical changes that accompany the physiological processes of animals and plants. The chemical properties of food and body substances, and their general specific functions; the changes that take place in digestion, assimilation and elimination, and the means by which these are brought about; enzymes and their functions; the blood and lymph; general metabolism, and the interrelations of organs, are among the important topics studied. Text: Mathews' *Physiological Chemistry.*

Laboratory.—The laboratory work is designed to familiarize the student with the compounds and processes discussed in the lectures and recitations. Laboratory guide: Mathews' *Physiological Chemistry.*

240. ADVANCED QUALITATIVE ANALYSIS. Elective and graduate, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Chemistry II. Associate Professor Newman.

This course is designed to broaden the student's knowledge of chemistry by a systematic study of the properties of the acid and basic elements and their compounds as shown in a detailed study of systematic analysis. Many of the rarer elements are included. A study of the application of chemical theory to analytical reactions is taken up in considerable detail with the aim of familiarizing the student with the important theories as applied to analytical procedure. Reports are made on assigned reference work.

250. QUANTITATIVE ANALYSIS II. Elective and graduate, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Chemistry II. Assistant Professor Brubaker.

This course covers the general procedure of gravimetric analysis and volumetric analysis, together with a discussion of chemical theory as applied to quantitative reactions. Particular attention is paid to the commercial significance of the procedures studied. The work for the first part of the semester consists of a selected series of gravimetric determinations designed to develop accuracy in a number of fundamental operations. The second part of the semester, solutions of acids, bases and oxidizing agents are standardized and used in analysis. Reports are made on assigned reference work for the study of methods of analysis not taken up in class. Textbook: *Quantitative Analysis,* by Edgar G. Mahin.

251. QUANTITATIVE ANALYSIS III. Elective and graduate, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Quantitative Analysis I. Assistant Professor Brubaker.

This is a continuation of Quantitative Analysis II and applies the fundamental principles of quantitative work to the analysis of important industrial products and raw materials. The applications of analytical methods to commercial analysis, together with the chemical theories

underlying these methods are emphasized. Textbook: *Quantitative Analysis,* by Edgar G. Mahin.

252. CHEMISTRY OF SOILS AND FERTILIZERS. Elective and graduate, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Quantitative Analysis I. Associate Professor Swanson.

The class work takes up the chemical composition of soils and fertilizers, and those chemical changes in the soil which are most important in affecting plant growth. Attention is also given to colloids and soluble salts in relation to optimum soil conditions. The course is adapted especially to the needs of students of soils.

Laboratory.—The laboratory work is planned to give the student a knowledge of the most important chemical methods used in the analysis and investigation of soils and fertilizers.

253. CHEMISTRY OF PLANT PRODUCTS. Elective and graduate, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry and Quantitative Analysis I. Associate Professor Swanson.

In the class work a detailed study is made of the chemical composition of substances present in plants and plant products; the most important chemical transformations which take place in plant growth; and enzymes and colloids in relation to plant substances and plant growth.

Laboratory.—The laboratory exercises are planned to give the student a working knowledge of the most important methods used in the analysis and investigation of substances present in plants and plant products.

254. DAIRY CHEMISTRY. Elective and graduate, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry and Quantitative Analysis I. Associate Professor Swanson.

The class work is centered chiefly upon the following: A detailed study of the chemical compounds present in milk, butter, cheese, and other dairy products; chemical changes affected by conditions of handling dairy products; a review of literature relating to recent investigational work in dairy chemistry.

Laboratory.—The laboratory exercises are designed to give the student a working knowledge of the most important chemical methods used in the analysis and investigation of dairy products.

255. CHEMISTRY OF MEATS. Elective and graduate, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry and Quantitative Analysis I. Associate Professor Swanson.

The class work includes the following: A detailed study of the chemical compounds present in the edible portions of meat animals; chemical changes effected by different methods of preparing and storing meat products; a review of recent literature relating to investigational work in the chemistry of meat and meat products.

Laboratory.—The laboratory exercises are designed to give the student a working knowledge of the most important chemical methods used in the analysis and investigation of meats and meat products.

256. RESEARCH WORK IN AGRICULTURAL CHEMISTRY. Elective and graduate, both semesters. One semester credit for each three hours of laboratory work or equivalent. The prerequisites depend upon the nature of the work the student wishes to take up. Associate Professor Swanson.

In this course the student may study a special chemical problem in connection with such subjects as feeds, soils, fertilizers, flour, dairy

products, silage, preparation of special feeds for use in animal nutrition, etc. The chemical investigations of the Experiment Station in soils, fertilizers, feeds, crops, silage, flour, animal nutrition, etc., afford unusually good opportunities for students to obtain experience in agricultural chemical investigations.

260. ADVANCED QUANTITATIVE ANALYSIS. Elective and graduate, both semesters. One credit for each three hours of laboratory work. Prerequisites: Quantitative Analysis I, or Quantitative Analysis II and III. Assistant Professor Brubaker.

Under this heading provision is made for the election of any kind of quantitative chemical work not otherwise designated. The various research and state laboratories afford a large opportunity for advanced work.

265. HOUSEHOLD CHEMISTRY. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry. Assistant Professor Brubaker.

The lectures cover the chemistry of numerous problems of air, water, soap, laundering, dry cleaning, food and cookery, and textiles. A portion of the lecture time is given to reciting on the subject matter of previous lectures and of the laboratory work. References are given for study.

Laboratory.—The laboratory work consists largely of quantitative exercises dealing with air, water, soap, foods, food accessories, and textiles.

275. SEMINAR. Once a week, throughout the year, the officers of the department, with the more advanced students and such others as wish to, meet for papers and discussions upon topics representing the progress of chemical science, chiefly as found in the current journals. The preparation of subjects for presentation at these meetings may be made a part of the credit work of advanced students.

Economics and Sociology

Professor KAMMEYER
Assistant Professor MACKLIN*
Assistant Professor MERRITT

Vocational training alone does not fully prepare a student for his life work, nor for the acceptable discharge of his duties as a citizen. It is necessary that he should have at least a general knowledge of the economic and social conditions under which he will live and work, in order that he may become a useful member of society. The State needs men and women trained for citizenship. It is the purpose of this Department to plan and direct its work with this need in view.

A Department library of well-selected books and pamphlets bearing on economics, sociology, and statistics is at the disposal of the students, and is used for collateral readings, book reviews, and reports.

COURSES IN ECONOMICS

FOR UNDERGRADUATES

101. ECONOMICS. Junior and senior years, both semesters. Class work, three hours. Three semester credits. Professor Kammeyer.

This is a course in the fundamentals of economic science, including a

* Absent on leave, 1917-'18.

study of man's wealth-getting and wealth-using activities as they manifest themselves in the consumption, production, exchange, and distribution of commodities and services. Budgets, factors and expenses of production, money, banking, wage systems, labor organizations, rent, interest and profits are some of the leading topics for study and class discussion. These phenomena are here studied in conjunction with the laws or social conventions which control or influence them, such as the federal-reserve systems, the farm-loan act, legal restrictions concerning commerce, strikes, child labor, trusts, monopolies, and the like. The application of economic principles to such subjects as taxation, socialism, insurance, etc., is also considered. Supplementary reading of current literature, reference books, the keeping of notes, and periodical written reports are required. A combination of the textbook and lecture methods is followed. Text: Ely's *Outlines of Economics.*

102. AGRICULTURAL ECONOMICS. Elective, both semesters. Class work, three hours. Three semester credits. Assistant Professor Macklin.

Clear thought and sound judgment, upon the problems that confront the individual, are essential to success in any phase of agricultural production. The course in agricultural economics undertakes to familiarize the student with the economic principles and forces with which every farmer must deal. The relative profitability of farm enterprises, the proportion in which the factors of production should be combined for optimum results, and other phases of production are followed by the laws of values and the important questions connected with the exchange of farm products and the ultimate distribution of farm wealth. The course is conducted by lectures, texts and supplementary reading. Texts: Taylor's *Agricultural Economics;* and Ely and Wicker's *Elementary Principles of Economics.*

FOR GRADUATES AND UNDERGRADUATES

204. BUSINESS ORGANIZATION. Junior or senior year, both semesters. Class work, one hour. One semester credit. Prerequisite: Economics. Assistant Professor Merritt.

A study of individual proprietorship, partnership and corporation as forms of business organization and management; the advantages and disadvantages of each, and legislative restrictions. The selling plans, advertising methods and systems of credits and collections used by typical manufacturing and distributive industries are made the basis of study and reports. Attention is given also to the origin and operation of markets and exchanges, cost accounting, and special systems of wage payment. Instruction is by recitations, lectures, and reports. Text: Briscoe's *Economics of Business.*

207. LABOR PROBLEMS. Elective, first semester. Class work, one hour. One semester credit. Assistant Professor Merritt.

The history, organization, functions and legal status of labor unions in the United States and the principal countries in Europe. Statistics and judicial decisions relating to strikes, boycotts, picketing, arbitration, etc., are subjects of study and investigation. The course also includes a study of the various plans that have been proposed and tried for the more equitable distribution of wealth, such as coöperation, profit-sharing, industrial partnership, etc. Instruction by lectures, assigned readings, and reports. Text: Groat's *Organized Labor in America.*

210. MONEY AND BANKING. Elective, second semester. Class work, one hour. One semester credit. Must be preceded by a course in general economics. Professor Kammeyer.

A study of money, its history and characteristics as a medium of exchange and a standard of value. Bank currency: its nature, forms, and limitations. The principal banking systems of the world, their ma-

chinery and methods; branch banks, clearing houses, foreign and domestic exchange, etc. Special attention is given to the new Federal Reserve Act, its purpose, provisions, and operation. Text: White's *Money and Banking*.

213. PUBLIC FINANCE. Elective, second semester. Class work, one hour. One semester credit. Professor Kammeyer.

This course embraces a study of public revenues and public expenditures; the development of tax systems, reforms needed, public indebtedness, budgets, and other phenomena of financial administration. Plehn's *Introduction to Public Finance* is used as a basis for recitations. This is supplemented by library work and reports.

216. MARKETING AND COÖPERATION. Elective, both semesters. Class work, two hours. Two semester credits. Prerequisite: Agricultural Economics. Assistant Professor Macklin.

American farmers' organizations have attempted much in the way of reorganizing the process by which agricultural products are transferred from the farm to the consumer as well as in the bettering of farmers as a class. Knowledge of their experience in coöperative undertakings, whether in the line of marketing or production, is essential to a thorough understanding of the situation regarding farmers' coöperative organizations and the problems of greater economy in marketing. Following the sketch of the important farmer movements, speculation, market organization, coöperative production, exchange and credit are studied in detail. The course consists of lectures, special topics, assigned readings and discussions. Text: Weld's *The Marketing of Farm Products*.

219. AGRICULTURAL LAND PROBLEMS. Elective, both semesters. Class work, one hour. One semester credit. Prerequisite: Agricultural Economics. Assistant Professor Macklin.

The practical exhaustion of free land, rising prices, increasing tenancy and steadily declining soil fertility have produced unusual interest in land problems. The conditions essential to the best productive use of land, together with the various attempts in different countries to promote the proper use of land by partial or more or less complete land policies, provides the basis for the development of helpful views respecting land reforms which are even now pressing for public recognition. The course consists of lectures, reference work, assigned topics and discussions.

222. RESEARCH IN AGRICULTURAL ECONOMICS. Elective, both semesters. Open to a limited number of advanced students only. Hours of work to be arranged by appointment. Credit to be based on the quality and quantity of the work accomplished. Assistant Professor Macklin.

This opportunity is given to a small number of students especially interested in the economic problems of immediate interest to the farmers of Kansas. The facts and the processes of present marketing systems must be known before intelligent changes in them can be suggested. The forces causing undesirable tenancy must be determined before the evils can be eradicated. These subjects and many others are topics for careful research in this course.

COURSES IN SOCIOLOGY

FOR GRADUATES AND UNDERGRADUATES

201. SOCIOLOGY. Senior year, both semesters and summer school. Class work, three hours. Three semester credits. Assistant Professor Merritt.

This course deals with social life in general, involving a study of social origins, activities, and organization. Such social institutons as the family, the state, the church and the school are studied as to origin, development, organization and aims. The processes of socialization, social forces, and

social control particularly as they manifest themselves in rural life receive special emphasis. Consideration is given also to social pathology; poverty, its causes and remedies; crime, its causes and prevention; and to remedial legislation and correctional agencies. The aim of the course is to help the student to get his social bearings and to find himself as a fact and factor in the complex interrelations of human society. Assigned library readings and special written reports are required. Instruction is by recitation, class discussion and lectures. Text. Hayes' *Introduction to Sociology.*

224. RURAL SOCIOLOGY. Elective, both semesters. Class work, three hours. Three semester credits. Assistant Professor Merritt.

This course deals with the problem of the rural family, the rural school, the rural church, rural societies and associations, the economic and social activities of the community, and the relation of the state to the general welfare. This will lead to the reasons for the increased interest in rural sociology and problems; the effect of environment and occupation on community life; advantages and disadvantages of rural life; marketing and transportation as factors of community development; the various social institutions of the community, boys' clubs and girls' clubs, men's clubs, the grange and their possible economic and social activities; the country-life movement, and the reorganization of rural and social forces. The interdependence of town, city, and rural life are studied with special emphasis on conditions as they exist in this State. Instruction is by assigned readings, lectures, and recitations. Text: Voght's *An Introduction to Rural Sociology.*

Education

Professor HOLTON
Associate Professor KENT
Associate Professor ANDREWS
Assistant Professor HALM
Assistant Professor PETERSON

The courses in this Department have for their controlling purpose the professional training of teachers. Two types of courses are offered: (1) courses that give the broad, fundamental principles upon which public education is based, and (2) courses that develop technique and skill in school management and the organization of the subject matter of the curriculum. All courses are based upon the proposition that education supported by public taxation should function in social and vocational efficiency.

The minimum requirements for the three-year State certificate renewable for life are eighteen semester hours of work in this Department. Of these eighteen semester hours, twelve are specified by the State Board of Education, namely, Psychology, Educational Administration, History of Education, and Educational Psychology or Educational Sociology. For the remaining six semester hours the teachers' elective group in the Division of Home Economics specifies Home Economics Education and Special Methods in the Teaching of Home Economics, along with Supervised Observation and Teaching. Two credits toward graduation, but no credit toward the State certificate, are allowed for the last-named course. The remaining two semester hours may be chosen out of the elective courses in the Department.

Prospective teachers of agriculture should elect Agricultural Educa-

tion and Special Methods in the Teaching of Agriculture, and prospective teachers of industrial arts subjects should elect Industrial Education, and Special Methods in the Teaching of Industrial Arts.

The regulations of the State Board of Education allow the acceptance of only one course in special methods for the State certificate. This course must be taken in the student's senior year, in the field of his major work, and must be approved by the Department of Education.

COURSES IN EDUCATION

FOR UNDERGRADUATES

101. PSYCHOLOGY. Junior or senior year, first or second semester. Class work, three hours. Three semester credits. Required for State teachers' certificates. Assistant Professor Peterson.

This course is a general introduction to the forms and laws of conscious experience as based on a knowledge of the physiological conditions of mental life. It combines the study of selected texts and outside readings with lectures and class experiments.

105. EDUCATIONAL ADMINISTRATION. Junior or senior year, first or second semester. Class work, three hours. Three semester credits. Required for State teachers' certificates. Associate Professor Andrews.

This course is a study of the organization of state, city and county school systems, with special emphasis upon rural and vocational schools; the interrelation of the functions of boards of education, superintendents, principals, teachers. The school law of Kansas is an important part of the course.

109. EDUCATIONAL PSYCHOLOGY. Junior or senior year, first or second semester. Class work, three hours. Three semester credits. Required for State teachers' certificates. Prerequisite: Psychology. Assistant Professor Peterson.

The course will deal with those aspects of psychology that have a direct bearing upon educational practices. Attention will be paid to the results of experimental investigations in the field. Lectures and library work.

113. HISTORY OF EDUCATION. Junior or senior year, first or second semester. Class work, three hours. Three semester credits. Associate Professor Andrews.

This course is intended to present the successive relationships that have existed between educational machinery and practices, and the changing political, economic, scientific, cultural and ideal environments from primitive times to the present.

118. EDUCATIONAL SOCIOLOGY. Junior or senior year, first or second semester. Class work, three hours. Three credits. Professor Holton.

This course deals with the concrete objectives of education considered as a process of social adjustment; the meaning of education in a democracy; the educative functions of the home, the community, the church and the school; the school as a special environment; the meaning of labor and leisure; cultural and vocational education; intellectual and practical studies; and physical and social studies.

121. HOME ECONOMICS EDUCATION. Senior year, first or second semester. Class work, two hours. Two semester credits. Required of all candidates for State teachers' certificates who are preparing to teach home economics. Prerequisite: Foods I and II, Clothing I and II, and Educational Administration. Assistant Professor Halm.

This course considers problems dealing with the place of home eco-

nomics in modern secondary education; the aims and the organization of the work in various types of schools; the administration, maintenance, equipment and supervision of departments of home economics. Special attention is paid to Kansas conditions.

125. AGRICULTURAL EDUCATION. Senior year, first semester. Class work, two hours. Two semester credits. Expected of all candidates for State teachers' certificates who are preparing to teach agriculture. Prerequisite: Educational Administration. Associate Professor Kent.

A comparative study is made of the provisions for agricultural education in Kansas and other states and countries and the principles underlying such education. The part played in agricultural education by community, county, state and nation is discussed. Types of schools, courses of study, adjustment of school work to community needs, and the equipment and administration of agricultural schools are studied. The aim of the course is to fit the student to plan, teach and administer or supervise agricultural work, especially in high schools.

129. INDUSTRIAL EDUCATION. Senior year, first semester. Class work, two hours. Two semester credits. Expected of all candidates for State teachers' certificates who are preparing to teach manual training, shop work, trade courses, and other industrial subjects. Prerequisite: Educational Administration. Associate Professor Kent.

This course is a study of typical secondary schools of industrial education and departments of industrial education in public schools; of the industrial schools of Germany and other foreign systems; of the making of a course of study in industrial education for secondary schools; and of shop equipment and costs.

132. SPECIAL METHODS IN THE TEACHING OF HOME ECONOMICS. Senior year, first or second semester. Class work, three hours. Three semester credits. Expected of all candidates for State teachers' certificates who are preparing to take home economics. Prerequisite: Foods I and II, Clothing I and II, and Psychology. Assistant Professor Halm.

This course applies the principles of sound teaching to the selection and development of the subject matter of home economics in lessons for high-school pupils and to the conduct of laboratory and classroom exercises. It is supposed to accompany course 141.

136. SPECIAL METHODS IN THE TEACHING OF AGRICULTURE. Senior year, second semester. Class work, three hours. Three semester credits. Expected of all candidates for State teachers' certificates who are preparing to teach agriculture. Prerequisite: Educational Psychology. Associate Professor Kent.

Training in planning lessons, organizing materials and conducting class and laboratory work in agriculture is the purposes of this course. The work will include observation, criticism and reports of class exercises, a study of work done in high schools, and the making and criticism of lesson plans and outlines. Special attention is given to selecting laboratory materials, conducting laboratory exercises, and adapting class and laboratory work to each other.

140. SPECIAL METHODS IN THE TEACHING OF INDUSTRIAL ARTS SUBJECTS. Senior year, second semester. Class work, three hours. Three semester credits. Expected of all candidates for the State teachers' certificates who are preparing to teach industrial subjects. Prerequisites: Mechanical Drawing II, Woodworking II, and Educational Psychology. Associate Professor Kent.

The various lines of work included under the head of industrial arts are studied and a series of progressive lessons worked out in each of these lines emphasizing important elements. A study is made of the various materials employed and the methods of utilizing them for the needs of pupils. The arrangement of courses, the outline and presen-

tation of assignments, the preparation of assignments, the preparation of laboratory material and the conduct of laboratory exercises are taken up. The work includes recitation, class discussion, assigned readings and written reports.

Physics 224. SPECIAL METHODS IN THE TEACHING OF PHYSICS. Elective. Class work, two hours; laboratory, three hours. Three semester credits. Assistant Professor Raburn.

(See Department of Physics, course 224).

141. SUPERVISED OBSERVATION AND TEACHING IN HOME ECONOMICS. Senior year, first or second semester. Laboratory work, six hours. Two semester credits. Prerequisites: Foods I and II, Clothing I and II, and Special Methods in the Teaching of Home Economics. Assistant Professor Halm.

Students whose qualifications are accepted for this course will serve as teachers of sewing and cooking in the classes of the junior high school of Manhattan.

146. SUPERVISED OBSERVATION AND TEACHING IN AGRICULTURE. Senior year, first or second semester. Laboratory work, nine hours. Three semester credits. Expected of all candidates for State teachers' certificates who are preparing to teach industrial arts. Prerequisite: Educational Psychology. Associate Professor Kent.

Students expecting to teach take this work as a part of the regular classes in the School of Agriculture. The work is supervised by a member of the Department of Education and by the regular class teacher. Both teachers criticise lesson plans and presentation.

150. SUPERVISED OBSERVATION AND TEACHING IN INDUSTRIAL ARTS. Senior year, first or second semester. Laboratory work, nine hours. Three semester credits. Expected of all candidates for State teachers' certificates who are preparing to teach industrial arts. Prerequisite: Educational Psychology. Associate Professor Kent.

Industrial classes conducted by experienced teachers are visited and careful observations are made in regard to sequence of courses, methods of presentation, interest, class order, and other phases of class work. Reports are presented on this work for discussion. Students are assigned teaching work under careful supervision, results are noted and suggestions are made for individual improvement.

FOR GRADUATES AND UNDERGRADUATES

201. RURAL EDUCATION. Junior or senior year, first or second semester. Class work, three hours. Three semester credits. Prerequisite: Educational Administration. Professor Holton.

This course deals with extension education, boys' and girls' club work, the problems of the rural school, consolidation, social centers, farmers' organizations, and all forms of organized community life in the open country. A certain amount of field work will be done in connection with the course.

FOR GRADUATES

301 and 302. EDUCATION SEMINAR I AND II. Open to candidates for the master's degree. First and second semesters, respectively. Class work, two hours. Four semester credits on completion of both courses; no credit for either separately. Prerequisites: Educational Psychology, and Educational Administration. Professor Holton.

The work consists of lectures, reports and class discussions. Each member of the seminar chooses a topic early in the term for special investigation. Preliminary reports are made to the class from time to time and the final results of the study are embodied in a paper.

English

Professor SEARSON*
Professor MACARTHUR
Associate Professor DAVIS
Assistant Professor RICE
Assistant Professor CONOVER
Assistant Professor BURK
Assistant Professor MACLEAN
Instructor LEONARD
Instructor SYFORD
Instructor RUSSEL
Instructor HAZLETT

Ability to think well and to speak well, and capacity to appreciate the world's best literature, are recognized essentials of a liberal education. The work of the Department of English is to acquaint the student with the best standards of English practice and appreciation, and to encourage him to maintain these standards in all his work. To this end the Department offers studies in cultural and technical English and special drills in expressing thought freely and effectively in matters touching the vital interests of the student. The study of the English language and literature is thus made the means of increasing the power and efficiency of the individual. It is therefore the aim of the Department, in coöperation with the technical departments of the College, to increase the knowledge and effectiveness of the students.

COURSES IN ENGLISH LANGUAGE

FOR UNDERGRADUATES

101. COLLEGE RHETORIC I. Freshman year, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisite: Three units of high-school English. Professor Searson, Professor Macarthur, Associate Professor Davis, Assistant Profesors Rice, Conover, Burk, and Maclean, Miss Leonard, Miss Syford, Miss Russel, and Mr. Hazlett.

After a series of tests to determine the fitness of the student to pursue the work of the course, a rapid, thorough review of the essentials of English is given, special attention being paid to sentence and to paragraph structure. This is followed by themes designed to develop the student's ability to tell accurately what he knows, to describe interestingly what he sees, and, above all, to enable him to relate the subject of English to the work which he expects to do in after life. Texts: Lomer and Ashmun, *Study and Practice of Writing English;* Cunliffe and Lomer, *Writing of To-day,* first half.

104. COLLEGE RHETORIC II. Freshman year, both semesters. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric I. Professor Searson, Professor Macarthur, Associate Professor Davis, Assistant Professors Rice, Conover, Burk, and Maclean, Miss Syford, Miss Leonard, Miss Russel, and Mr. Hazlett.

This course is a continuation of the work in College Rhetoric I. Special emphasis is laid on outlining and on expository and argumentative writing. Attention is directed to practical as well as to literary subjects for the frequent themes written throughout the course. Texts: Canby and others, *English Composition in Theory and Practice;* Cunliffe and Lomer, *Writing of To-day,* second half.

107. SPECIAL ENGLISH. Freshman year, both semesters. Class work, three hours. No credit. Associate Professor Davis and Assistant Professor Maclean.

* Absent on leave, 1917-'18.

This course is a review of the essentials of English composition, accompanied by drills in sentence structure and in idiomatic expression, by special exercises and by consultations. It is required of any student assigned to College Rhetoric I who within the first few weeks of the work of that course shows that he is unable to express his ideas clearly and accurately. Textbook: Lomer and Ashmun, *The Study and Practice of Writing English.*

110. ENGINEERING ENGLISH. Senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: College Rhetoric II. Professor Macarthur.

This is an advanced course in English particularly adapted to the needs of engineers. The general problems of engineering writing are discussed. Specific assignments are made in the writing of business letters relating to engineering, and in the preparation of technical manuscripts and reports. A series of essays of especial value to the engineer are read and analyzed. Texts: Watt, *The Composition of Technical papers;* Aydelotte, *English and Engineering.*

113. ADVANCED COMPOSITION I. Elective, both semesters. Class work, two hours. Two semester credits. Prerequisite: College Rhetoric II. Assistant Professor Conover.

In this course special emphasis is given to the subject of exposition. The subjects of the themes required are taken as far as possible from the student's particular field of work. Models of reports, explanations and general expository work are carefully studied. Text: Jelliffe, *Handbook of Exposition.*

116. ADVANCED COMPOSITION II. Elective, both semesters. Class work, two hours. Two semester credits. Prerequisite: Advanced Composition I. Assistant Professor Conover.

Narrative writing is studied in this course, both in its relation to the other forms of composition and as an independent form. The practical forms of narrative are studied in detail, and attention is given to the short story. Text: Buck and Morris, *Narrative Writing.*

119. ARGUMENTATION AND DEBATE. Elective, both semesters. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric II. Assistant Professor Burk.

This course includes a systematic study of the theory of debate; brief making; classroom practice in debating, in defending propositions, and in extemporaneous speaking; the proper method of collecting and classifying material; and effective methods of refuting arguments. Consultations, library investigations and special group conferences form helpful laboratory features of the course. Text: Stone and Garrison, *Essentials of Argument.*

122. BUSINESS ENGLISH. Elective, both semesters. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric II. Professor Searson, Associate Professor Davis.

This course comprises a thorough review of business forms and general business writing, with special attention to business correspondence and special sales letters. A close study is made of the principles of effective writing as they are found applied in the best writing in the commercial world. Text: Gardner, *Effective Business Letters.*

125. ADVERTISING ENGLISH. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric II. Associate Professor Davis.

This course offers a study of the principles of effective English as they are applied in present-day advertising writing. A preliminary survey of the principles of advertising is made in the early part of the course.

Later actual practice is given in the writing and printing of the fundamental types of advertisements. Texts: Hall, *Writing an Advertisement.*

128. ORAL ENGLISH I. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric I. Professor Macarthur, Assistant Professor Burk.

In this course a study of the principles of oral composition and practice in oral composition in the form of explanations, narrations, descriptions, selling and other business talks, travel talks and speeches for special occasions are offered. For materials for the exercises given in class, students are directed to cultural subjects, more particularly to painting, sculpture, architecture, and music. Text: Brewer, *Oral Composition.*

131. ORAL ENGLISH II. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite, College Rhetoric I. Professor Macarthur, Assistant Professor Burk.

This course is a continuation of Oral English I, but does not require it as a prerequisite. Attention is directed especially to the forms of oral English more commonly employed, such as conversation, the toast or after-dinner speech, introductions, nominations, announcements, presentations, and the like. For reading the students are directed to current magazines so as to be able to discuss current events of all kinds. Text: Brewer, *Oral Composition.*

134. METHODS OF TEACHING ENGLISH. Elective, second semester and summer school. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric II. Professor Searson, Associate Professor Davis.

This course is planned to meet the needs of those who are called upon to teach English in connection with the applied sciences. The course of study, the application of English instruction to life needs and definite methods of motivating English instruction are specially considered. Text: Carpenter, Baker, and Scott, *Teaching of English.*

151. COMPOSITION AND LITERATURE I. Freshman year, both semesters. Class work, two hours. Two semester credits. Prerequisite: Three units of high-school English. Associate Professor Davis, Assistant Professors Conover, Burk, and Maclean.

This course consists of a presentation of literary principles with a view to teaching the student how to study and appreciate the best in literature. Masterpieces of drama, of narrative and of lyric poetry are studied intensively in class, and frequent compositions upon the selections studied are required. Textbook: Heydrick, *How to Study Literature;* selected texts in dramatic, narrative and lyric poetry; Lomer and Ashmun, *Study and Practice of Writing English.*

154. COMPOSITION AND LITERATURE II. Freshman year, both semesters. Class work, two hours. Two semester credits. Prerequisite: Composition and Literature I. Professor Macarthur, Assistant Professors Conover, Rice, and Maclean.

This course is a continuation of Composition and Literature I. In it masterpieces of fiction, the essay and the oration are intensively studied. The composition work is continued. Textbook: Heydrick, *How to Study Literature;* selected texts in fiction, the essay, and the oration; Lomer and Ashmun, *Study and Practice of Writing English.*

FOR GRADUATES AND UNDERGRADUATES

201. FARM ADVERTISING. Elective, first semester. Class work and practice, three hours. Three semester credits. Prerequisite: College Rhetoric II. Associate Professor Davis.

How to advertise all kinds of farm produce in order to secure regular

customers by parcel post or by direct delivery is the object of this course. The student is shown how to write the most effective copy for "display ads.," "story ads.," and handbills, and how to feature the central point in each advertisement. The course includes the collection of the most important facts concerning farm produce and such study of markets and marketing as is necessary. Text: Starch, *Advertising.*

204. FARM BULLETINS. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: College Rhetoric II. Associate Professor Davis.

In this course the student is required to make an extensive study of farm bulletins and the essentials of writing good bulletins. How to write in a simple, direct style that appeals to the readers for whom the bulletin is intended is the subject of careful study. Current farm bulletins are made the basis for the work. The student is permitted to take the facts he has collected in conection with the work of other classes and to use them in working out special reports required in this course. The course is designed especially for those who intend later to write farm bulletins.

207. TECHNICAL WRITING. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: One of the following courses: 113, 116, 122, 125, 201, 204. Professor Searson, Professor Macarthur.

This course is planned to help students properly to record and to report technical work. Fundamental principles of technical writing are studied in connection with such practice as will necessitate clearness, accuracy, and effectiveness. Text: Watt, *The Composition of Technical Papers.*

210. HOME ECONOMICS ENGLISH. Elective, second semester. Class work, two hours. Two semester credits. Assistant Professor Maclean.

This course recognizes the special needs of women in home, club and social life, and provides a special training to meet those needs. Note taking, outlining and abstracting in home economics; club papers, special reports, books reviews, demonstration talks, social correspondence, and human-interest stories from home environment are considered in this course. Text: Moore, Tompkins and Maclean, *English Composition for College Women.*

251. THE SHORT STORY. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: English Literature I or Composition and Literature II. Assistant Professor Rice.

Practice in writing short stories, based upon a thorough study of the world's best short stories, is offered in this course. The principles which underlie the material and structure of the short story—plot, setting, action, and character analysis—are especially emphasized. Text: Esenwein, *Writing the Short Story;* Ashmun, *Modern Short Stories.*

254. COMMUNITY ENGLISH. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: English Literature I or Composition and Literature II. Professor Searson.

This course comprises the study and practice of the English work most needed in the activities and recreations of community life. A detailed study is made of the pageant. The class is organized as a special group and its members are trained in the various forms of procedure that may be required in the rural community. Text: Bates and Orr, *Pageants and Pageantry.*

FOR GRADUATES

301. HISTORY OF LANGUAGE. Elective, first semester. Class conference, two hours. Two semester credits. Prerequisite: English Literature II. Professor Searson, Professor Macarthur.

This course offers a study of the origin and development of the English language. Text: Wyld's *Historical Study of the Mother Tongue.*

304. SPECIAL STUDIES. Elective, second semester. Class conference, two hours. Two semester credits. Prerequisite: History of Language. Professor Searson, Assistant Professor Conover.

Individual assignments are made in the fundamental fields of research in applied English. The student is required to carry on an original investigation and to make an acceptable report of his research work.

COURSES IN ENGLISH LITERATURE

FOR UNDERGRADUATES

171. ENGLISH LITERATURE I. Sophomore year, both semesters and summer school. Class work, four hours. Four semester credits. Prerequisite: College Rhetoric II. Professor Searson, Associate Professor Davis, Assistant Professors Conover, Burk, and Maclean.

In this course the students are made familar with the principles of literary appreciation and are taught to apply them to selected texts in narrative, lyric and dramatic poetry, as well as in fiction, the essay, and the oration. The work of the course is intensive, notebooks are kept, and frequent tests are given. Text: Heydrick, *How to Study Literature.*

174. ENGLISH LITERATURE II. Sophomore year, both semesters. Class work, four hours. Four semester credits. Prerequisite: English Literature I or Composition and Literature II. Professor Macarthur, Assistant Professors Rice and Maclean, Miss Syford.

This course presents history of English literature by means of lectures and of discussions of the text. Extensive assignments in reading are made, and reports are given in class. Weekly tests are required. Text: Long, *English Literature.*

177. ENGLISH LITERATURE HE-I. Junior year, both semesters. Class work, three hours. Three semester credits. Prerequisite: College Rhetoric II. Associate Professor Davis, Assistant Professors Rice and Maclean.

This course offers in slightly condensed form the work given in course 171. Text: Heydrick, *How to Study Literature.*

180. ENGLISH LITERATURE HE-II. Junior year, both semesters. Class work, three hours. Three semester credits. Prerequisite: English Literature HE-I. Professor Searson, Assistant Professor Rice, Assistant Professors Conover and Maclean, Miss Syford.

This course presents a history of English literature in much the same way as course 174. The amount of reading required is slightly less. Text: Long, *English Literature.*

FOR GRADUATES AND UNDERGRADUATES

271. THE ENGLISH BIBLE. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: English Literature I or Composition and Literature II. Professor Searson.

This course familiarizes the student with the different kinds of literature found in the English Bible. A careful study is also made of the style of that great classic in order to discover the secrets of its simplicity, clearness, and power. Text: Moulton, *Short Introduction to the Literature of the Bible.*

274. THE SHAKSPERIAN DRAMA. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: English Literature I or Composition and Literature II. Professor Searson, Professor Macarthur.

This course includes a study of Shakspere's life and times and the

reading of ten of his greatest plays. Text: Boas, *Shakspere and His Predecessors.*

277. NINTEENTH CENTURY LITERATURE. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: English Literature II. Professor Macarthur, Assistant Professor Conover.

In this course there is discussion of the literary movements found throughout the century, especially in the Victorian period. Significant works are read and are made the subjects of class reports and discussions. Text: Saintsbury, *Nineteenth Century Literature.*

280. AMERICAN LITERATURE. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: English Literature I or Composition and Literature II. Associate Professor Davis, Assistant Professor Rice.

The course consists of lectures on the history of American literature and of class reports on assigned readings. A special study is made of the standard works of the chief American authors. Text: Curtis, Hidden, Page, *Chief American Poets.*

282 CURRENT LITERATURE. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: English Literature I or Composition and Literature II. Miss Syford.

It is the aim of this course to establish a definite basis or standard of literary criticism and appreciation by an inductive study of contemporary literature. The course will include a consideration of the best works of such literary figures as Tagore, Henry James, Maeterlinck, Galsworthy, Anatole France, Thomas Hardy, Tchekov, Bernard Shaw, Selma Lagerlöf, Emile Verhaeren, Arnold Bennett, Stephen Phillips, Wm. Butler Yeats, J. M. Synge, Alfred Noyes, and the younger group.

285. THE NOVEL. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: English Literature II. Assistant Professor Conover.

A study of the English novel, including the discussion of its historical development, its relation to other forms of fiction, and its place in contemporary literature. Especial attention is given to representative works of modern writers, both English and American. Text: Cross, *The Development of the English Novel.*

288. ENGLISH SURVEY I. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: Nineteenth Century Literature, or its equivalent. Professor Searson, Professor Macarthur.

This course offers an advanced study in the history of English literature. Beginning with Anglo-Saxon times the course continues through the Middle English period down to the close of the Elizabethan period. Text: Garnett and Goss, *History of English Literature,* Vols. I and II.

290. ENGLISH SURVEY II. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: English Survey I. Professor Searson, Professor Macarthur.

This course is a continuation of English Survey I. It traces the rise of Puritanism and its influence on English literature. Emphasis is placed upon the classical movement. A brief survey is made of romanticism and its development. Text: Garnett and Goss, *History of English Literature,* Vols. III and IV.

293. TENNYSON AND BROWNING. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: English Literature I or Composition and Literature II. Professor Searson.

This course offers a study in the interpretation of some of the best known poems of Browning and Tennyson. Texts: Phelps, *Browning, How to Know Him;* Van Dyke, *The Poetry of Tennyson.*

295. THE ARTS AND CRAFTS MOVEMENT. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Nineteenth Century Literature, or its equivalent. Professor Macarthur, Miss Syford.

This course takes as its basis the life of Wm. Morris, and treats of the arts and crafts movement in its relation to literature. Works of Morris, Rossetti, Ruskin and other writers of the same group are read and discussed. Text: Mackail's *Life of William Morris.*

FOR GRADUATES

310. THE ROMANTIC MOVEMENT I. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: Nineteenth Century Literature. Professor Searson, Assistant Professor Conover.

This course offers advanced work in the study of eighteenth century romanticism. Text: Beers, *A History of English Romanticism in the Eighteenth Century.*

313. THE ROMANTIC MOVEMENT II Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Nineteenth Century Literature. Professor Searson, Miss Syford.

This course continues throughout the Victorian period the work done in the preceding course. Text: Beers, *A History of English Romanticism in the Nineteenth Century.*

Entomology

Professor DEAN
Associate Professor WELCH
Assistant Professor MERRILL
Assistant Professor TANQUARY
Instructor MCCOLLOCH
Assistant HAYES

In all courses a special effort is made to make the student realize that he is studying living things which form a part of his daily environment, and upon which his welfare in many cases vitally depends. In courses in which both class and laboratory instruction is given the closest correlation is striven for, and wherever possible the same form is studied simultaneously in laboratory and class. The student is led to integrate his classroom knowledge with local animal life by means of frequent and carefully planned field excursions and by the free use of vivaria in laboratory and museum. The courses offered are intended to awaken in the student a keen appreciation of the general principles underlying insect life, of the life economy of the more beneficial as well as of the more injurious species, and of the general principles governing methods for their control.

Standard anatomical charts, a representative collection (especially of local species), a high-grade lantern for the projection of lantern and microscope slides, a large and excellent series of lantern slides (many of them colored) and a series of microscope slides are available for illustration. Compound and dissecting miscroscopes sufficient for the needs of laboratory classes have been provided.

Facilities for advanced work are provided for graduate students and others who expect to pursue the subject professionally. An advanced laboratory is equipped with individual desks, binocular microscopes, compound microscopes, rotary microtome, imbedded ovens, drawing apparatus, and a supply of glassware and reagents sufficient for histological work and for research. A well-equipped insectary is available for train-

ing in insectary methods. An air-conditioning machine in the insectary adds materially to the possibilities for experimental work. A field station with all the necessary equipment provides means for the study of insects under normal field conditions.

COURSES IN ENTOMOLOGY

FOR UNDERGRADUATES

101. GENERAL ENTOMOLOGY. Elective, both semesters and summer school. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: General Zoölogy I and II. Professor Dean, Associate Professor Welch, and Assistant Professor Tanquary.

This is a study of the elementary anatomy and physiology of insects, complete enough to give a thorough understanding of the life history and habits of the most important species and the general principles upon which the control of these economic forms is based. It is a study of the more important general facts about insects as a class; the main characters of the different orders and groups; how they survive and multiply; and how the structure and habits of one group render it susceptible to certain measures of control, while in other groups entirely different measures are necessary. The class work consists of lectures and of text and special reference study.

106. HOUSEHOLD ENTOMOLOGY. Elective, first semester. Class work, two hours. Two semester credits. Prerequisites: General Zoölogy I and II. Professor Dean.

This is a study of the elementary structure and physiology of insects, complete enough to give a clear understanding of the life history, habits and methods of control of the principal insects injurious to house, garden, lawn, and human health. The course consists of reference study and a series of lectures.

111. APICULTURE. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: General Zoölogy I and II. Assistant Professor Merrill.

This course comprises a general study of the structure, life history, general behavior, activities and products of the honeybee. Special attention is given to practical beekeeping, dealing with the best methods practical among beekeepers. A study is made of bee diseases and of the standard methods to be used in the eradication and control of them. A study is also made of the relation of bees to agriculture and horticulture.

116. MILLING ENTOMOLOGY. Junior year, second semester. Class work, one hour. One semester credit. Professor Dean.

This is a study of the insect pests of flour mills, elevators, granaries, warehouses and bakeries, and of the standard methods to be used in dealing with them. The course consists of lectures and special reference reading. Inspection trips will be made to flour mills and warehouses.

FOR GRADUATES AND UNDERGRADUATES

201. HORTICULTURAL ENTOMOLOGY. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: General Entomology. Assistant Professor Merrill.

This is a study of the most important insect pests of orchard, garden and forest, and of standard methods for controlling their ravages. The class work consists of lectures and the study of references.

206. GENERAL ECONOMIC ENTOMOLOGY. Elective, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: General Entomology. Professor Dean.

This is a study of the life economy of the more important economic insects, of methods to be used in dealing with them, and of the literature of economic entomology. The student is made familiar with our present knowledge of the most important of our injurious insects, with the sources of economic literature, and with methods commonly used in the investigation of problems in economic entomology. The class work consists of lectures, and of text and special reference reading.

Laboratory.—The laboratory work consists of the formation and study of a collection of injurious insects, and in insect breeding. This work naturally involves much field study, in the course of which the student gains a first-hand acquaintance with the more important injurious insects at home in nature.

211. INSECT MORPHOLOGY I. Elective, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisite: General Entomology. Associate Professor Welch.

This course deals exclusively with the external anatomy of representative insects belonging to a number or orders. The types studied are selected so as to present the essentials of the structure of the exoskeleton and to afford a basis for the courses in taxonomy and for professional studies in hexapod morphology.

216. PRINCIPLES OF TAXONOMY. Elective, second semester. Lecture, one hour. One semester credit. Prerequisite: (1) For students taking Taxonomy of Insects I: General Entomology and Insect Morphology I. (2) For students taking Taxonomy of Vertebrates: General Zoölogy I and II. All students registering in either of the above-mentioned courses must also register for this course. Course cannot be taken separately. Associate Professor Welch.

This course of lectures deals with the fundamental principles of modern taxonomy. The following subjects are considered in detail: Systems of classification; terminology of taxonomic groups; criteria of species and genera; binomial nomenclature; pre-Linnæan and modern nomenclature; international code of zoölogical nomenclature, and other codes; law of priority; and modern tendencies in taxonomy.

217. TAXONOMY OF INSECTS I. Elective, second semester. Laboratory, six hours. Two semester credits. Prerequisites: General Entomology and Insect Morphology I. Students registering for this course must also register for the course in Principles of Taxonomy. Associate Professor Welch.

This is a study of the general principles of the classification of representative insects. The purpose of the course is so to familiarize the student with the literature, methods and ideals of classification that he will be able to identify unknown forms and to pursue advanced taxonomic studies.

221. ADVANCED GENERAL ENTOMOLOGY. Elective, first semester. Class work, three hours. Three semester credits. The class work consists of lectures, assigned readings and written reports. Prerequisite: General Entomology. Associate Professor Welch.

The purpose of this course is to give the advanced student a comprehensive view of the broad biological aspect of the subject and an understanding of the relation of insects to the complex of environmental factors. The various subdivisions of entomology are correlated and used as a basis in the presentation of general principles as well as illustrating the problems of maintenance and the various ways in which insects have solved them. The course includes, in part, a detailed consideration of the following: Phylogeny of insects and their relatives; metamerism; reproduction; gynandromorphism; parthenogenesis; paedogenesis; polyembryony; respiration; temperature; embryology; internal and external metamorphosis; metabolism; aquatic insects, their evolution, adaptations,

and activities; regeneration; experimental work with insects; insect parasitism; color and coloration; insects in relation to other organisms; insect behavior; and geological and geographical distribution.

226. MEDICAL ENTOMOLOGY. Elective, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisite: General Entomology. Assistant Professor Tanquary.

The subject matter of this course deals with insects and other arthropods as transmitters and disseminators of disease, attention being confined to that phase of the subject which pertains to the health of man. Emphasis is placed on the various important species of insects which are related to disease, the pathogenic organisms and their relation to insects, and the preventive measures which have, up to date, proved most effective. Some attention is also given to the important theories which underlie this subject and to important investigations in progress at the present time.

Laboratory.—The laboratory work consists of a careful study of insects and other arthropods which may affect the health of man directly, and of those which may be instrumental in the dissemination of disease; also a study of the causative organisms of certain insect-borne diseases and the methods by which these organisms are transmitted.

231. ENTOMOLOGICAL AND ZOÖLOGICAL LITERATURE. Elective, first semester. Lectures, one hour. One semester credit. Prerequisite: General Entomology. Associate Professor Welch.

This course deals with the literature of entomology, special consideration being given to bibliographical works and their uses. Since the literature of entomology is, to a considerable extent, inseparably associated with that of zoölogy, the course is of equal importance to the students of both subjects. The course is designed primarily to meet the needs of advanced undergraduates and graduate students who are beginning research work. General and special bibliographical sources, foreign and American scientific journals and serials, and the construction of special bibliographies according to approved methods constitute the chief subjects for consideration. All advanced students of entomology and zoölogy are expected to take this course.

236. ZOÖLOGICAL AND ENTOMOLOGICAL SEMINAR. Elective, both semesters. One two-hour session each week. One semester credit. Prerequisite: Consult seminar committee.

This course consists in the presentation of original investigations, reviews of papers appearing in current journals, summaries of recent advances in the various fields, and discussion of the various aspects of the fundamental problems of modern biology.

FOR GRADUATES

301. INSECT MORPHOLOGY II. Elective, first semester. Laboratory, nine hours. Three semester credits. Prerequisite: Insect Morphology I. Associate Professor Welch.

This course is designed for those advanced students who desire more thorough preparation in the essentials of insect anatomy than is provided for in Insect Morphology I. More extensive studies of detailed external and internal anatomy are made and preparation is afforded for advanced work in taxonomy and research in morphology.

306. TAXONOMY OF INSECTS II. Elective, second semester. Laboratory, nine hours. Three semester credits. Prerequisite: Taxonomy I and Insect Morphology II. Associate Professor Welch.

This course provides for a more comprehensive preparation in the field of insect taxonomy. At the discretion of the instructor, the work may be taken in such a way that either a broader acquaintance with insects and the principles of classification is afforded, or intensive work may be done on selected groups.

311. INSECT HISTOLOGY. Elective, first semester. Class work, one hour; laboratory, six hours. Three semester credits. Prerequisites: General Entomology, and General Cytology. Associate Professor Welch.

This course is designed primarily for students who expect to do technical work in entomology. The work of the laboratory consists of the application of those special methods of gross and microscopical technique which are applicable to insects. Practice in the use of the various special methods of killing and fixing, clearing, sectioning, staining and mounting the various groups of insects and insect tissues afforded. A study of insect tissues constitutes an important part of the course. The lectures deal with the more general matters of technique and insect histology.

316. RESEARCH IN ENTOMOLOGY. Advanced students having sufficient fundamental training may, with the approval of the head of the department, undertake original investigation in one of the following fields of entomology: taxonomy, morphology, economic entomology. Such work is pursued under the direct supervision of some member of the departmental faculty and the final results may, if of sufficient merit, be used to fulfill the thesis requirement for the master's degree. The Special student may, if willing and capable, be drawn into the research work of the Agricultural Experiment Station during the summer vacation and receive training in the investigation of economic problems. Prerequisites: (1) For research in taxonomy and morphology: General Entomology, Insect Morphology I, Taxonomy of Insects I, and Cytology. (2) For research in economic entomology: General Entomology, General Economic Entomology, Insect Morphology I, and Taxonomy of Insects I. Professor Dean, Associate Professor Welch, Assistant Professor Merrill, Assistant Professor Tanquary, and Instructor McColloch.

Geology

Professor NABOURS
Associate Professor NEWMAN

By use of abundant illustrative material, an effort is made to have the student realize that he is dealing with natural forces which intimately affect his own well-being and that of his fellows. The agencies that have made the earth what it is are observed and studied in the field. The purpose of these courses is to arouse in the student an appreciation of the general principles underlying the structure and formation of the earth.

Some charts, a series of lantern slides, a representative collection of fossils and minerals, and a surrounding country exhibiting considerable variety of hill and valley, limestone, glacial drift and sand dunes, are available for illustrative purposes.

COURSES IN GEOLOGY

FOR UNDERGRADUATES

101. DYNAMIC AND STRUCTURAL GEOLOGY. Elective, first semester. Class work, two hours; two field trips during the semester. Two semester credits. Professor Nabours.

This course consists of a brief study of the structure of the earth, and of the agencies by which rocks are formed or destroyed and the topographic features of the earth produced. Text: *Introductory Geology*, by Chamberlain and Salisbury.

102. ENGINEERING GEOLOGY. Junior year, and Elective, second semester. Class work, two hours; laboratory, six hours. Four semester credits. Required in the course in civil engineering. Professor Nabours and Associate Professor Newman.

The class work consists of a study of the general principles of structural and dynamic geology, and of rocks in respect to their mineral composition, structural properties, changes in weathering, etc. It is given by lectures, textbooks, and references.

Laboratory.—The laboratory work comprises the observation and description of such structural and dynamic features as the locality affords, and a study of the principal rocks and their mineral constituents.

FOR GRADUATES AND UNDERGRADUATES

201. HISTORICAL GEOLOGY. Elective, second semester. Class work, two hours; two field trips during the semester. Two semester credits. Prerequisites: Geology 101, Elementary Zoölogy, and General Botany, or equivalent. Professor Nabours.

This course takes up a brief study of the history of the earth as shown by the record in the rocks. Special emphasis is placed on the history of life as indicated by the fossils.

History and Civics

Professor PRICE
Associate Professor ILES
Assistant Professor TAYLOR
Assistant Professor JAMES
Instructor OREM

Training for citizenship, breadth of view, historic-mindedness, fairness of judgment and general culture are constant and specific aims of each course offered by the Department of History and Civics. As a result of the training received in these courses the student is better prepared to understand and appreciate the institutions in the midst of which he lives and of which he is a part. He is also prepared to act more wisely his part as a leader in good citizenship wherever his lot may be cast. In our modern age and self-governing nation, and in an institution supported by the State and Nation, it would seem to be the imperative duty of every student to secure specific training for wise and effective leadership in the governmental affairs of the State and Nation that are thus preparing him for life and its duties.

COURSES IN HISTORY

FOR UNDERGRADUATES

101. AMERICAN HISTORY I (*or* BEGINNINGS OF THE AMERICAN NATION). Junior or senior year, both semesters and summer school. Class work, three hours. Three semester credits. Professor Price.

This course gives special emphasis to the industrial phases of the origin and development of American nationality and democracy to the end of the War of 1812. It also includes our constitutional and political development, especially with reference to origin, basis, cause, and effect. It aims to develop historic-mindedness; that is, training the student to put himself in the other fellow's place and understand fairly "the why." The European origin and background of American history, the evolution of colonial life, industries, and institutions; why we became an independent nation; our westward expansion; the establishing of nationality, and the development of government by the people, are phases definitely em-

phasized. Instruction is given by means of lectures, readings, and recitations, based on *An American History Note Book*, prepared by the Department.

105. AMERICAN INDUSTRIAL HISTORY. Sophomore or Junior year, both semesters and summer school. Class work, three hours. Three semester credits. Assistant Professor Taylor.

This course traces the history of American agriculture, manufactures, and commerce with related activities from their colonial beginnings to the present. It includes a survey of the physical basis for American history, the growth of population and its expansion across the continent, and the reflection of these things on our industrial, social and political life. European developments, especially the industrial revolution and the expansion of commerce, are studied for the light they throw on American history. Finally, throughout the course an attempt is made to trace the growth of our national industrial organization and its present-day aspects. This course is based on *Outlines of American Industrial History*, prepared by the Department. A text, such as Coman's *Industrial History of the United States* or Bogart's *Economic History of the United States* is required, and the student is held responsible (*a*) for the contents of his text and (*b*) for assigned library work and lectures.

121. ENGLISH HISTORY. Sophomore year, both semesters and summer school. Class work, three hours. Three semester credits. Not open for credit to students who offer English history for entrance; such students should take History 226 or some other three-hour College course in history. Assistant Professor Taylor.

This is a general survey of the whole field of English history with some emphasis on the modern period. It includes the outlines of political history and the essentials of English constitutional development. Special attention is given to the development of the empire, to the English background of American history, and to the industrial and social development of the English people. The work is based on Cheyney's *Short History of England*, with lectures and assigned readings.

123. HISTORY OF WESTERN EUROPE. Sophomore year, second semester. Class work, three hours. Three semester credits. Assistant Professor Taylor.

This is a general course in the history of Europe from the fall of Rome to the end of the Napoleonic era. It includes a study of medieval institutions, the rise of towns and commerce, the development of western nations, the Renaissance and the Reformation, the commercial and industrial revolution, and the expansion of Europe, and closes with a survey of France in the eighteenth century, the French Revolution, and the age of Napoleon. The work is based on a standard text with lectures and assigned readings.

126. CURRENT HISTORY. Freshman year, both semesters and summer school. Class work, one hour. One credit each semester. Open as elective for not to exceed a total of four semester credits. Assistant Professor James.

The content of this course differs each semester from that of any other semester. The text for the course is a good weekly magazine, such as *The Independent* or *The Outlook;* but this is supplemented by such monthly periodicals as *The Review of Reviews* and *World's Work*, together with the daily papers and some library references. The course is so conducted as to give a wide outlook on the world of to-day, and a better understanding of the conditions and institutions in the midst of which we live. It includes a study of as much of the everyday essentials of American and foreign governments, of international relations, of international law, of biography, of industrial developments, and of history—suggested each week by the events of the week—as can be crowded into

the one hour of the recitation period. It directs the student to good habits of news reading of the right sort.

127. TEACHERS' COURSE IN HISTORY. Elective, summer school. Class work, two hours. Two semester credits. Associate Professor Iles.

This is a seminar course of discussion based on Henry Johnson's *Teaching of History in Elementary and Secondary Schools,* together with Mace's revised work, *Method in History,* and supplemented by a study of the Report of the Committee of Seven, and of the Committee of Five on *History in the Secondary Schools,* and the Committee of Eight on *History in the Elementary Schools.* A critical examination is made of special books on methods in history and civics, such as Wayland's *How to Teach American History,* and of special articles in the *History Teachers' Magazine.* The different texts in history and civics are critically investigated as to points of excellence or weakness, including lectures on the content or viewpoint of each. Information is also given as to the best illustrative material and helps in the teaching of history and civics. The course reveals the evolution in the writing of history, and the growing importance of history and civics in the modern school curriculum, together with the improving viewpoint as to content of both the history and the civic courses.

FOR GRADUATES AND UNDERGRADUATES

202. AMERICAN HISTORY II (*or* WESTWARD EXPANSION AND SECTIONALISM). Elective, both semesters and summer school. Class work, three hours. Three semester credits. Professor Price.

This course concerns itself with the industrial conditions, the issues and the leaders of the middle period of our history, from the close of the War of 1812 to the Civil War. Among the subjects investigated are the industrial and political conditions in America in 1816; the Missouri Compromise; the antislavery agitation; the Webster-Hayne debate; South Carolina nullification; annexation of Louisiana, Florida, and especially Texas; the Mexican War, and the resulting preponderance of the slavery issue; the Compromise of 1850; the Kansas-Nebraska bill and the early Kansas struggle "to the stars through difficulties," including the various constitutions and the final admission to statehood; the origin of the Republican party; the election of 1860; and the events leading immediately to the secession of the Southern States. Instruction is by means of lectures, recitations, and readings, based on *An American History Notebook,* prepared by the Department.

203. AMERICAN HISTORY III (*or* THE NEW INDUSTRIAL AGE). Elective, second semester and summer school. Class work, three hours. Three semester credits. Professor Price.

This course opens with a review of the industrial conditions in America just before the Civil War; next a careful examination is made of the industrial effects of that war; finally a study of the political and constitutional history of the last half-century is made in the light of the industrial conditions and developments of the same period. Manufactures, commerce, and especially agriculture, are carefully examined, particularly with reference to the South and West. The new developments in political parties and the new devices in self-government are carefully studied as to developments, cause, and present conditions. The new America, with its spirit of nationality, its emphatic self-government, and its new world power and responsibility, are studied especially in the light of the new industrial developments. Instruction is imparted by lectures, recitations, assigned readings, and special reports.

204. AMERICAN AGRICULTURAL HISTORY. Elective, first semester and summer school. Class work, three hours. Three semester credits. Professor Price.

This course is intended primarily for students in the Division of Agriculture. It devotes itself chiefly to the history of American agriculture.

The course starts with a study of European background and Indian beginnings. It traces and compares the agricultural development of New England, the South and the central colonies during the colonial period; then follows the westward movement into the prairie regions of the Mississippi valley, with the distinctive American developments in methods, livestock and especially farm machinery. The course gives special consideration to the South with its cotton, to the Northwest with its wheat, to the Southwest with its livestock, and to the corn belt with its varied industries. A special study is made of the last quarter-century, when varied industries, more intensive farming and the high cost of living are replacing extensive mining of the soil, with its remarkable era of low cost of living, its sudden accumulation of wealth, and its rapid development of civilization. The relation of all this to our own State is constantly kept in view. This course should be supplemented by the course in American Political History. Instruction is given by lectures and recitations, readings and reports.

206. AMERICAN POLITICAL HISTORY. Elective, first semester. Class work, two hours. Two semester credits. This course is especially intended to supplement course 204 or course 105; it is not open for credit to students who have credit in course 202. Associate Professor Iles.

This course gives the story of the origin, development, leaders and function of political parties in America, and studies the issues and results of the more important presidential elections. It traces the growth of nationality and the development of self-government through American history, but with special reference to present tendencies. A very desirable course for any one who would understand and appreciate present political and governmental conditions and tendencies.

207. PAN-AMERICA. Elective, first semester. Class work, two hours. Two semester credits. Assistant Professor James.

The history, government and industrial conditions of Canada, Mexico and the South American nations, and the interrelations of each of those and the United States are studied in this course.

223. MODERN EUROPE (SINCE 1814). Sophomore year and elective, both semesters and summer school. Class work, three hours. Three semester credits. Associate Professor Iles.

This course traces the evolution of the modern European nations since 1814, with special attention to political organization, industrial development, and colonial expansion. Political problems and social and economic adjustments due to the Great War are included. Recitations, lectures and assigned readings. Text: Hayes's *A Political and Social History of Modern Europe*, Vol. II.

224. EUROPEAN INDUSTRIAL HISTORY. Elective, second semester. Class work, three hours. Three semester credits. Assistant Professor Taylor.

This course includes a survey of the industrial and social history of England and the European continent, with some reference to those regions which have been brought into touch with European industrial development. It begins with a view of conditions under the later Roman empire, followed by a study of the medieval manor, the rise of commerce and the towns, the growth of manufactures and the guilds, the development of the middle and laboring classes, the beginnings of modern industry and commerce, and the agricultural and industrial revolution. It closes with a somewhat detailed study of the social and industrial development of modern Europe to the most recent times. Special use is made of such texts as Cheyney's *Industrial and Social History of England*, Day's *History of Commerce*, and Ogg's *Economic Development of Modern Europe*, supplemented by lectures and assigned readings.

225. HISTORY OF THE HOME. Elective, second semester. Class work, three hours. Three semester credits. Miss Orem.

This course includes the history of the primitive family; the Hebrew family; the family life of the Greeks and of the Romans; and the history of the home and family during the Middle Ages, including the influence of the Christian church. Next the history of the English family in the seventeenth and eighteenth centuries and of the American colonial home are studied. This is followed by a study of the industrial revolution and its effects upon family life. Finally, the history of the family during the nineteenth century, the present situation and tendencies are examined. The course is based primarily on Goodsell's *History of the Family,* supplemented by lectures and special studies.

226. MODERN ENGLAND AND THE BRITISH EMPIRE. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Entrance credit in English history or three hours College credit in history, preferably History 121. Assistant Professor Taylor.

This course begins approximately with the accession of the Tudors in 1485. Special emphasis is placed on the beginnings and growth of world empire, England's part in international affairs, the economic and social history of the British Islands, and the changes by which England's government has become a practical democracy. The work closes with a survey of England and her empire as they exist to-day with their part in the World War. The course is based on Cross's *History of England and Greater Britain,* with lectures, assigned readings, and reports.

228. IMMIGRATION AND INTERNATIONAL RELATIONS. Elective, second semester. Class work, two hours. Two semester credits. Professor Price.

The title of the course suggests its content. It includes a study of the causes and the effects—economic, social, and political—of the coming of the foreigner to our shores, including the colonial period, the middle period, and the period since our Civil War, with special reference to the recent changes both as to character of the immigrants and the conditions in America. The text for this part of the course is Fairchild's *Immigration—A World Movement and Its American Significance.* The second part of the course is covered by lectures and assigned readings and reports.

229. THE ANCIENT WORLD. Elective, first semester. Class work, three hours. Three semester credits. Miss Orem.

This course is intended primarily for those who expect to teach this subject in the high schools. It includes a study of the ancient world, with special reference to its industries, art, literature, and government. The standard modern texts are used, and the student is familiarized with the best modern literature on the subject.

230. KANSAS HISTORY. Elective, second semester. Class work, two hours. Two semester credits. Assistant Professor Taylor.

This course covers the history of Kansas from the beginning down to the present time, with emphasis on the period of statehood. The conquest of the frontier, the building of the State, and the social, industrial, and political advance to the present day are studied. This is a library course, based on outlines and references prepared by the Department.

232. HISTORY OF BRITISH AGRICULTURE. Elective, second semester. Class work, three hours. Three semester credits. Assistant Professor Taylor.

This is a somewhat detailed study of agricultural developments in the British Islands, with considerable attention to affairs in the neighboring countries on the continent and in the outlying portions of the empire. Particular attention is given to the economic and social aspects of rural

and agricultural affairs in the British Islands in the modern period. The course is based on Prothero's *English Farming, Past and Present,* supplemented by lectures and assigned readings.

235*c*. SEMINAR IN AMERICAN INDUSTRIAL HISTORY. (Course *c* gives special emphasis to the period since 1890.) Elective, both semesters. Class work, two hours. Two semester credits. Assistant Professor Taylor.

This course comprises a detailed study of a brief period of American economic history, including agriculture, manufacture and commerce. By lectures and assigned reading the class obtains a general view of the period chosen for study. Each student is assigned a special topic for independent research and reports. A brief training is given in the elements of the methods of historical research and presentation very necessary for graduate work in history. The seminar is open to graduate students and to advanced undergraduates who have had sufficient training and can convince the instructor in charge that they can pursue the work creditably. As the period studied varies from term to term it is possible for a student to register for more than one semester's credit.

COURSES IN CIVICS

FOR UNDERGRADUATES

151. AMERICAN GOVERNMENT. Junior and senior years, both semesters and summer school. Class work, three hours. Three semester credits. Associate Professor Iles.

This course in civics, or actual government, reviews definitely the fundamental principles and operations of our State and national governments, including the essential principles of constitutional law, but gives special emphasis to the actual present-day conditions and movements in our governmental and political life. Among the subjects especially studied are the initiative and referendum, suffrage and primary elections, the recall, city government and government of territories, the regulation of commerce, conservation of national resources, national defense, taxation and finance, the actual methods of congressional activity, and the function, organization, power, and importance of political parties in our government. The course is primarily based on Beard's *American Government and Politics.* Throughout this course special and definite attention is given to recent and current events in governmental activities.

153. BUSINESS LAW I. Junior and senior year, both semesters. Class work, one hour. One semester credit; but see Business Law II. Assistant Professor Taylor.

This course includes a careful study of the essential principles in the law of contracts, of sales, and of negotiable instruments. It should be followed by Business Law II. Text: Huffcut's *Elements of Business Law.*

154. BUSINESS LAW II. Elective, both semesters. Class work, one hour. One semester credit. Prerequisite: Business Law I. Assistant Professor Taylor.

This course includes a careful study of the more fundamental principles of the law of agency, of insurance, of guarantee and damages; of partnership and corporations; of bailments, including common carriers; of torts, especially the law of negligence; and of patent rights. Text: Huffcut's *Elements of Business Law,* and the *Kansas Statutes.*

155. FARM LAW. Elective, both semesters. Class work, two hours. Two semester credits. Assistant Professor Taylor.

This course outlines the following subjects as far as the time permits; *First.* The title to the farm—deeds, etc.; boundaries of the farm—

fences, etc.; water rights, including irrigation; police power of the State —quarantine, destruction of diseased animals, pure food; live stock—liability of owner, trespassing animals, estrays. *Second.* Contracts, including hired help, etc.; farm crops and their ownership; renters; sales, including warranty, etc.; factors, or commission merchants; common carriers, such as railroads; insurance. The course is based on Green's *Law for the American Farmer*, supplemented by the *Kansas Statutes.*

FOR GRADUATES AND UNDERGRADUATES

252. COMPARATIVE GOVERNMENT. Elective, first semester. Class work, two hours. Two semester credits. Associate Professor Iles.

This course comprises a study of the leading features, especially with regard to administration, of certain European governments such as England, France and Germany, and a comparison of essential features with government in the United States. It is planned to supplement and round out the course in American Government. Text: Macy and Gannaway's *Comparative Free Government* or Holt's *Introduction to the Study of Government.*

256. INTERNATIONAL LAW. Elective, first semester. Class work, two hours. Two semester credits. Assistant Professor Taylor.

The fundamental principles of international law and international relations, and rights and obligations, public and private, in time of peace and in time of war, are studied, especially in the light of recent developments, such as the Hague conferences. Text: Stockton's *Outlines of International Law.*

Industrial Journalism and Printing

Professor CRAWFORD
Assistant Professor SNOW
Instructor KEITH
Assistant ALLEN

The work in industrial journalism and printing endeavors to accomplish two purposes: the preparation of students who expect to be leaders in industrial, economic, and social life to do occasional writing for newspapers and other periodicals on subjects of special interest; the training of students fundamentally interested in journalism for positions on farm journals, newspapers and other publications, particularly where writing on agriculture and other industrial subjects is in demand. The instruction given in the courses considers the requirements of newspapers, agricultural papers, trade publications, and general magazines. The work comprises lectures, discussions, and practice. *The Kansas Industrialist,* the official paper of the College, is under the editorial and mechanical direction of the professor of industrial journalism and superintendent of printing. In it is published acceptable matter prepared by students, who write also for newspaper and other publications.

Attention is given to the mechanical side of the profession in the instruction in printing, two semesters of which are required of all students taking the curriculum in industrial journalism. Printing has been taught in the institution continuously since 1875—the longest period during which instruction in the subject has been given in any American college. Practical work is done not only on *The Kansas Industrialist,* but in a wide variety of job printing for College departments.

The equipment for instruction in journalism and printing is that of

a practical publishing and printing plant. The journalism work room contains typewriters, reference books, "morgue," and files of a large number of agricultural publications, newspapers, and trade journals.

The printing plant contains one two-revolution cylinder press, one drum-cylinder press, three platen presses, two wire-stitching machines, two paper cutters, a folding machine, an interchangeable perforating and punching machine, a quantity of both display and body type, including some of the most modern faces, and a large amount of miscellaneous equipment. All power machines are driven by individual electric motors.

A large amount of timely agricultural and other information is furnished regularly to Kansas newspapers, farm journals, and other publications. Special assignments are covered for these periodicals, and special inquiries are answered.

COURSES IN INDUSTRIAL JOURNALISM AND PRINTING

FOR UNDERGRADUATES

101. PRINCIPLES OF TYPOGRAPHY I. Freshman year, first semester. Class work, two hours; laboratory practice, three hours. Three semester credits. Mr. Keith.

The course comprises a study of the case, the point system, and the measurement of type and stock. The history of printing is presented and a study is made of the development of the various typographical styles. Practice is given in setting straight matter. Emphasis is laid on accuracy.

104. PRINCIPLES OF TYPOGRAPHY II. Freshman year, second semester. Class work, two hours; laboratory practice, three hours. Three semester credits. Mr. Keith.

The work of the preceding term is continued, a study being made of type faces and the typography of advertisements and head display. The principles of effective make-up are treated. The use of cost systems in printing offices receives extensive attention.

107. ELEMENTARY JOURNALISM. Sophomore year, both semesters. Class work, two hours. Two semester credits. Assistant Professor Snow.

The course is intended to give the student practical experience in the fundamentals of news writing. Methods of obtaining news of various types, the writing of the lead, and the general style of the news story are carefully considered.

113. INDUSTRIAL WRITING. Sophomore year, second semester. Class work, two hours. Two semester credits. Prerequisite: Elementary Journalism. Assistant Professor Snow.

This course applies the principles of journalism to the treatment of industrial subjects, such as are found in agriculture, engineering, home economics, and more general scientific research. The work of the College and the Experiment Station affords the basis for the study and practice.

121. AGRICULTURAL JOURNALISM. Junior year, both semesters. Class work, one hour. One semester credit. Professor Crawford and Assistant Professor Snow.

The course is intended to supply students in the course in agriculture with sufficient knowledge of the principles of news writing, as applied to

agriculture, to enable them to become occasional contributors to newspapers and farm journals. Much practice in agricultural writing is given in the course.

123. INDUSTRIAL FEATURE WRITING. Junior year, first semester. Class work, two hours. Two semester credits. Prerequisite: Industrial Writing. Assistant Professor Snow.

The course takes up the feature story, with careful attention to both the informative and the entertaining type. The principles underlying the feature story are applied to writing on agricultural and other industrial subjects. The demands of newspapers, farm journals and general magazines for writing of this character are analyzed.

125. PRINCIPLES OF ADVERTISING. Junior year, second semester. Class work, three hours. Three semester credits. Prerequisite: Industrial Feature Writing. Associate Professor Davis of the Department of English.

The course considers the fundamentals of advertising as a part of modern business. The study of the goods to be advertised, the analysis of the market, the psychology of advertising, the preparation of advertising copy, and other important matters are taken up. The student is required to make application of the principles brought out in the course.

130. TECHNICAL JOURNALISM. Junior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Industrial Feature Writing. Professor Crawford.

The course deals specifically with agricultural journals, trade journals, and other publications of highly specialized character. The writing which is done in the course is done for publications of these types, and the students are required to submit their material to editors. A beginning is made in the study of the desk work required on a technical journal, including the handling of copy, the use of illustrations, and the principles of make-up from the editorial standpoint.

110, 116, 127, 133. JOURNALISM PRACTICE I, II, III, IV. These courses comprise laboratory practice accompanying courses 107, 113, 123, 130. Sophomore and junior years. Six hours. Two semester credits for each course. Prerequisite for each semester is the work of all preceding semesters in Journalism Practice. Professor Crawford and Assistant Professor Snow.

The work in Journalism Practice follows closely the other courses in journalism with which it is taken. Students are required to gather news, both assigned and unassigned, and to write the stories in the Department workroom. The College campus is divided into "runs," which the students must cover at regular intervals, and assignments are given at specific times. The work given is suited to the advancement of the student. As he progresses in his work he is required not only to obtain news and feature stories, but to edit copy, to read proof, to write heads, to prepare editorials, to select matter worthy of reprint, and to perform other duties required in newspaper and magazine offices. Emphasis is laid on popular treatment of industrial subjects. The instructor in charge gives the students training in looking up references and in handling technical subjects simply but accurately, and also makes specific criticism on the work done by the students.

FOR GRADUATES AND UNDERGRADUATES

201. CIRCULATION AND ADVERTISING PROMOTION. Senior year, first semester. Class work, three hours. Three semester credits. Prerequisite: Technical Journalism. Professor Crawford.

This course deals with the business management of periodical publications. The building up of circulation and the soliciting of advertising

receive special emphasis. Premiums and other plans for increasing circulation are discussed. The advertising agency, the circulation analysis, and the fixing of advertising rates are treated.

204. COPY READING. Senior year, first semester. Laboratory practice, six hours. Two semester credits. Prerequisite: Technical Journalism. Professor Crawford.

The course continues the work begun in Technical Journalism and gives practice in the work required of the copy reader, whether on a newspaper, an agricultural journal, or some other publication. A study is made of newspaper style and of magazine and book style, the distinction between the two being clearly pointed out. The writing of heads and titles and proof-reading receive detailed attention. A large amount of copy is actually handled in class, and papers of various types are made up as practice assignments.

207. EDITORIAL PRACTICE. Senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Copy Reading. Professor Crawford.

The course deals not only with the writing of editorials suitable for farm papers, trade papers and newspapers, but with the conduct of the editorial offices of a periodical publication. Students obtain instruction and practice in writing the matter commonly prepared by the editorial staff of a paper, including editorials, paragraphs, and exchange matter. The acceptance and rejection of contributions receive consideration. Editorial policies and their influence form the subject of careful discussion.

210. ETHICS OF JOURNALISM. Senior year, second semester. Class work, two hours. Two semester credits. Prerequisite: Circulation and Advertising Promotion. Professor Crawford.

The course treats ethics of journalism as exemplified in the use of contributed matter, in the work of the reporter or staff writer, in the editorial conduct of the paper, and in the handling of circulation and advertising. The federal and state laws relating to periodical publications, to advertising, to libel, and to authors' rights, including the federal law of copyright, are treated. The attitude of periodical publications on matters of ethics and law is observed at first hand by the students.

213. MATERIALS OF JOURNALISM. Elective, first semester. Class work, two hours. Two semester credits. Assistant Professor Snow.

This is a course intended primarily for the general student who desires to obtain a knowledge of the principal newspapers and magazines, and to be able to form judgments as to the accuracy and adequacy of news reports and other published matter. The materials handled by the publications, the methods of treatment, and the character of the editorial comment are carefully presented. Attention is given to the several types of journalism.

216. MAGAZINE FEATURES. Elective, second semester, on permission of the instructor. Two semester credits. Assistant Professor Snow.

The course is intended for advanced students who desire to prepare literary work suitable for publication in magazines. The matter of the courses is varied to suit the needs and desires of the students, emphasis being laid upon such types of magazine writing as members of the class wish to practice.

219. HISTORY OF JOURNALISM. Elective, first semester. Class work, two hours. Two semester credits. Professor Crawford.

The course deals with the history of journalism from its beginning and with the history of printing so far as this is concerned with periodical publications. Most of the time of this course is given to journalism in England, Canada and the United States, though some attention is

given to publications of other countries. The differentiation of journalism in the nineteenth century, and the several types which arose because of this are the subjects of careful study. Particular attention is given to the fields of agricultural and trade journalism.

222. JOURNALISM SURVEYS. Elective, second semester. Laboratory work, six hours. Two semester credits. Professor Crawford.

This course comprises the careful investigation of the periodical reading matter of communities. The information obtained is carefully tabulated, and studies are made of the relation of the reading matter to the industrial, economic, social, and moral life of the communities.

225. CURRENT PERIODICALS. Elective, first semester. Class work, two hours. Two semester credits. Professor Crawford.

The course comprises a study of current periodicals of various types. Special emphasis is laid on the material that they contain and the nature of its appeal to the reader. It is a nontechnical course, intended to give general students some knowledge of the field of current periodical literature.

Library Economy

Librarian SMITH
Assistant Librarian DERBY
Reference Assistant O'BRIEN
Reference Assistant LANCEFIELD

The library supplements the work of every department of the College. It is a storehouse of knowledge for every student. It supplies information and the latest results of scientific research for every instructor. The library is thus essential to the College, forming, as it were, a center from which its various activities radiate.

In order that the library may perform its functions with the highest degree of efficiency it is necessary that instruction be given regarding its use. With this thought in mind a course is offered the purpose of which is to familiarize the student with scientific, up-to-date methods in the use of books and to acquaint him with the best general reference books as well as with standard works on various subjects. Placed at the beginning of his College course it should tend to increase largely his efficiency in study throughout the entire course.

COURSES IN LIBRARY ECONOMY

FOR UNDERGRADUATES

101. LIBRARY METHODS. Freshman year, both semesters. Class work, one hour. One semester credit. Assistant Librarian Derby, Miss O'Brien and Miss Lancefield.

The course consists of lectures on classification and arrangement of books in the library; card catalogues; the principal works of reference, such as dictionaries, encyclopedias, atlases, and standard works in history, literature, economics, quotations, statistics, etc.; public documents and their indexes; indexes to periodicals, etc. Instruction is given also in methods of indexing current reading for purposes of future reference.

Mathematics

Professor REMICK
Associate Professor WHITE
Assistant Professor STRATTON
Instructor ZEININGER
Instructor FEHN
Instructor HOLROYD

In an institution that stands as an exponent of the industrial type of education, mathematics should occupy an important place. Training in the exact science is valuable not only for its own sake but also on account of its manifold applications. On this basis the courses in mathematics are offered primarily with the following ends in view: (1) the attainment of mental power and accuracy in the interest both of general culture and special application; (2) the acquirement of facts and processes that will provide the student with an indispensable tool for further scientific and technical study.

COURSES IN MATHEMATICS

FOR UNDERGRADUATES

101. PLANE TRIGONOMETRY. Freshman year, first and second semesters. Class work, three hours. Three semester credits. Prerequisites: Plane geometry and one and one-half years of high-school algebra. Professor Remick, Associate Professor White, Assistant Professor Stratton, and Mr. Fehn.

This course treats of the functions of acute angles, right triangles, goniometry, oblique triangles, practical problems. Text: Palmer and Leigh's *Plane and Spherical Trigonometry.*

104. COLLEGE ALGEBRA. Freshman year, first and second semesters. Class work, three hours. Three semester credits. Prerequisites: Plane geometry and one and one-half years of high-school algebra. Professor Remick, Associate Professor White, Assistant Professor Stratton, and Mr. Fehn.

Elementary topics, functions and their graphs, quadratic equations are rapidly reviewed. The further treatment includes the subjects of complex numbers, theory of equations, permutations and combinations, partial fractions, logarithms, and determinants. Text: Hawke's *Higher Algebra.*

107. COLLEGE ALGEBRA (*a*). Freshman year, first semester. Class work, five hours. Five semester credits. Prerequisites: Plane Geometry and one year of high-school algebra. Professor Remick, Associate Professor White, Assistant Professor Stratton, and Mr. Fehn.

After a brief review of elementary subjects, a thorough treatment of quadratics, ratio, proportion, progressions, and the binomial theorem for positive exponents is given. The remainder of the course follows closely the chief content of course 104. Text: File's *College Algebra.*

110. PLANE ANALYTICAL GEOMETRY. Freshman year, second semester. Class work, four hours. Four semester credits. Prerequisites: Plane Trigonometry and College Algebra. Associate Professor White, Assistant Professor Stratton.

This course treats of coördinate systems, projections, loci, straight line, conics, parametric and empirical equations, with a discussion of the general equation of the second degree. Text: Bailey and Wood's *Analytic Geometry.*

113. CALCULUS I. Sophomore year, first semester. Class work, five hours. Five semester credits. Prerequisite: Plane Analytical Geometry. Professor Remick and Associate Professor White.

The usual topics of differential calculus will be considered together with integration of standard forms, definite integrals, rational fractions, and integration by parts. This course contains problems closely related to the work of engineering students. Text: Phillip's *Differential and Integral Calculus.*

116. CALCULUS II. Sophomore year, second semester. Class work, three hours. Three semester credits. Prerequisite: Calculus I. Professor Remick and Associate Professor White.

In this division of the subject emphasis is laid upon the applied side. Problems involving areas, lengths, surfaces, and volumes are treated by processes of single integration. The idea of successive and partial integration is applied to areas, neoments, centers of gravity, surfaces, volumes, etc. The types of differential equations which the student of engineering is most likely to meet with in his subsequent work are briefly discussed. Text: Phillip's *Differential and Integral Calculus.*

119. CALCULUS. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Analytical Geometry. Professor Remick and Associate Professor White.

This course is designed especially for students intending to teach secondary mathematics. It includes a brief treatment of the fundamental principles of both branches of the calculus, practice with the standard formulas of differentiation and their application to geometry and mechanics. Integration of the usual elementary forms is followed by the idea of the definite integral and a few of the more important applications.

122. TEACHERS' COURSE IN MATHEMATICS. Elective, second semester. Class work, three hours. Three semester credits. Assistant Professor Stratton.

As its name indicates, this course is intended primarily for those who are planning to teach elementary mathematics. Emphasis is given to pedagogical questions, with some reference to the historical course of development. A discussion of the best methods of teaching arithmetic, algebra, and geometry; a study of the report of prominent mathematical organizations, especially those of the international commission; a comparison of the curricula of different schools—these are some of the matters which receive attention. An examination is made of books and articles on the teaching of mathematics. The course proceeds by lectures, readings, and reports on assigned topics.

125. ANALYSIS OF STATISTICS. Elective, first semester. Class work, three hours. Three semester credits. Professor Remick and Assistant Professor Stratton.

The special purpose of this course is to acquaint students of agriculture, who may have occasion to make use of statistical tables of various sorts, with the modern mathematical methods of treatment. Use is made of farm bulletins, agricultural reports, etc., by means of lectures, reading, and recitations.

128. MATHEMATICS OF BIOLOGY. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Analytical Geometry. Professor Remick.

Elements of differential and integral calculus, curve plotting, and determination of equations of curves, are here considered. The course is designed to meet the needs of students in biology and is taught largely by the lecture method.

131. INSTITUTIONAL ACCOUNTING. Elective, second semester. Class work, three hours. Three semester credits. Assistant Professor Stratton.

This course treats of accounting for institutions such as colleges, schools, clubs, societies, industrial and social organizations. The practice work includes preparation for publication of statements of income and expenditure, balance sheets, treasurer's reports, financial data and statistics, and of the annual returns of net income required under the federal income-tax law. A study is made of the mathematics of investments, the handling of endowment and trust funds, and the preparation of budgets. The work proceeds by lectures, discussions, written reports, and exercises.

FOR GRADUATES AND UNDERGRADUATES

201. DIFFERENTIAL EQUATIONS. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Calculus II. Professor Remick.

This course is designed for those who may wish to extend their study of mathematics beyond the usual first course in calculus, and also for those intending to take advanced work in physics, mechanics, or engineering. The various standard types of differential equations are considered together with the usual applications. Text: Murray's *Differential Equations.*

204. METHOD OF LEAST SQUARES AND THEORY OF MEASUREMENT. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Calculus II. Professor Remick and Associate Professor White.

This course includes a study of the law of error based on the theory of probability and the probability curve. Adjustments of observations by the method of least squares. Development of precision measures. Distribution of errors. Gauss's method of substitution in the solution of normal equations. The solution of a number of problems will be required.

207. SOLID ANALYTICAL GEOMETRY. Elective, second semester. Class work, three hours. Three semester credits. Prerequisites: Plane Analytical Geometry and Calculus II. Associate Professor White.

The topics treated include coördinates of points in space and their transformations, and involve the usual discussion of lines and planes. The standard types of quadric surfaces are considered together with their classification and principal properties. Text: Snyder and Sisam's *Analytical Geometry of Space.*

FOR GRADUATES

In addition to the preceding courses, more advanced work in mathematics is offered for candidates for the master's degree. Courses are available in the following subjects: 301, Advanced Calculus; 306, Theory of Equations; 311, Theory of Functions of a Complex Variable; 316, Modern Analytical Geometry; and 321, Theoretical Mechanics.

Military Training

Captain W. P. J. O'Neill (U. S. A.), Professor of Military Science and Tactics, Commandant of Cadets
Major W. B. Wendt (K. S. A. C.), Assistant Commandant
Captain R. H. Brown (K. S. A. C.), Bandmaster

Since this College is one of the beneficiaries of the act of Congress of 1862, military tactics is required in the College curriculum. All young men, not physically disqualified, of age are required to take military science three full hours a week for two years. A student entering as a junior or above is held for military science for the time necessary to complete the remainder of his College course unless this period is reduced by credits accepted from another institution.

Requests for excuse from military science, or for postponement of the work, are acted upon by the President of the College. Such requests are presented through the student's dean, and the President obtains the advice of the commandant of cadets, who thoroughly investigates each case on its merits and makes his recommendation to the President. Requests based on physical condition must be accompanied by a recommendation made by the College physician. Students excused from military science on account of physical disability or age are assigned to an equivalent amount of some other College work instead. Students permitted to postpone military science for any reason are not thereby excused but must make it up later, even though they have in the meantime reached the age of twenty-five years.

The act of Congress of June 3, 1916, known as the national defense act, provides for the establishment in civil institutions of a Reserve Officers' Training Corps (R. O. T. C.).

The object of this provision is stated as follows:

"The primary object of establishing units of the Reserve Officers' Training Corps is to qualify, by systematic and standard methods of training, students at civil institutions for reserve officers. The system of instruction herein prescribed presents to these students a standard measure of that military training which is necessary in order to prepare them to perform intelligently the duties of commissioned officers in the military forces of the United States, and it enables them to be thus trained with the least practicable interference with their civil careers."

"Units of the senior division may be organized at civil institutions which require four years' of collegiate study for a degree, including State universities and those State institutions that are required to provide instruction in military tactics under the provisions of the act of Congress approved July 2, 1862, donating lands for the establishment of colleges where the leading object shall be practical instruction in agriculture and the mechanic arts, including military tactics."

"Units of the junior division may be organized at any other public or private educational institution."

An infantry unit of the Reserve Officers' Training Corps has been established in this College, the senior division consisting of men in the four years' College curriculum and the junior division consisting of the men in the School of Agriculture.

Provided the necessary appropriation of funds is made by Congress, members of the R. O. T. C. will receive the benefits mentioned below:

1. JUNIOR DIVISION (School of Agriculture). Each student of these classes will be furnished free one uniform. When this uniform, or any article of it, has been worn out by ordinary wear and tear, and condemned, it will be replaced without expense to the student. The student incurs no obligation except that of properly caring for his uniform and equipment.

2. SENIOR DIVISION, BASIC COURSE (Freshmen and Sophomores). Same as the Junior Division.

3. SENIOR DIVISION, ADVANCED COURSE (Juniors and Seniors). The student who continues in the R. O. T. C. during his junior and senior years will receive the following benefits:

He will receive the uniform referred to above, on the same terms.

He will be furnished commutation of subsistence, estimated to amount to seven or nine dollars a month, provided he executes an agreement to continue in the R. O. T. C. during the remainder of his college course, and to take the course of camp training during such period, prescribed by the Secretary of War. The camps referred to involve no expense on the part of the student.

After graduation he will be eligible for appointment by the President of the United States as a reserve officer of the Army, and if so appointed he may, under certain conditions, be appointed and commissioned as a temporary second lieutenant in the regular army for a period of six months, with pay at the rate of $100 per month, with the usual allowances.

In order to continue in the R. O. T. C. during his junior and senior years, the student must have the recommendation of the President of the College and the commandant of cadets.

The corps of cadets at present is organized as a regiment of infantry, consisting of two battalions of four companies each. A military band is also provided for, the members of which must be thoroughly trained in military tactics. Assignments to the military band are made upon recommendation of the bandmaster, who has charge of the technical instruction.

Officers and noncommissioned officers are selected from the seniors and juniors by the commandant of cadets, with the approval of the President of the College. This selection is made from among those cadets who have been most studious and soldierlike in the performance of their duties, and the most exemplary in their general deportment. Commissions are given all officers, and these commissions are signed by the governor, the secretary of state and the adjutant-general of the Kansas National Guard, while warrants signed by the President of the College and the commandant of cadets are issued to the noncommissioned officers. Both are held during the good conduct of the recipient.

Juniors and seniors who are regularly enrolled in the advanced course of the senior division receive two semester credits of elective work toward graduation for each semester of military training taken beyond the basic course.

COURSES IN MILITARY TRAINING

SENIOR DIVISION, R. O. T. C.

BASIC COURSE

101. MILITARY SCIENCE I. Freshman year, first semester. Lectures, recitations, and military drill, three hours a week. One semester credit. Prerequisite: None.

(*a*) *Practical.* Physical drill; infantry drill; school of the soldier, squad and company in close and extended order; preliminary instruction, sighting, position and aiming drills, gallery practice, nomenclature and care of rifle and equipment.

(*b*) *Theoretical.* Theory of target practice, individual and collective military organization; map reading; service of security; personal hygiene.

102. MILITARY SCIENCE II. Freshman year, second semester. Lectures, recitations and military drill, three hours a week. One semester credit. Prerequisite: Military Science I.

(*a*) *Practical.* Physical drill; infantry drill; school of the battalion; ceremonies; manuals; bayonet combat; entrenchment; first-aid instruction; range and gallery practice.

(*b*) *Theoretical.* Lectures on military policy as shown by military history of the United States, and military obligation of citizenship; service of information; combat; Infantry Drill Regulations, to include the School of the Company; camp sanitation for small commands.

103. MILITARY SCIENCE III. Sophomore year, first semester. Lectures, recitations and military drill, three hours a week. One semester credit. Prerequisite: Military Science II.

(*a*) *Practical.* Same as 102 (*a*); combat firing.

(*b*) *Theoretical.* Infantry Drill Regulations, to include the School of the battalion and combat; Small Arms Firing Regulations; lectures as in 102 (*b*); map reading; camp sanitation and camping expedients.

104. MILITARY SCIENCE IV. Sophomore year, second semester. Lectures, recitations and military drill, three hours a week. One semester credit. Prerequisite: Military Science III.

(*a*) *Practical.* The same as 102 (*a*); signaling; semaphore and first aid; sand table work; range practice.

(*b*) *Theoretical.* Lectures on recent military history; service of information and security; marches and camping.

ADVANCED COURSE

105. MILITARY SCIENCE V. Junior year, first semester. Lectures, recitations and military drill, five hours a week. Three semester credits. Prerequisites: Military Science IV.

(*a*) *Practical.* Duties consistent with rank of cadet officers or noncommissioned officers in connection with courses 101, 102, 103, and 104; military sketching.

(*b*) *Theoretical.* Minor tactics; field orders; map maneuvers. Company administration, general principles, papers and returns; military history.

106. MILITARY SCIENCE VI. Junior year, second semester. Lectures, recitations and military drill, five hours a week. Three semester credits. Prerequisite: Military Science V.

(*a*) *Practical.* Same as course 105 (*a*).

(*b*) *Theoretical.* Minor tactics; map maneuvers continued; elements of international law; property accountability and method of obtaining supplies and equipments.

107. MILITARY SCIENCE VII. Senior year, first semester. Lectures, recitations and military drill, five hours a week. Three semester credits. Prerequisite: Military Science VI.

(*a*) *Practical.* Same as course 105 (*a*).

(*b*) *Theoretical.* Tactical problems; map maneuvers; proceedings of court-martial; international relations of America from discovery to present day; gradual growth of principles of international law embodied in American diplomacy, legislation and treaties; psychology of war and kindred subjects; general principles of strategy to show relations between the statesman and the soldier.

108. MILITARY SCIENCE VIII. Senior year, second semester. Lectures, recitations and military drill, five hours a week. Three semester credits. Prerequisites: Military Science VII.

(*a*) *Practical.* Same as course 105 (*a*).

(*b*) *Theoretical.* Tactical problems; map maneuvers; rifle in war; lectures on military history and policy.

Modern Languages

Professor CORTELYOU
Instructor LIMPER
Assistant HESSE

The study of modern foreign languages serves a number of purposes. It gives the student general training and culture; it throws helpful side lights upon English, his mother tongue; and it gives him important aid in scientific research. It is desired that the instruction in modern languages here given be as practical as possible, without, however, failing to encourage an appreciation of modern foreign literature. The plan of instruction in general is a combination of the grammatical and conversational methods, each of which has its own special advantages.

A number of literary and scientific periodicals published in German and French are received by the College library, and afford the student an excellent opportunity to amplify his reading knowledge of these languages.

Students who have had German or French in the high school are required, as a rule, to take more advanced courses as their electives or required work in foreign languages here.

A realization of the growing importance of our relations with Spanish-speaking peoples has led to the introduction of Spanish courses, which may be taken as electives.

COURSES IN GERMAN

FOR UNDERGRADUATES

101. GERMAN I. Sophomore year and elective, both semesters and summer school. Class work, three hours. Three semester credits. Professor Cortelyou and Mr. Limper.

After two periods given to the acquisition of the sounds of the German letters, the student at once begins reading. Vocabularies are learned from the outset, while grammar is acquired gradually through reading. Oral and written work and simple conversational exercises begin with the first reading lesson. In the work of this term there is

included the study of articles, declensions of nouns and pronouns, the indicative mode of weak verbs, sentence order, and the comparison of adjectives. Frequent reviews enable the student to digest the facts presented, while the abundant conversation and written work subserves the same end. Text: Vos's *Essentials of German* (first eighteen lessons).

106. GERMAN II. Sophomore year, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisite: German I. Professor Cortelyou and Mr. Limper.

The remaining important points of grammar are studied. Students are repeatedly drilled on the grammatical constructions already emphasized in Elementary German I. The general plan of the work is the same as in the preceding course. Essential facts of grammar are insisted upon, but German is taught as a living language. Conversational exercises in German and written translation from English into German are frequent. Text: Vos's *Essentials of German* (completed).

111. GERMAN READINGS. Junior year and elective, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisite: German II. Professor Cortelyou and Mr. Limper.

This course embraces readings of easy, idiomatic selections from modern authors. Grammatical drill is continued. German conversations based on the texts read are frequent. In this course also the student learns to read and to write German script. Text: *Aehrenlese*, by Bierwirth and Herrick.

FOR GRADUATES AND UNDERGRADUATES

201. GERMAN SHORT STORIES. Elective, both semesters. Class work, three hours. Three semester credits. Prerequisite: German Readings. Given in the year 1917-'18 and alternate years thereafter. Professor Cortelyou and Mr. Limper.

The material read in this course comprises a number of short stories of considerable interest, by such modern authors as Auerbach, Niese, Goldhammer, von La Roche, von Leander, von Scheffel, and von Polenz. Text: Baker's *German Stories*.

206. GERMAN COMEDIES. Elective, both semesters. Class work, three semester credits. Prerequisite: German Readings. Given in the year 1918-'19 and alternate years thereafter. Professor Cortelyou and Mr. Limper.

The course comprises the reading of recent one-act comedies of literary merit, and of a realistic, lively and cleanly humorous nature, including the following: Julius Rosen's *Ein Knopf*, Gustav von Moser's *Ein amerikanisches Duell*, Hugo Mueller's *Im Wartesalon erster Klasse*, Emil Pohl's *Die Schulreiterin*, and Alexander Elz's *Er ist nicht eifersuechtig*. Exercises in conversation and sight reading are occasionally introduced. Texts: Manley and Allen's *Four German Comedies* and Elz's *Er ist nicht eifersuechtig*.

216. GERMAN HISTORICAL PROSE. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Course 201 or 206. Given in the year 1917-'18 and alternate years thereafter. Professor Cortelyou.

In this course an insight is obtained of the Prussian government, administration of justice, military system, economic development, and strivings toward national unity as they existed at the time of Frederick the Great. Text: Rogge's *Der grosse Preussenkoenig*, edited by Adams.

221. GERMAN PROSE I. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Course 201 or 206. Given in the year 1918-'19 and alternate years thereafter. Professor Cortelyou.

This is a practical course designed to give the student an intimate

knowledge of everyday German as used among the Germans in their varied activities. The following are studied in this course: visits; the various stores; restaurants, meals, and expressions used at table; boarding houses and hotels; the family, weddings, marriages, etc.; dress; the school system; religion and church life; divisions of society, occupations; money, measures, and weights; festivities; traveling; the postal system, the telegraph, the telephone; the city in general; Berlin and cities of the provinces; the country; the German empire; the military system; conversational phrases; the best German; everyday German. There are occasional sight translations, and some conversational work is done. Text: Kron's *German Daily Life.*

226. GERMAN CLASSICS. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Course 216, 221, or 231. Given in the year 1917-'18 and alternate years thereafter. Professor Cortelyou.

This is a course introductory to a study of the German classics. Two or three of the simpler works of classic authors, such as Lessing's *Minna von Barnhelm* and Goethe's *Hermann und Dorothea,* are translated in the work of this term. Textbooks: Lessing's *Minna von Barnhelm,* edited by von Minckwitz and Wilder, and Goethe's *Hermann und Dorothea,* edited by Allen.

231. GERMAN PROSE II. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Course 201 or 206. Given in the year 1918-'19 and alternate years thereafter. Professor Cortelyou.

This course is designed to give the student facility in the rapid translation of fairly easy prose. A number of modern short stories are read. Besides the more formal work, there are sight translations of easy selections. Text: Allen and Batt's *Easy German Stories,* Vols. I and II.

236. SCIENTIFIC GERMAN I. Elective, first semester. Class work, three hours. Three semester credits. Prerequisite: Course 201 or 206. Professor Cortelyou.

This course is designed as an introduction to the vast field of scientific publications appearing in German. It consists chiefly in translating miscellaneous scientific articles, especially those dealing with chemistry and physics. Text: Dippold's *Scientific German Reader.*

241. SCIENTIFIC GERMAN II. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: Course 236. Professor Cortelyou.

This is a continuation of the preceding course. The material studied is of a more general nature than in course 236. Text: Greenfield's *Technical and Scientific German.*

COURSES IN FRENCH

FOR UNDERGRADUATES

151. FRENCH I. Sophomore year and elective, both semesters and summer school. Class work, three hours. Three semester credits. Mr. Limper and Miss Hesse.

The phonetic symbols being a great help in the acquisition of accurate pronunciation, the first two days are devoted to learning these symbols and a number of useful expressions in French. The recitations are conducted largely in French and considerable time is devoted to conversation. Nevertheless, conversation is considered merely a means to the acquisition of a reading knowledge of French. The fundamentals of grammar are covered in this semester and reading matter in the grammar is supplemented by a reader. Text: Olmsted's *Elementary French Grammar* (first twenty-two lessons) and Allen and Schoell's *French Life* (thirty pages).

156. FRENCH II. Sophomore year and elective, both semesters and summer school. Class work, three hours. Three semester credits. Prerequisite: French I. Mr. Limper and Miss Hesse.

This course is a continuation of French I. The grammar is completed, special attention being given to irregular verbs. Reading and conversation are continued throughout the course. Students who have had one year of French in high school begin with this course. Texts: Olmsted's *Elementary French Grammar* (Lesson XXII to the end) and Allen and Schoell's *French Life*.

161. FRENCH READING. Junior year and elective, first semester and summer school. Class work, three hours. Three semester credits. Prerequisite: French II. Mr. Limper and Miss Hesse.

This is essentially a reading course, the purpose being to enlarge the student's vocabulary. Grammar is reviewed and considerable time is devoted to conversation. Fontaine's *En France* and one other short French text are read.

FOR GRADUATES AND UNDERGRADUATES

251. FRENCH SHORT STORIES. Elective, second semester. Class work, three hours. Three semester credits. Prerequisite: French Readings. Mr. Limper and Miss Hesse.

The purpose of this course is to introduce the student to modern French literature. The modern short story, since it covers so large a range of subjects, also offers excellent material for the enlargement of the vocabulary. Stories by such writers as Daudet, Maupassant and Zola are read.

COURSES IN SPANISH

FOR UNDERGRADUATES

176. SPANISH I. Elective, first semester. Class work, three hours. Three semester credits. Miss Hesse.

In this course nouns, adjectives, pronouns, demonstratives, and numerals are treated and the indicative of verbs is studied. The course is largely conducted in Spanish, the student gradually acquiring a fair-sized and practical vocabulary. Text: Hills and Ford's *First Spanish Course* (first thirty-one lessons).

181. SPANISH II. Elective, second semester. Class work, three hours. Three semester credits. Miss Hesse.

In addition to study of grammar, which is here completed, considerable reading is done. Stress is laid upon training the ear to understand spoken Spanish. Texts: Hills and Ford's *First Spanish Course* (completed), and Bergé-Soler and Hatheway's *Elementary Spanish-American Reader*.

FOR GRADUATES AND UNDERGRADUATES

276. SPANISH READINGS. Elective, first semester. Class work, three hours. Three semester credits. Miss Hesse.

A thorough study is made of one or two of the best works in Spanish literature from the more modern writers. One hour a week is devoted entirely to conversation and composition, the subjects being taken from current topics of the day.

Music

Professor WESTBROOK
Associate Professor BROWN
Instructor ABERNETHY
Instructor BUGBEY
Instructor JOHNSTON
Instructor KIMMELL
Instructor SMITH
Miss HUGHES

The aim of the Department of Music is to become of vital value in the life of every student. The department strives to create and foster a love and appreciation for the best in music and to give to students that broader culture and more complete education which is gained through academic and professional and vocational training combined with musical and artistic study. Believing that this can be accomplished to a much greater degree by having artistic performers among us, courses are offered which will prepare those who so desire to be efficient in some chosen musical line. Students enrolled in the Department participate in the musical contributions to the public programs of the College, and such participation is a part of their training and duty.

METHODS OF INSTRUCTION

Instruction in voice and instrumental music is taught in private lessons. No two students have the same mental, physical or artistic capacity, and their individual capabilities can be neither properly nor fully developed without painstaking personal attention. The best results are dependent on a close adaptation to the individual needs of the pupils, and this, of course, can not be gained in classes, as is the case in the individual lessons. The effectiveness of the methods used is demonstrated by the interest and progress of the pupils.

All theoretical work is taught in classes. These and other classes in the Department of Music are free to any student in the institution.

CREDITS

Students taking work in the Department of Music are allowed credits on their work in the Divisions of General Science, Home Economics, and Agriculture, while substitutions in music, with the approval of the Dean, may be made in the Division of Mechanic Arts, as follows: For Voice or some instrument, two hours each semester; for Musical History, one hour each semester; for Harmony, two hours each semester; for Counterpoint, Musical Form and Musical Analysis, two hours each semester; for Chorus, Orchestra or Band, one hour each semester; for Public School Music Methods, two hours each semester; for Ear Training, one hour each semester. Young women electing music instead of the second year of physical training may choose among the subjects offered by the Department of Music any combination which is the equivalent of two hours of work, the subjects chosen to be approved by the professor of music.

Students coming from other schools to take up our course in applied music may be sufficiently advanced as players or singers to enter the second or third year of the regular course but prohibited therefrom owing to their lack of theoretical knowledge. If such students enter the

first year of the theoretical course, their progress as players and singers is not retarded, but it would be much to their advantage to make special theoretical preparation in the hope of qualifying for more advanced standing.

CURRICULUM IN ADVANCED MUSIC

By applied music is meant the practical and scientific study of voice, piano, violin, violoncello, organ, or some band instrument, in private individual lessons, together with the study of theoretical subjects in classes. The course is designed to fit students not only to be artistic soloists, but also to be efficient teachers of their chosen instrument.

In addition to the requirements outlined below, a high-school education or its equivalent is necessary for a certificate. As to the length of time it takes to complete this course satisfactorily, much depends upon the natural ability of the pupil, the intensity of his application, and the time he spends in developing the art of his particular instrument. Each candidate for a certificate must give a public recital sometime during the spring term of his third year.

During the last semester in this course a teacher-training class in each department is conducted, and this practice teaching, under the supervision of the instructor, together with the training already acquired, gives to the student the fundamentals for successful teaching.

Outline of Curriculum in Music

FIRST YEAR

First Semester:

Voice or some instrument. Two private lessons a week.
Harmony I. Two one-hour recitations a week.
Musical Appreciation I. One one-hour recitation a week.
Ensemble. Choral society, orchestra, band or glee club.
German I. Three one-hour recitations a week.

Second Semester:

Voice or some instrument. Two private lessons a week.
Harmony II. Two one-hour recitations a week.
Musical Appreciation II. One one-hour recitation a week.
Ensemble. Choral society, orchestra, band or glee club.
German II. Three one-hour recitations a week.

SECOND YEAR

First Semester:

Voice or some instrument. Two private lessons a week.
Harmony III. Two one-hour recitations a week.
Ensemble. Choral society, orchestra, band or glee club.
Musical History I. One one-hour recitation a week.
Ear Training. One one-hour recitation a week.
English I (Music). Three one-hour recitations a week.
Recital.

Second Semester:

Voice or some instrument. Two private lessons a week.
Harmony IV. Two one-hour recitations a week.
Ensemble. Choral society, orchestra, band or glee club.
Musical History II. One one-hour recitation a week.
Ear Training. One one-hour recitation a week.
English II (Music). Three one-hour recitations a week.
Recital.

THIRD YEAR

FIRST SEMESTER:

Voice or some instrument. Two private lessons a week.
Counterpoint. Two one-hour recitations a week.
Ensemble. Choral society, orchestra, band or glee club.
Psychology. Three one-hour recitations a week.
Recital.

SECOND SEMESTER:

Voice or some instrument. Two private lessons a week.
Musical Form and Analysis. Two one-hour recitations a week.
Ensemble. Choral society, orchestra, band or glee club.
Educational Psychology. Three one-hour recitations a week.
Harmonics. Two one-hour recitations a week.
Recital.
Practice Teaching.

Upon the approval of the Dean of the Division of General Science and the Director of the Department of Music, substitutes in collegiate subjects such as German, English, etc., as outlined above, may be made, these substitutes to be made in literary lines.

A certificate is awarded to students who complete the curriculum in music as outlined in the foregoing statement.

CURRICULUM IN PUBLIC-SCHOOL MUSIC

For those wishing to prepare themselves to teach music in the public schools a curriculum in public-school music, as outlined below, has been prepared. The completion of a four-year high-school course or its equivalent is required before entering on the work here outlined. To those satisfactorily completing this curriculum a State teacher's certificate in music is granted.

OUTLINE OF CURRICULUM IN PUBLIC-SCHOOL MUSIC

FIRST YEAR

FIRST SEMESTER:

Voice. Two lessons a week. Two credits.
Piano. One lesson a week. One credit.
School Music Methods I. Two credits.
Harmony I. Two credits.
Psychology. Three credits.
Chorus. One credit.
Musical Appreciation I. One credit.
English I. Three credits.

SECOND SEMESTER:

Voice. Two lessons a week. Two credits.
Piano. One lesson a week. One credit.
School Music Methods II. Two credits.
Harmony II. Two credits.
Chorus. One credit.
Musical Appreciation II. One credit.
Methods in Teaching. Three credits.
English II. Three credits.

SECOND YEAR

FIRST SEMESTER:

Voice. Two lessons a week. Two credits.
Piano. One lesson a week. One credit.
School Music Methods III. Two credits.
Harmony III. Two credits.
Chorus. One credit.
Musical History I. One credit.
Educational Administration. Three credits.
French I. Three credits.

SECOND SEMESTER:

Voice. Two lessons a week. Two credits.
Piano. One lesson a week. One credit.
School Music Methods IV. Two credits.
Harmony IV. Two credits.
Chorus. One credit.
Musical History II. One credit.
French II. Three credits.
American Literature. Three credits.

THEORETICAL COURSES IN MUSIC

The aim of theoretical courses is primarily to give the student an intelligent conception of music as a science, and give him such working knowledge of the material of music as will fit him for intelligent appreciation, criticism and interpretation; and secondarily, to form a broad foundation for later study in composition.

101, 102. HARMONY I AND II. Elective, beginning first semester and continuing throughout the year. Class work, two hours. Two semester credits for each course.

This course consists of a study of the following: Scales and intervals; primary and secondary triads and their inversions; harmonizing of given basses and melodies; chords of the dominant seventh; secondary seventh chords; modulation; original work begun; ear training; key-board harmony.

103, 104. HARMONY III AND IV. Elective, beginning first semester and continuing throughout the year. Class work, two hours. Two semester credits for each course. Prerequisite: Harmony II.

This course includes a study of the following: Modulations, continued; altered chords; suspensions; foreign tones; pedal points; figuration; accompaniments; original work; ear training; elementary harmonic analysis; elementary analysis of form.

107. COUNTERPOINT. Elective, first semester. Class work, two hours. Two semester credits. Prerequisite: Harmony IV.

The course in counterpoint consists of the study of simple counterpoint in two parts; first, second, third, fourth and fifth species, and florid counterpoint.

109. MUSICAL FORM AND MUSICAL ANALYSIS. Elective, second semester. Class work, two hours. Two semester credits. Prerequisites: Harmony IV and Counterpoint.

Chord reading and the accounting theoretically for every note in a piece of music, combined with analytical study of hymn tunes, preludes, inventions, and dance forms of Bach, small instrumental forms, song forms, sonata forms, cantata and oratorio forms.

110, 111. HISTORY OF MUSIC I AND II. Elective, beginning first semester and continuing throughout the year. Students may enter at the

beginning of either semester, however. Class work, one hour. One semester credit for each course.

A modern text forming the basis of this work is supplemented by lectures and library research. Time is given to the early and primitive development of the art, but special stress is laid upon the classical, Roman and modern periods, together with the present-day conditions and tendencies. In addition to theses upon the general historical and critical subjects, the class is also given practice in journalistic criticism of concert and recital performances.

115, 116. MUSICAL APPRECIATION I AND II. Elective. Class work, one hour. Students may enroll at the beginning of either semester. One semester credit for each course.

Music is a language, and like language must be learned by hearing. As it is the sole design of this course to facilitate intelligent listening, the student's powers of imagination and observation are appealed to at once.

The work is presented in a nontechnical way, in the form of illustration from a talking machine. The subjects treated are melody, rhythm, form, cadence, classical and romantic ideals, present-day tendencies, songs, piano, violin, orchestra, band, chorus, opera, etc., and differences in concert and recital programs.

Several different hours are devoted to this work, so that many students may be accommodated at periods which will suit their convenience.

120, 121. SCHOOL MUSIC METHODS I AND II. First semester and continuing throughout the year. Lectures and research, three hours. Two semester credits for each course.

These courses deal with the place of music and the teacher in the school and in the community.

122, 123. SCHOOL MUSIC METHODS III AND IV. First and second semesters, respectively. Lectures, research, and practice teaching, three hours. Two semester credits for each course.

These courses are a continuation of School Music Methods I and II.

PRACTICAL COURSES IN MUSIC

130. VOICE. Two private lessons a week. Two semester credits. Elective in College courses.

The course of instruction is based primarily upon the Italian school for training voices. Correct tone placement, so that the pupil produces tones throughout all registers with ease, and with firm, even quality, is the foundation of good singing. During the first year especial attention is given to a systematic course in breathing, tone placement and analysis of vowels and consonants relative to vocal needs. At all times attention is given to perfect enunciation, and German, French and Italian diction is taught in connection with actual song coaching. The song literature of America, England, Germany, France and Italy is studied, and a satisfactory performance of songs, oratorio or operatic arias from each one of these schools is necessary. Students specializing in voice in this course are expected to be or become able to play simple accompaniments.

135. VIOLIN. Two private lessons a week. Two semester credits. Elective in College courses.

In this department the aim is to teach the fundamentals of violin playing in such a manner as to lay the foundation of intelligent musicianship. In this work, as in the other lines of musical endeavor, mastery of the instrument is a task which imposes different difficulties upon every student. Natural ability, physical characteristics and the general make-up of the individual so influence progress that no definite method of instruction can be outlined which can be profitably pursued by all players. However, particular attention is paid to the correct position of the student while playing, and also to the manner of holding the violin and bow. A grace-

ful and natural method of playing is insisted upon, and great care is exercised to develop an accurate feeling for good intonation. Elementary scale work is begun at an early period and is gradually extended. Studies and exercises from the best writers are selected and, as the student develops, the entire field of violin literature is open for study.

Violoncello, viola and contrabass receive the same attention in this department as does the violin.

140. PIANO. Two private lessons a week. Two semester credits. Elective in College courses.

The methods of instruction in this department are direct and simple. Pupils are taught not only to play, but also to think logically according to the scientific principles of the art. Thus is developed definite and intelligent teaching ability as well as sound artistic performance. A technical foundation is the first requisite in modern piano playing. This is accomplished by a carefully selected and graded set of exercises and studies, designed to bring about that mental control of muscles without which artistic results cannot be obtained. Clearness of conception, distinctness of phrasing, variety of tone, good rhythm and technical accuracy are insisted upon. As the student advances, difficult compositions of both the classic and modern writers are studied. Interpretation becomes a special study, and all the emotional, intellectual and physical faculties are brought into that harmony and control which alone results in artistic performance. Opportunity is offered for study of accompaniments and piano ensemble.

145. WIND INSTRUMENTS. Two private lessons a week. Two semester credits. Elective in College courses.

In this department opportunity is offered for the study of any wind instrument. Both the Albert and Boehm systems of clarinet playing are taught, while the semi-no-pressure system of cornet playing is used. In this as in other departments the work is taught beginning with elementary scale and technical study and extending over the more difficult literature written for wind instruments. Instruction in instrumentation, conducting and formation of bands is also given.

MUSICAL ORGANIZATIONS

Every voice and each instrument has a distinct function in the science of tonal expression, and only in the combination of voices and instruments are the finest effects in the coloring of melody, harmony and rhythm produced. This combination is made possible in the Department of Music by the number of students enrolled in the College and by the variety of ensemble organizations.

150. THE CHORAL SOCIETY. Throughout the year. Weekly rehearsals, all special rehearsals and public performances. One credit each semester.

This organization, which is conducted by Professor Westbrook, numbers about two hundred and is one of the best student singing organizations in the West. The rehearsals are held Monday evening, weekly, and part songs, madrigals, glees, cantatas, and the great oratorios are studied, and presented publicly with the assistance of the orchestra and visiting artist soloists.

151. THE ORCHESTRA. Regular rehearsals, all special rehearsals and public performances. One credit each semester.

The orchestra is conducted by Assistant Professor Brown, teacher of stringed instruments. It is a definite organization wherein discipline prevails and permanent membership with regular attendance is insisted upon. This body maintains a correct and well-balanced instrumentation, containing all the instruments of the modern symphony orchestra. The

work is highly educational, and offers in the preparation for concerts and performances with the choral society the actual experience and routine necessary for efficient orchestra playing. Membership is open to all in the College who are capable of playing acceptably.

152. THE MILITARY BAND. Regular rehearsals, special rehearsals and public performances. One credit each semester.

The band is a part of the cadet corps, and practice in the band is accredited through the Department of Military Science in lieu of drill and theoretical instruction. Members of the band are required to conform strictly to the cadet regulations. The band furnishes music for all ceremonies of a military character and for various other College occasions.

THE APOLLO CLUB. The Apollo Club consists of about thirty of the best men's voices in the institution. The try-out for this singing body is held in the first semester of each year and the club is chosen from a large number seeking admission. A "waiting list" is maintained, and a place made vacant in the club by a member who drops out is immediately filled by one of this list.

The singing of the Apollo Club is characterized by striking vigor, spontaneity, clear enunciation, shading and color, all of which are vital elements in artistic singing. This organization is available for a limited number of concert engagements and recitals throughout the State.

THE ST. CECILIA CLUB. This is a singing organization of young women, and is without doubt one of the finest organizations of its kind in the West. The voices are selected with the utmost care as to range, blending qualities and special adaptability to the work, thus securing an almost perfect ensemble. The St. Cecilia and Apollo clubs are combined for special choir singing.

RECITALS AND CONCERTS

Unusual advantages for hearing good music are afforded at this institution. In addition to numerous choral, orchestra, band and glee-club concerts given, in which the leading soloists of the country are heard assisting, a number of great artists are brought to our College in the Artist Series Course, and during Spring Festival Week. There are also numerous recitals by the members of the conservatory faculty and by students.

FEES

33 half-hour lessons with director	$33.00
33 half-hour lessons with other teachers	22.00
16 half-hour lessons with director	18.00
16 half-hour lessons with other teachers	12.00

Physical Education and Athletics

Professor CLEVENGER
Assistant Professor SCHULZ
Assistant Professor BAUER
Instructor LORING
Assistant BOND

The purpose of this Department is to assist the students of the College to live to the best advantage, and so to aid them in the formation of hygienic habits that during their College course they may make profitable physical preparation for life. It is an urgent necessity that each student have an intelligent appreciation of the means requisite for the preservation of his health, in order that he may be able to formulate intelligently his own policy of health control.

All young men and all young women of the College are entitled to the privileges of the gymnasium, which is one of the largest in the West and is well equipped with all sorts of apparatus for physical training, with lockers, plunge baths, shower baths, and other accommodations.

PHYSICAL EDUCATION FOR MEN

Physical education is required of all freshmen unless excused for disability by the College physician. After completing the freshmen requirement, advanced work may be elected for a total of four hours of credit.

PHYSICAL EXAMINATIONS

The work of the Department is based largely upon a physical examination given each student upon his first entrance to the department. A second examination is given at the close of his first year. All students, whether taking work in the Department or not, are entitled to receive a physical examination, and advice as to their physical condition.

The measurements taken and the tests given have each a definite purpose with reference to ascertaining the muscular condition of the individual. A diagnosis is also made of the vital organs to ascertain their functional conditions, and a complete inspection of the whole body is made to detect any weakness or deformity that may exist. Based upon the information thus obtained, advice is given and work is assigned to students in accordance with their physical needs, tastes, and capacities. Delicate students and those suffering from functional disorders receive individual attention. Students organically sound are assigned work in a carefully graded and progressive system of gymnastics and athletics. All candidates for athletic teams should enroll in the Department, submit to a thorough physical examination, and pass the grade tests before being allowed to compete for positions on the various teams. Students engaging in two or more sports during the school year must undergo a physical examination preliminary to participation in each sport. This is required in order that no student may engage in athletics to his own permanent physical injury. Each student may secure a copy of his own physical measurements, and an anthropometric chart, showing in graphic form his own development as compared with the average of typical men.

Members of the teams, reporting regularly, are excused from regular class work, and are entitled to full credit in that portion of their work; but before the completion of the course at least two semesters' work must be done in the gymnasium. Credit, the equivalent of a one-hour subject, is given and counts toward the College degree. The individual's grade rests largely on the basis of attendance, punctuality, earnestness, and application, but practical tests are also given.

Regulation uniforms must be worn in the gymnasium. Students are advised not to procure uniforms until after their arrival at the College.

INSTRUCTION IN PHYSICAL EXERCISE

This course furnishes instruction in all the various grades of gymnastic and athletic exercises offered by the department. The great variety of exercises offered is intended to meet all individual needs,

capacities and tastes. A physical examination and test determines the grade or class of exercises for which a student is fitted.

103. PHYSICAL EDUCATION M-I. Freshman year, first semester. Two hours a week. Assistant Professor Bauer.

Hygiene and social problems are discussed as an essential part of this course. This instruction gives an insight into the practical problems of daily healthy living from a personal point of view. Directions are given for avoiding the common ills of student life, and for maintaining the highest physical and mental condition while in College, as well as for gaining the highest development of vital power and health for future duties.

During the winter the work is conducted indoors, and consists of light and heavy gymnastics, which are selected with a view to obtaining progressive effect upon the bodily organism. During the fall a man may select Rugby football or soccer football. Beginning about December first the work consists of the following:

a. *Free Calisthenics.* Exercises are selected for their different effects upon the bodily organism, and are arranged in the order of increasing difficulty. They involve hygienic or body-building work, educative movement, and corrective or remedial exercises. Both the Swedish and the German systems are used.

b. *Light Apparatus.* Training is given in the use of Indian clubs, dumb-bells, wands, bar bells, etc.

c. *Heavy Apparatus.* Graded exercises are given on parallel bars, vaulting bars, bounce board and mat, side and long horse, high and low horizontal bars, traveling and flying rings, etc.

d. *Indoor Athletics.* Instruction is given in all indoor track events preparatory to indoor track meets.

e. *Games.* There are included basketball, indoor baseball, volley ball; also, other games of more recreative nature.

104. PHYSICAL EDUCATION M-II. Freshman year, second semester. Two hours a week. Assistant Professor Bauer.

This course is a continuation of Physical Training M-II. Baseball, track and field athletics are given in the spring as soon as weather conditions permit outdoor work. A part of the regular instruction for the spring semester is in swimming. A passing grade must be made in this phase of the work also.

110. ADVANCED APPARATUS I. First semester. Three hours a week. One semester credit. Assistant Professor Bauer.

This course is open only to those men who show ability as gymnasts. From this class men are picked for the gymnastic team. Tumbling and work on the various pieces of apparatus are given.

111. ADVANCED APPARATUS II. Second semester. Three hours a week. One semester credit. Assistant Professor Bauer.

This is a continuation of Advanced Apparatus I.

120. PHYSICAL TRAINING SPECIALTIES. Under this head come fencing, boxing, wrestling, offered as advanced work to those who have had not less than two terms' work in the gymnasium. Hours are arranged with the instructor.

ATHLETICS

DEPARTMENTAL ATHLETICS. In the fall and spring terms the courses in the gymnasium are partly supplemented by instruction in outdoor athletics. Individuals are assigned to the kind of work best suited to them. Attendance is compulsory upon those participating. In the fall the following sports are offered: football; track and field events; cross-country running; and outdoor basketball. In the spring are offered: baseball; track and field events; cross-country running; and outdoor basketball.

Cross-country running is encouraged throughout the year. Natural exercise in the open air takes precedence of all other forms of exercise. Opportunity is offered for tennis, but it cannot be elected in place of required work.

Days unsuited for outdoor work are devoted to a discussion of playing rules, the principles of training for athletic contests, and lectures on team work.

INTRAMURAL ATHLETICS. All athletics within the institution, including the School of Agriculture teams, come directly under the supervision of the Department of Physical Education. It is the aim of the department to furnish an opportunity for all students to participate in some form of healthy athletic competition. To carry out the above aim class football is maintained during the fall term between the different classes of the College, also between the different classes in the School of Agriculture. Basketball is also promoted during the fall and early part of the winter between the different fraternities, different classes and different cadet companies, as well as between the different departments of the institution.

The work of the spring is largely given over to competition in baseball, between the different classes, both in the College and School of Agriculture, the different departments of the institution and boarding-house teams. It is the aim of the department, too, to revive an interest in track athletics between the different classes of the institution. All these activities as promoted will be run, as nearly as possible, on a tournament plan, making it possible for a large majority of the students to participate in some form of activity. Suitable trophies will be presented and suitable emblems will be granted to participants on winning teams.

In addition to interclass competition there will be a small outside schedule for the School of Agriculture in the different forms of athletics promoted by the Department.

By action of the Student Council, approved by the faculty, the following rules govern class athletic contests:

1. Managers of class teams are required to play only men who hold assignments to the class with which they play.

2. The requirements for participation in class games are the same as for varsity teams.

3. The respective managers of class athletics are required to present a certified list of eligible players to the other manager at each game.

4. No man who has been a member of the varsity squad during a given season shall participate in a class game during that season.

5. No man shall participate in a class game who has won a K in that sport.

INTERCOLLEGIATE ATHLETICS. These contests are promoted and encouraged for the more vigorous students, because of their effect upon college life, and their wide social and moral value to the participants. Intercollegiate teams should represent the final stage of selection in an educational process and development among a large number of students, thereby giving both a rational physical-education system and a healthy system of sport. Intercollegiate contests are scheduled for the different sports; namely, football, basketball, baseball, track athletics, and tennis. The College is a member of the Missouri Valley Conference and competes with the best teams in the Middle West.

Intercollegiate athletics are placed under the supervision of the Athletic Board by an order of the Board of Administration. This Athletic Board consists of the President of the College, four other members of the faculty appointed by the Board of Administration, and one member from each College class, elected by his class.

Participation in intercollegiate athletic contests is fixed by the following Missouri Valley Conference rules:

1. No student is eligible who receives pay from his institution as a regular instructor.

2. No student is eligible who receives pay for his services as player or manager of his team.

3. No student who has received pay for his athletic skill or knowledge is eligible to participate in any intercollegiate contest (except for summer baseball prior to 1912).

4. No student shall participate in contests as a member of an athletic team except on his home baseball team. No student shall play under an assumed name.

5. No student shall participate in intercollegiate sport for more than three years.

6. No graduate student shall participate in any intercollegiate contest.

7. No student shall participate in intercollegiate contests who has not been in attendance one full year prior to the date of contests, who has not passed in his entrance requirements, who has not passed in at least 30 semester hours' work during the year previous to contest, and who is not maintaining passing grades in 12 credit hours during the current semester.

8. No person who, having participated in any intercollegiate contest, fails to remain in College the remainder of that semester, unless excused by his Dean for sickness, or other sufficient reason, shall participate again until he shall have completed six months of work following his last participation.

PHYSICAL EDUCATION FOR WOMEN

All young women in the College are required to take two years of physical education unless excused by the Dean of Women. In the second year music may be substituted for physical education upon the recommendation of the head of the Music Department and approval by the Dean of Women and by the head of the Department of Physical Education.

After the two years' required physical education have been completed, women have the privilege of electing physical education for a total of four credit hours; such elective work must be approved by their Dean.

PHYSICAL EXAMINATION

A physical examination of each young woman is made by the instructor in charge of women and the assistant College physician before permission to enter a class is given. This includes a system of body measurements, strength tests, and examination of the condition of the heart and lungs. Physical defects, abnormalities and weaknesses are noted, and special exercises are prescribed for the student needing the individual corrective work.

A suit has been adopted which consists of an all-white middy blouse, black tie, and black-plaited bloomers. The white tennis shoe with a white rubber sole is used. For swimming, girls must have the regulation one-piece tank suit made from brown cotton covert, according to a pattern approved by the Department of Physical Education or a one-piece grey knit suit. Do not buy your swimming suit before arriving in Manhattan.

For further information address Women's Department of Physical Education, K. S. A. C., Manhattan, Kan.

INSTRUCTION IN PHYSICAL EDUCATION

151A. PHYSICAL EDUCATION W-I. Freshman year, first semester. Three hours. Dean Van Zile, Miss Loring, and Miss Bond.

Instruction in hygiene and social problems is an essential part of this course. In these lectures, in addition to the problems of hygiene as applied to individual health, the biological truths that lead to serious, respectful consideration of social and sex hygiene are presented. This part of the course is given by Dean Van Zile of the Division of Home Economics.

The physical training part of the course is divided into two hours a week of regular gymnasium work and one hour of esthetic dancing, folk dancing, games, tennis, hockey, basket ball, or swimming. Classes are in part held out of doors as long as the weather permits.

152A. PHYSICAL EDUCATION W-II. Freshman year, second semester. Three hours. Prerequisite: Physical Education W-I. Miss Loring and Miss Bond.

In this semester the marching tactics, floor work, etc., are continued for two hours a week, and basket ball, games, esthetic dancing, folk dancing, tennis and swimming for one hour a week.

153, 154. PHYSICAL EDUCATION W-III AND W-IV. Sophomore year. Three hours each. The work in these two semesters is a continuation of courses 151 and 152, and includes more advanced work in marching tactics and apparatus.

155. SWIMMING W. Open to all women students in the College. Individual instruction is given in this course.

Physics

Professor HAMILTON
Assistant Professor FLOYD
Assistant Professor RABURN
Assistant Professor STEWART
Instructor SMITH
Instructor PIELEMEIER*

Recognizing the need of a thorough knowledge of the fundamental laws and principles involved in all physical changes, provision has been made, in the courses which follow, for both a theoretical and a practical treatment of the subject. Instruction is based upon the facts given in selected textbooks, and these topics are enlarged upon by lectures and illustrated by experimental demonstrations. The purpose is to give a training in exact reasoning, and a knowledge of principles that will be factors in the solution of problems in all branches of science as well as in everyday life.

The laboratory work which accompanies the courses in physics gives a student abundant opportunity to test the principal laws of the science; and, since he is expected to arrange and operate the apparatus, the work should enable him to acquire skill in manipulation, precision of judgment, and care in the use of delicate instruments. The laboratories are well arranged for the work, and the equipment provided is of a nature adapted to meet the requirement of accurate work in all courses. The manual in use in most of the courses is one prepared by the Department to meet the

* Absent in military service.

exact conditions and equipment of the laboratory. A deposit of $2 a semester is required to cover the cost of supplies and breakage.

COURSES IN PHYSICS

FOR UNDERGRADUATES

101. HOUSEHOLD PHYSICS. Freshman year, both semesters. Class work, three hours. Three semester credits. Prerequisite: One year of high school physics or its equivalent. Professor Hamilton or Assistant Professor Floyd.

This course consists of lectures and demonstrations, in which the laws relating to principles involved in appliances of the household are explained and illustrated. The work in heat is based upon thermometry, calorimetry, radiation, absorption, and methods of refrigeration and ventilation. The course includes a study of light, with its color phenomena and actinic effects; of some of the optical instruments used in scientific work; a study of electric lighting and illumination, and of cost of operating many of the appliances used in the home, including suggestions for the proper use and care of electrical apparatus for the protection of the appliances and of the operator.

111. AGRICULTURAL PHYSICS. Sophomore year, second semester. Class work, three hours. Three semester credits. Assistant Professor Raburn or Assistant Professor Stewart.

This course includes a series of lectures and class demonstrations based upon heat, light and electricity as involved in influencing farm life. The elementary factors of weather and weather forecasting are explained, and access given to the weather records and apparatus of the College weather station. The work in light emphasizes the value of light in plant growth, in spectrum analysis, and in many of the natural phenomena. Electricity is presented in such a manner that the student may gain a working knowledge of the various electrical appliances that can be used on the farm. Text: Spinny's *Physics*.

120. PHOTOGRAPHY. Elective, both semesters. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Training in physics and chemistry. Professor Hamilton.

The importance of a record of exact details, as shown in a photograph, makes this work valuable to all scientists. The course gives the student some knowledge of the chemical and physical principles involved in the art, as well as practice in making good negatives and prints. The lecture and laboratory work deals with: Things to be considered in selecting a camera; proper exposures; composition of pictures; proper development of plates; tests of different developers; retouching; reducing and intensifying negatives; printing and mounting; making lantern slides, bromide enlargement, and the prints best adapted for illustrated articles in newspapers and magazines.

130. WIRELESS TELEGRAPHY. Elective, both semesters. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Elementary physics. Professor Hamilton and Assistant ———.

The work includes a study of the most efficient types of receiving and transmission sets, a study of the fundamental principles of electric waves, and of the most important points to be observed in the erection of a good plant.

Laboratory.— The student learns in the laboratory to receive and to transmit messages and as he learns the code he is instructed in field work.

FOR GRADUATES AND UNDERGRADUATES

201. GENERAL PHYSICS I. Sophomore year, first semester. Class work, three hours; laboratory, three hours. Four semester credits. Prerequisites: Elementary physics and Plane Trigonometry. Assistant Professor Floyd or Assistant Professor Stewart.

This course, like the one following, is provided for those intending to specialize in scientific lines. It covers, in as thorough a manner as possible, the general principles involved in mechanics, sound, and heat. Text: Reed and Guthe's *College Physics.*

Laboratory.—The work is based upon laws and principles discussed in the classroom, and is so arranged that the students may have a practical illustration of the facts learned.

202. GENERAL PHYSICS II. Sophomore year, second semester. Class work, three hours; laboratory, three hours. Four semester credits. Prerequisite: General Physics I. Assistant Professor Floyd or Assistant Professor Stewart.

This course includes a study of the theory of electricity and light. The class follows the subject as outlined in the text, but special emphasis is placed upon those parts that have an immediate bearing on the work of other sciences, such as electrolysis, thermal effects, relation of electrical and mechanical energy. Text: Reed and Guthe's *College Physics.*

Laboratory.—The work follows the subjects presented in the class and is conducted with a grade of apparatus that gives training in the use of the better class of instruments employed in scientific investigations.

211. ENGINEERING PHYSICS I. Sophomore year, both semesters. Class work, four hours; laboratory, three hours. Five semester credits. Prerequisites: Elementary physics and Trigonometry. Professor Hamilton or Assistant Professor Raburn.

This course in mechanics, sound and heat, is intended to give the engineering students as thorough a working knowledge as possible of the fundamental units and laws involved in force, work, power, and energy; also the laws of simple machines, gases, and liquids as they occur in the transformation of force and energy. Text: Kimball's *College Physics.*

Laboratory.—The work consists of the use of apparatus to test the laws of inertia, moments of force, moments of torsion, elasticity, and rigidity, and other laws and principles involved in mechanics and heat. Accurate measurements and carefully recorded data are required.

212. ENGINEERING PHYSICS II. Sophomore year, both semesters. Class work, four hours; laboratory, three hours. Five semester credits. Prerequisite: Engineering Physics I. Professor Hamilton or Assistant Professor Raburn.

This course treats of electricity and light. The work in electricity is of such a nature as to give the student working knowledge of the units employed, and of the fundamental laws; and to acquaint him with methods of producing a current, its uses, and the system by which electrical energy is measured. The principal phenomena of light, together with the laws that may have direct bearing upon light as a standard and method of measurement, are treated in this course. Text: Kimball's *College Physics.*

Laboratory.—The electrical work in this course includes measurements of resistances, a study of primary cells, and the tranformation of mechanical into electrical energy. The work of light consists of a study of the laws of reflection and refraction, and measurements of wave lengths by means of the spectroscope, the use of the interferometer, and photometry.

213. ACOUSTICS. Junior year, first semester. Class work, one hour. One semester credit. Prerequisite: Engineering Physics II. Assistant Professor Floyd.

In this course a special study is made of the acoustic properties of buildings, of the architectural defects which give rise to poor acoustics, with a study of special methods used to avoid such troubles in construction of buildings or to correct them in constructed buildings.

221. MOLECULAR PHYSICS. Elective, first semester. Class work, three hours; laboratory, three hours. Four semester credits. Prerequisites: College Physics and College Chemistry. Assistant Professor Floyd or Assistant Professor Stewart.

This course includes a study of molecular kinetics of gases, liquids and solids; liquid-gas systems; crystal-gas systems; crystal-liquid systems; Brownian movement; solutions, osmosis, and electrolytic conduction.

Laboratory.—The laboratory work is based on the theory as given in the class work, and includes the determination of capillary constants, molecular conductivities, percentage ionization, and specific heats of gases.

222. HARMONICS. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: One year each of music and elementary physics. Assistant Professor Floyd.

This course is given to students of music so that they may learn the fundamental principles of sound that are associated with harmony. It is a lecture and demonstration course that deals with many facts of interest relating to the construction of scales and chords. A clearer understanding of composition and of tone quality may be had if the physical laws of sound are understood.

223. PHYSICAL MEASUREMENTS. Elective. Class work, two hours; laboratory, three hours. Three semester credits. Professor Hamilton or Assistant Professor Floyd.

The class work is based upon principles that are involved in instruments for accurate measurements. The instruments described and used are typical ones employed in measurements of mechanical forces, heat, and electricity. Part of the class work is the development of formulas.

Laboratory.—The work is so selected as to give the widest possible range in the variety of instruments used and of principles illustrated.

224. SPECIAL METHODS IN THE TEACHING OF PHYSICS. Elective. Class work, two hours; laboratory, three hours. Three semester credits. For credit towards the State certificate for teachers this must be taken in the student's senior year. Prerequisites: Educational Psychology, College Physics. Assistant Professor Floyd or Assistant Professor Raburn.

This course is intended for those who are either teaching or expecting to teach physics in secondary schools. The class work includes an analysis of the present status of physics and of physics instruction in our high schools, and is based upon a critical study of the State text as well as other modern texts that may be used as reference. Special effort is made to vitalize the work and to make it apply to everyday life. Lectures, library work, demonstrations and practice teaching are used as methods of directing the course.

Laboratory.—The laboratory work includes the formation and adaptation of courses suitable for either rural or city high schools.

Public Speaking

Professor BURNS
Instructor DYKES

It is the constant effort of the Department of Public Speaking to relate the training in public speaking with the work of all the other departments of the College; to harmonize it with the spirit of the school, which is distinctly technical and industrial. With this object in view, students are trained in the presentation and discussion of the valuable ideas acquired in their various fields of study. The method pursued in this training is that of actual practice on the platform before an audience. Conviction, not entertainment, is the dominant purpose in every case.

The Department seeks to place itself at the service of those various organizations of the College which desire or need its assistance. In addition to its regular courses it aims to make itself available as far as possible for individual rehearsals; for the training of the debaters and orators of the College; and for the directing and coaching of plays. Students are urged to ally themselves with the organizations representing these various activities.

COURSES IN PUBLIC SPEAKING

FOR UNDERGRADUATES

101. PUBLIC SPEAKING I. Elective, both semesters. Class work, two hours. Two semester credits. Instructor Dykes.

The purpose of this course is to enable the student to attain some proficiency in the art of oral interpretation. The training given seeks to develop a natural style. In connection with the practice work upon the platform the student is given such points of theory and such routine drill as are necessary for the development and use of the voice and for proper platform deportment.

102. PUBLIC SPEAKING II. Elective, both semesters. Class work, two hours. Two semester credits. Prerequisite: Public Speaking I, or by arrangement with the head of the department. Instructor Dykes.

This course is a continuation of Public Speaking I, and involves a more advanced study of the art of oral interpretation.

FOR GRADUATES AND UNDERGRADUATES

201. EXTEMPORE SPEECH I. Sophomore, junior, and senior years, both semesters. Class work, two hours. Two semester credits. Professor Burns.

The work of this course consists in the preparation and delivery of short addresses based on prepared outlines. Careful preparation of material is required. The plan of the speech is made in advance, but the choice of language is left for the moment of speaking. Criticism and points of theory given by the instructor supplement the course.

202. EXTEMPORE SPEECH II. Elective, second semester. Class work, two hours. Two semester credits. Prerequisite: Extempore Speech I, or its equivalent. Professor Burns.

This course is a continuation of Extempore Speech I. The same methods are pursued but special attention is given to the telling of humorous stories, to after-dinner speaking, and the like.

203. ADVANCED PUBLIC SPEAKING. Elective, second semester. One semester credit. Prerequisites: Extempore Speech I and II, or by special arrangement with the head of the Department. Professor Burns.

In this course the work consists of the preparation and delivery by the student of one extended lecture-recital, lecture, or address during the semester. This is supplemented by class lectures and practice, and by a study of types. It may include the preparation and delivery of institute talks, or addresses suitable for extension work.

Zoology

Professor NABOURS
Associate Professor ACKERT
Assistant Professor HARMAN
Instructor MUTTKOWSKI
Instructor HERSH
Assistant ANDREWS
Assistant ALSOP

The courses have been planned to give a fundamental knowledge of the structures, functions and relations of animals; information concerning the manner in which animals respond to the conditions of the environment; an appreciation of their human values; and a consideration of the problem of heredity and evolution.

The courses in General Zoölogy (101 and 102, and 105) constitute a general survey, and form an excellent introduction to all lines in agriculture, general science and home economics. Embryology (117), Cytology (214), Advanced Mammalian Embryology (220), Parasitology (123), Evolution and Heredity (217), and Paleontology (Geology 201) are preliminary to advanced work in animal breeding, animal husbandry, dairy husbandry and veterinary medicine. Selections may be made among these courses and Advanced Zoölogy (201, 202), Invertebrate and Vertebrate Taxonomy (205, 208), Economic Zoölogy (126), Ecology (211), Embryology and Physiology (108), Zoölogical Problems (129), Research in Zoölogy (301), and the Seminar (236), by those who expect to do advanced work in zoölogy or entomology, or become teachers of biology.

The classrooms and laboratories are equipped with charts, models, microscopic binoculars, microtomes, paraffin baths and other apparatus both for elementary and advanced work, and a good natural-history museum is available.

COURSES IN ZOOLOGY

FOR UNDERGRADUATES

101 and 102. GENERAL ZOÖLOGY I AND II. Sophomore year, first and second semesters, respectively. Class work, two hours; laboratory, three hours. Three semester credits for each course. Professor Nabours, Associate Professor Ackert, Assistant Professor Harman, Doctor Muttkowski, and Mr. Hersh.

In General Zoölogy I an elementary study is made of the structures and functions of types selected to illustrate the invertebrates; in course 102 an elementary study is made of the structures and functions of types selected to illustrate the development of the phylum chordata.

Laboratory.—The form and activities of animals are observed both in the field and in the vivaria, and important systems of those animals selected as types are dissected and sketched.

105. GENERAL ZOÖLOGY. Sophomore year, both semesters. Class work, three hours; laboratory, six hours. Five semester credits. Men and women in separate classes. Professor Nabours, Associate Professor Ackert, Assistant Professor Harman, Dr. Muttkowski, and Mr. Hersh.

The structures and functions of types of both invertebrates and vertebrates are studied.

Laboratory.—Studies of the form and function of types of living animals, and dissection and reconstruction of the important systems of selected types.

108. EMBRYOLOGY AND PHYSIOLOGY. Sophomore year and elective, both semesters. Class work, three hours; laboratory, six hours. Five semester credits. Prerequisites: Zoölogy 105 or equivalent, and Chemistry 121. Professor Nabours, Associate Professor Ackert, Assistant Professor Harman, and Miss Andrews.

The first three-fifths of the semester is devoted to (*a*) Embryology and the remaining two-fifths to (*b*) Human Physiology. The course thus falls into two closely related parts: (*a*) a study of the development of the germ cells, fertilization, origin of the germ layers, initiation and growth of systems of organs, establishment of fœtal relations, and nutrition and growth with special reference to the human; and (*b*) a study of the functions of the organs and systems of the human body, with special consideration of the digestive, respiratory, circulatory, nervous, and urinogenital systems and organs of special sense.

Laboratory.—Studies of the male and female germ cells, stages in the process of fertilization, the segmenting ovum, and whole mounts and serial sections of the chick and pig embryos in several stages of development, with demonstrations of types of mammalian fœtal relations. (*b*) Experiments for the demonstration of the composition and functions of bone, blood, lymph, and the reaction of muscles, nerves, parts of the digestive, respiratory, excretory and other systems.

111. GENERAL ZOÖLOGY VET. Freshman year, first semester. Class work, two hours; laboratory, three hours. Three semester credits. Given concurrently with Veterinary Medicine 201. Associate Professor Ackert, Dr. Muttkowski, and Mr. Hersh.

A general study is made of the forms in the animal kingdom, with attention given to classification, distribution, habitats, and relation to each other and to man.

Laboratory.—The form and activities of animals are observed in the field, vivaria and the museum, and a comparative study of the systems of organs in a few selected types are studied comparatively.

114. EMBRYOLOGY VET. Freshman year, second semester. Class work, one hour; laboratory, three hours. Two semester credits. Given concurrently with Vet. Med. 202 and 214. Prerequisite: Zoölogy III, and Vet. Med. 201 and 213. Associate Professor Ackert, Doctor Muttkowski, and Mr. Hersh.

The origin of the germ cells, fertilization, the establishment of relations between the uterus and embryo, the development of membranes, and the nutrition of the fœtus in mammals are considered briefly.

Laboratory.—Exercises in the reconstruction of organs and systems from sections and dissections in the chick and pig embryos, and of fœtal relations in mammals.

117. EMBRYOLOGY. Junior and elective, first and second semesters. Class work, two hours; laboratory, three hours. Three semester credits. Prerequisites: Zoölogy 101 and 102 or 105. Professor Nabours, Associate Professor Ackert, Doctor Muttkowski, and Mr. Hersh.

The development of the germ cells, fertilization, origin of the germ

layers, initiation and growth of systems of organs, establishment of fœtal relations, and nutrition and growth in mammals are studied in this course.

Laboratory.—Studies of the male and female germ cells, stages in the processes of fertilization, the segmenting ovum, and whole amounts, serial sections and reconstructions of the chick and pig embryos in several stages of growth, with demonstrations of types of mammalian fœtal relations.

123. PARASITOLOGY. Senior year and elective, first semester. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Courses 101 and 102, or 105. Associate Professor Ackert.

A study is made of the biology, life histories and economic importance of the external and internal parasites of the domestic animals and man.

Laboratory.—A study of the structural and functional adaptations of selected types of parasites.

126. ECONOMIC ZOÖLOGY. Elective, second semester. Class work, one hour; laboratory, six hours. Three semester credits. Associate Professor Ackert.

The bird and mammal groups are studied comprehensively. Specimens in the museum are used extensively.

Laboratory.—The laboratory work comprises largely three-hour field trips to a number of selected areas: woods, streams, meadows, College campus, and farm. This work includes identification of birds and mammals, with special studies of their migration, adaptation and economic importance.

129. ZOÖLOGICAL PROBLEMS. Elective, both semesters. One or two semester credits. Prerequisites: Consult instructors. Professor Nabours, Associate Professor Ackert, Assistant Professor Harman, and Doctor Muttkowski.

Individual problems in heredity, parasitology, cytology and embryology and animal behavior are assigned by the instructors with whom the work is done.

FOR GRADUATES AND UNDERGRADUATES

201. ADVANCED INVERTEBRATE ZOÖLOGY. Elective, first semester. Class work, two hours; laboratory, six hours. Four semester credits. Prerequisite: Zoölogy 101 and 102, or 105. Associate Professor Ackert.

A comprehensive study is made of representatives of the invertebrates, from the standpoints of behavior, comparative anatomy, development, and phylogeny. Representatives of the invertebrate groups are studied from the morphological aspect.

202. ADVANCED VERTEBRATE ZOÖLOGY. Elective, second semester. Class work, two hours; laboratory, six hours. Four semester credits. Prerequisite: Zoölogy 101 and 102, or 105. Associate Professor Ackert.

The behavior, comparative anatomy, development, and phylogeny are studied, giving a comprehensive view of the chordates. A study is made of the anatomy and morphology of certain representative vertebrates.

205. TAXONOMY OF INVERTEBRATES. Elective, first or second semester. Laboratory, nine hours. Three semester credits. Prerequisites: Zoölogy 101 and 102, or 105; and Entomology 216, concurrently. Doctor Muttkowski.

Practice is had in the use of keys for the identification of species, and emphasis is placed on familiarity with the literature of invertebrate taxonomy, except insects, and on the identification of species in the local fauna.

208. TAXONOMY OF VERTEBRATES. Elective, first or second semester. Laboratory, nine hours. Three semester credits. Prerequisites: Zoölogy 101 and 102, or 105; and Entomology 216, concurrently. Doctor Muttkowski.

This course is similar to course 205, with the difference that the subject matter consists of vertebrates instead of invertebrates.

211. ANIMAL ECOLOGY. Elective, second semester. Lectures, one hour; laboratory and field work, six hours. Three semester credits. Prerequisites: Zoölogy 101 and 102, or 105, and Entomology 101. Associate Professor Welch (from the Department of Entomology).

This course deals with the relation of animals to the complete environment. The associational method of study is used and the subject is considered from the descriptive, comparative and explanatory standpoints. Special attention is given to the dynamic factors of the environment and their effect on the present status and future changes of the animal community. The field work gives practice in the methods of field ecology and deals with the application of general principles to local conditions. The fundamental principles and other general aspects of the science are presented in the form of lectures.

214. CYTOLOGY. Elective, first semester. Lecture, two hours; laboratory, six hours. Four semester credits. Prerequisites: Zoölogy 108, 117, or equivalent. Assistant Professor Harman.

Methods of preparing material for microscopical study; killing, fixing, staining, and sectioning. The development of the germ cells; theories of structure and functions of the different parts of the cell. The work forms a basis for studies of heredity and related subjects.

217. EVOLUTION AND HEREDITY. Elective, second semester. Lecture, two hours; library reference reading and reports, three or six hours. Three or four semester credits. Prerequisites: Consult instructor. Professor Nabours.

A lecture and reading course dealing with the development of the idea of evolution; the evidence and the principal theories of the causes; problems of variation, heredity, and experimental evolution.

220. ADVANCED MAMMALIAN EMBRYOLOGY. Elective, second semester. Lectures, two hours; laboratory, six hours. Four semester credits. Prerequisites: Zoölogy 108, 114 or 117, or the equivalent. Professor Nabours and Assistant Professor Harman.

The course consists of further study of the main facts of embryology, with special reference to their bearing upon biological theories, the consideration of embryological problems, and a comparative study of the physiology of reproduction in mammals, including man.

225. ZOÖLOGICAL AND ENTOMOLOGICAL SEMINAR. Elective, each semester. One two-hour session a week. One credit. Subject matter changes each semester. Prerequisite: Consult seminar committee.

This course consists in the presentation of original investigations, reviews of papers appearing in current journals, summaries of recent advances in the various fields, and discussions of the various aspects of the fundamental problems of modern biology.

FOR GRADUATES

301. RESEARCH IN ZOÖLOGY. Elective, both semesters and during the summer. One to five semester credits. Prerequisites: Consult instructors. Professor Nabours, Associate Professor Ackert, Assistant Professor Harman, and Doctor Muttkowski.

Individual research problems in heredity and experimental evolution, parasitology, cytology and embryology, and animal behavior are assigned.

Special Courses for Teachers

At the present time teaching of vocational subjects in the public schools is undergoing great development. Many schools are introducing manual training, agriculture, domestic science and domestic art, and many others are extending the work hitherto given. The State law requiring the teaching of agriculture in the rural schools is also creating a strong movement in the same direction. There is an active demand for teachers who can handle such work successfully.

The College offers to graduates of other institutions, and indeed to all who have studied such subjects as may be prerequisite, unexcelled facilities for securing training in the industrial subjects indicated. Courses extending over one or two years may be arranged by means of which the student who is already prepared in English, mathematics, and to a certain extent in the sciences, may prepare himself to enter a broader and, frequently, a more remunerative field.

Nos. 31, 32, 33, 35, 36 and 37, on pages 215 to 216, exhibit groupings that illustrate the possibilities in work of this character, and other arrangements may be made. Those taking such courses will be cared for in the regular classes provided for other students, and no limitation is imposed except that the prerequisites for any subject must have been taken previously, here or elsewhere. These prerequisites are stated in this catalogue in connection with the description of each subject. The catalogue also shows the semester in which a subject is regularly given.

The Summer School

May 31 to August 2, 1918

EDWIN LEE HOLTON, *Dean*

PURPOSE

There is no larger or better equipped plant devoted to the teaching of agriculture, home economics, mechanic arts and related subjects than Kansas has in her State Agricultural College. In order that this plant may not remain idle during the summer months, the Board of Administration has authorized the organization of a Summer School. The College is authorized by an act of Congress to expend each year a portion of the national appropriation for "providing courses for the special preparation of instructors for teaching the elements of agriculture and mechanic arts."

Each year there is an increasing demand for trained teachers of agriculture, shop work, mathematics, the sciences and home economics. The College has not been able to supply this demand. The Summer School offers an opportunity for experienced teachers to prepare themselves to meet the new demand placed upon the public schools, viz.: Preparing the boys and girls for vocational and social efficiency.

ADVANTAGES AT KANSAS STATE AGRICULTURAL COLLEGE

There is a growing conviction among the leading educators that the best institution in which to train teachers of vocational subjects is a well-equipped technical college, where the courses of study are pointed towards the producing vocations. The Kansas State Agricultural College is such an institution.

The College campus occupies a commanding and attractive site upon an elevation adjoining the western limits of the city of Manhattan, with electric car service into town and to the railway stations. The grounds are tastefully laid out according to the designs of a landscape architect, and are extensively planted with a great variety of beautiful and interesting trees, arranged in picturesque groups, masses and border plantings, varied by banks of shrubbery and interspersed with extensive lawns, gardens and experimental fields. Broad, macadamized and well-shaded avenues lead to all parts of the campus. Including the campus of 160 acres, the College owns 1,146 acres of land. Outside the campus proper, all the land is devoted to practical and experimental work in agriculture. Within the College grounds most of the space not occupied by buildings or needed for drives and ornamental planting is devoted to orchards, forest and fruit nurseries, vineyards, and gardens.

The College buildings, twenty-one in number, are harmoniously grouped, and are uniformly constructed of attractive white limestone ob-

tained from the College quarries. The College owns and operates its own system of waterworks, and is provided with a complete sewerage system.

The library will be open during the summer and its valuable collection of books, periodicals, bulletins and reports will be placed at the service of the Summer School students.

EXPENSES

Tuition is free. A matriculation or entrance fee of $5 and an incidental fee of $5 are charged all students whose homes are in Kansas. For nonresidents of the state a matriculation fee of $10 and an incidental fee of $10 are charged. Each student pays also a sick-benefit fee of $1. Receipts for these fees must be presented before enrollment in the Summer School classes. Table board varies from $3.50 to $5 a week. Three meals a day, except on Sunday, are served at the College cafeteria in Kedzie Hall. Room rent ranges from $6 to $12 per month. The College Young Men's Christian Association offers accommodation in its building for a limited number of men students at prices ranging from $10 to $12 a month. The cost of rooms is reduced by half where two students room together.

REGISTRATION AND LATE REGISTRATION

Registration will take place in Nichols Gymnasium from eight until five o'clock on the opening day, Friday, May 31. No one will be allowed to register for full-time work after Friday, June 14. All class and laboratory work begins with the first period, Saturday, May 31.

COLLEGE CREDITS AND VISITING PRIVILEGES

Full College credit will be given for all courses satisfactorily completed by regularly matriculated students unless otherwise specified in the announcement of courses. Students desiring College credit will not be allowed to carry more than nine semester credit hours of work. Those interested primarily in freshening their acquaintance with subject matter, in enlarging their outlook, or in improving their methods of teaching, and not caring for credit toward a degree, may, upon showing a receipt for Summer School fees, be given a visitor's card, which will admit them to any courses offered. They should, however, make out class cards for any courses which they wish seriously to pursue. A limited visiting privilege may be granted to candidates for College credit by the Director in case such privilege be not likely to interfere with the quality of the College-credit work.

CONVOCATION AND COLLEGE LECTURES

The hour from eleven to twelve daily except Monday is reserved for general assembly of all students and members of the faculty. At least once a week the program is musical or literary in nature, including numbers by the Summer School music staff, by visiting artists and by the Summer School chorus and orchestra. Every student with musical ability is urged to join one of the musical organizations. The remaining days of the week are devoted to lectures by visiting instructors and by teachers of the College.

RECREATION AND AMUSEMENT

On Thursday evening of each week a special program for relaxation and enjoyment will be offered on the College campus. Last summer, out-of-door moving picture shows, "community sings" and folk games proved to be of general interest to students and townspeople alike. These programs will be continued and improved upon in the Summer School of 1918. The vicinity of Manhattan abounds in beautiful and easily accessible spots for "hikes" and picnics. Camp Funston is only forty minutes distant by trolley, and a trip to the Camp makes an enjoyable and instructive outing. For those who appreciate opportunities for literary and forensic improvement, combined with social good times, the Summer School Literary Society meets Saturday evening of each week and is open to all students.

Courses in the Summer School

Division of Agriculture

L. E. CALL, Acting Dean

AGRICULTURE

METHODS OF TEACHING AGRICULTURE. Class work, four hours. Two semester credits. Principal Zahnley.

This course deals primarily with methods of presenting the various phases of agriculture in a one-year high-school course. Outlines for recitation and laboratory work; arrangement and equipment of laboratories; providing materials for laboratory and illustrative purposes; making use of the high-school community as an important laboratory for the study of all phases of agriculture are among the topics emphasized. Only such subject matter as is necessary to illustrate the method of presentation will be considered. Sufficient opportunity for use of the library will be given to familiarize teachers with the best sources of material on the teaching of agriculture.

AGRICULTURAL EDUCATION. Class work, four hours. Two semester credits. Professor Holton.

See courses under Education.

SPECIAL METHODS IN AGRICULTURE. Class work, six hours. Three semester credits. Mr. Zahnley.

See courses under Education.

SEMINAR IN AGRICULTURAL EDUCATION. Class work, four hours. Two semester credits. Professor Holton.

See courses under Education.

AGRONOMY

Professor CALL
Associate Professor THROCKMORTON
Assistant Professor SEWELL
Assistant Professor BONNETT
Instructor ZAHNLEY

101. GRAIN CROP PRODUCTION. Class work, four hours; laboratory, six hours. Three semester credits. Assistant Professor Bonnett.

This course is a study of the distribution, relative importance and production of grain crops, including wheat, corn, oats, barley, rye, rice, buckwheat and flax. Prerequisite: General Botany.

131. SOILS. Class work, six hours; laboratory, six hours. Four semester credits. Associate Professor Throckmorton.

This course comprises a study of the management of farm soils and deals with the origin of soils and their physical nature; the effect of different methods of cultivation upon the liberation of plant food; conservation of moisture, and physical conditions of the soils. Prerequisite: General Chemistry. Text, Lyon, Fippen and Buckman's Principles of Soil Management.

132. SOIL FERTILITY. Class work, four hours; laboratory, six hours. Three semester credits. Professor Call and Assistant Professor Sewell.

This course involves a study of the effect of different crops and different systems of farming upon the fertility of the soil; the use of barnyard manure, including proper methods of handling, preserving and applying it; and determinations of needs of soils for commercial fertilizer and lime. Prerequisite: Quantitative Analysis and Soils. Text, Hopkins' Soil Fertility.

ELEMENTARY AGRICULTURE. Class work, four hours; laboratory, six hours. Three semester credits. Instructor Zahnley.

This is a general course planned for teachers of public schools who teach one year of agriculture. It covers the entire field of general agriculture, together with suggested outlines for a year's work in the laboratory. Texts, Waters' Essentials of Agriculture, and Call and Schafer's Manual of Agriculture.

TEACHERS' COURSE IN SOILS AND CROPS. Class work, four hours; laboratory, six hours. Three semester credits. Professor Call and Assistant Professor Bonnett.

This course is designed primarily for young women preparing to teach the one-year course in agriculture offered in many Kansas high schools. The course deals with the origin and formation, texture and composition, of soils; the management of soils to conserve moisture and to maintain fertility; and the adaptation of soils to crops. It also deals with the distribution, relative importance, and production of such grain crops as wheat, corn, kafir, oats, barley, and rye; and such forage crops as sorghum, alfalfa, clover, and grasses.

ANIMAL HUSBANDRY

Professor COCHEL
Assistant Professor VESTAL
Assistant Professor PATERSON

ANIMAL HUSBANDRY I. Class work, two hours; laboratory, twelve hours. Four semester credits. Assistant Professor Paterson.

This course consists of a study of the market and breeding types and classes of horses, cattle, sheep, and swine. The purpose of this course is to give to the student a knowledge of animals which will be in feed lots and on breeding farms.

ANIMAL HUSBANDRY IV. PRINCIPLES OF FEEDING. Class work, six hours. Three semester credits. Assistant Professor Vestal.

This course involves a study of the digestive system and the processes of nutrition, and of the theory of practical economy of rations, both for the maintenance and for the fattening of all classes of farm animals. Prerequisite: Elementary Organic Chemistry.

TEACHERS' COURSE IN ANIMAL HUSBANDRY. Class work, four hours. Two semester credits. Professor Cochel.

This course is planned to give a general view of the livestock industry and to prepare teachers, especially young women, for the handling of the general livestock problems that should be included in a one-year high-school course in agriculture. Class work, lectures, and demonstrations will include the judging, management, feeding, and breeding of the general classes of livestock found on Kansas farms.

DAIRY HUSBANDRY

Professor REED
Instructor DAVIS

101. ELEMENTS OF DAIRYING. Class work, four hours; laboratory, six hours. Three semester credits. Professor Reed and Instructor Davis.

This is a general course in dairying, dealing with the secretion, composition and properties of milk; care of milk and cream on the farm, a study of the different methods of creaming, construction and operation of farm separators; principles and application of the Babcock test; use of the lactometer; and buttermaking on the farm. Lectures are supplemented by textbook work.

Laboratory. Practice in operating the Babcock test and lactometer; separation of milk; and farm buttermaking.

104. DAIRY JUDGING. Laboratory work, six hours. One semester credit. Professor Reed.

Dairy stock is judged from the standpoint of economical production and breed type. Score cards are used to teach the student to become accurate, thorough and systematic in the selection of animals as representatives of breeds or for breeding purposes.

TEACHERS' COURSE IN DAIRY HUSBANDRY. Class and laboratory work, four hours. One semester credit. Associate Professor Fitch.

This is a general course in dairying for high-school teachers, and consists of lectures and recitations, class demonstrations, and laboratory work. The four leading breeds of dairy cattle are studied and some practice provided in judging. The general problems involved in the feeding and management of dairy cattle for milk production are discussed. The composition of milk and dairy products, butter and cheese making, separation and testing of milk, and the care of milk and cream are considered as fully as time will permit. Practice is also provided in the use of the separator, the Babcock test, and butter and cheese making.

HORTICULTURE

Professor DICKENS
Professor AHEARN

PLANT PROPAGATION. Class work, four hours; laboratory, six hours. Three semester credits. Professor Dickens.

A discussion of the natural and cultural methods of propagation; seeds, seed testing, and seed growing; treatment given to different classes of seeds; the production of seedlings for stock; grafting, budding, layering, making cuttings, and the special requirements necessary in propagating commercial fruits and ornamental plants. Lectures and assigned readings. Prerequisite: Plant Anatomy.

Laboratory. Practical work in preparation of seeds, seed testing, the preparation of seed beds, the use of seeding machinery, transplanting, grafting, budding, and general nursery practice.

LANDSCAPE GARDENING. Class work, four hours; laboratory, six hours. Three semester credits. Professor Ahearn.

Lectures are given on the principles of landscape art and the means of their application to the problems of improving lawns, yards, country homes, school grounds, and public parks. Opportunity is given the student to become acquainted with plant materials that are best adapted to Kansas conditions.

ORCHARDING. Class work, six hours. Three semester credits.

It is a discussion of the conditions necessary for success with orchards.

Location, improvement of soil, application of fertilizers, pruning, prevention of loss from frost, marketing and storage. Prerequisites: Plant Propagation and Pomology II.

MARKET GARDENING. Class work, four hours; laboratory, six hours. Three semester credits. Professor Ahearn.

In this course a systematic study is made of both commercial and amateur gardening; soil improvement, the value of fertilizer, marketing and storage conditions are given special attention.

Laboratory. The laboratory work consists of the preparation of the plans for gardens; seed testing; the construction of the hotbed; the use of tools and machinery; and practical work in the garden.

PLANT MATERIALS. Class work, four hours; laboratory, six hours. Three semester credits. Professor Ahearn.

Lectures are given on various species adapted to Kansas conditions; their arrangement and adaptability to the ornamentation of home grounds and a study of their form, texture and flowering habits.

Laboratory. The laboratory work consists of field work where the student is given the opportunity to become thoroughly acquainted with the habits of growth of different species found in this vicinity.

POULTRY HUSBANDRY

Professor LIPPINCOTT
Assistant FOX
Superintendent AMOS

101. FARM POULTRY PRODUCTION. Class work, two hours; laboratory, six hours. Two semester credits. Professor Lippincott.

This course takes up the problems of poultry management on the general farm. The subjects of feeding, breeding, incubating, brooding, and preparing for market are studied.

105. PRACTICE IN INCUBATION. Three times a day, seven days a week, for a period of not less than four weeks, at hours outside the regular schedule. One to two semester credits. Mr. Amos.

This course consists of the care of an incubator by the student through the incubation period, testing the eggs, and bringing off the hatch. Careful records of fertility, cost of incubation and varying temperature, moisture and ventilation conditions are kept. For one credit, one successful hatch must be brought off in either a hot-air or hot-water incubator. For further credit, the other types must be operated. Students specializing in poultry husbandry must take three credits.

107. PRACTICE IN BROODING. Three times a day, seven days a week, for a period of not less than four weeks, at hours outside the regular schedule. One to three semester credits. Mr. Amos.

In this course each student handles a flock of chicks. He has the entire care of brooding and feeding them during the four most critical weeks. A report of fuel and feed, of gain in weight, and of mortality, is required. This course must be preceded or accompanied by Practice in Incubation. For one credit a group of at least fifty baby chicks must be successfully brooded for four weeks in any one of the several types of brooders. For further credits, broods must be handled successfully in two other types of brooders. Students specializing in poultry husbandry must take three credits.

110. POULTRY BREEDS AND TYPES. Class work, two hours; laboratory, six hours. Two semester credits. Assistant Fox.

In this course a historical study is made of the various breeds commonly found on Kansas farms. Particular attention is paid to tracing

the evolution of the present breed types. The laboratory is given over largely to judging the different breeds and varieties, both by score cards and by comparison.

201. MARKET POULTRY. Class work, two hours; laboratory, six to twelve hours. Two to three semester credits. Assistant Fox.

In this course the lectures cover the methods of handling market poultry alive and dressed. The laboratory work consists of practice work in caponizing, killing, bleeding, packing, cooling, grading poultry for market, and candling and grading eggs. Where twelve hours of laboratory is taken the student will also milkfeed three lots of chickens for a period of two weeks each.

BACKYARD POULTRY KEEPING. Class work, two hours. One semester credit. Professor Lippincott.

This is a course in the art of poultry keeping with particular reference to the problems confronting town and city dwellers. The subjects of housing, feeding, breeding, incubating, brooding and preparing poultry products for consumption are discussed.

TEACHERS' COURSE IN POULTRY HUSBANDRY. Class work, two hours. One semester credit. Professor Lippincott.

This course takes up the problems of poultry management for egg and meant production. The subjects of feeding, breeding, housing, incubation, brooding, and preparing poultry for market are studied.

VETERINARY MEDICINE

Professor DYKSTRA
Associate Professor BURT

PHYSIOLOGY. Class work, six hours. Three semester credits. Associate Professor Burt.

The work in this subject consists of the study of the skeletal tissues, the circulatory, digestive, respiratory and other systems, in much the same manner as is done during the regular college course. The lectures are supplemented with demonstrations and experiments. Dissected specimens are used as often as possible instead of papier-mâché models. The laboratory is well equipped with physiological apparatus. This apparatus is freely employed and its application explained. The demonstrations and experiments are especially helpful to those engaged in teaching and those intending to teach this subject. Credit in this course is the same as the credit in Human Physiology. It may be substituted for Animal Physiology. Text, Martin's Human Body. References are also made to Howell's Text Book on Human Physiology and others. Teachers are recommended to use the text by Howell.

167. FARM ANIMALS IN HEALTH AND DISEASE. Class work, six hours. Three semester credits. Professor Dykstra.

In this course the common diseases of domesticated animals are discussed, and particular attention is devoted to first-aid treatment, preventive measures against the spread of contagious and infectious diseases, methods of taking temperatures, counting the pulse and respirations, modes of administering drugs, bandaging, etc. Various aids to correct diagnoses, particularly tuberculin testing of dairy and beef animals, are taken up. A few lectures on the more commonly used medicines are included. When clinical cases are available, they are used to visualize the instruction given in the class room. This is a course for teachers and students of agriculture and for those engaged in agricultural pursuits.

Division of Engineering

A. A. POTTER, Dean

APPLIED MECHANICS AND MECHANICAL DRAWING

Assistant Professor WENDT
Assistant Professor PEARCE

101. APPLIED MECHANICS I RECITATION. Class work, six hours. Three semester credits. Prerequisites: Calculus I and Engineering Physics II. Assistant Professor Wendt.

This course includes composition, resolution and conditions of equilibrium of concurrent and nonconcurrent forces; center of gravity; laws of rectilinear and curvilinear motion of material points; moments of inertia; relations between forces acting on rigid bodies and the resulting motion; work energy and power; graphical solutions of problems in statics. Text, Riggs' Hancock's Applied Mechanics for Engineers.

115. APPLIED MECHANICS E-II RECITATION. Class work, six hours. Three semester credits. Prerequisite: Applied Mechanics I. Assistant Professor Wendt.

Behavior of materials subjected to tension, compression and shear; riveted joints; torsion; shafts, and the transmission of power; strength and stiffness of simple beams; design of beams of wood, steel and reinforced concrete; stresses in columns and hooks; and the design of columns of wood, steel and reinforced concrete. Text, Boyd's Strength of Materials. Cambria Steel is used for reference.

145. CONCRETE CONSTRUCTION. Laboratory, six hours. One semester credit. Assistant Professor Wendt.

Instruction is given in the principles governing the selection and preparation of materials, the proper proportioning of materials for concrete, the construction of forms, mixing and handling concrete, finishing concrete surfaces, and the waterproofing of concrete. Text, Seaton's Concrete Construction for Rural Communities.

97. MILITARY SURVEYING AND TOPOGRAPHY. Lectures and recitations, one hour; field work, three hours. One semester credit. Assistant Professor Wendt.

In this course training will be given in the use of the transit, level, plane table, aneroid barometer, and stadia work. The purpose is to teach rapid method of sketching topography and to have the students acquire speed and accuracy in representing same.

98, 99. MECHANICAL DRAWING FOR HIGH SCHOOLS. Lectures and recitations, two hours; drafting, eight hours. Three semester credits in the School of Agriculture.

A course intended for high-school teachers of mechanical drawing and for those desiring to make College entrance credits. The work of the course will be varied to suit the previous training of those who register for it. A study is made of drawing instruments and materials, drawing-room practice and conventions, lettering, orthographic projection, and simple working drawings. Practice is also given in tracing and blueprinting. Text, Crawshaw and Phillip's Mechanical Drawing for Secondary Schools.

160, 165. MECHANICAL DRAWING I. Lectures and recitations, two hours; drafting, six hours. Two semester credits. Prerequisite: Descriptive Geometry (Arch. 104, 107). Assistant Professor Pearce.

The course includes the use and care of drawing instruments, with simple exercises in making working drawings from given plates. Special

attention is given to the arrangement of views to secure balance, and to the subject matter and layout of titles and notes. The following supplies are required: Triangles, T-square, scale, pencils, pens, ink, eraser, thumb tacks, drawing paper, and a set of drawing instruments. Students are advised not to purchase these until after consulting with the instructor. Text, French's Engineering Drawing.

170. MECHANICAL DRAWING II. Drafting, sixteen hours. Three semester credits. Assistant Professor Pearce.

Free-hand sketches are made from simple machine parts, followed by complete working drawings from these sketches without further reference to the objects. This is followed by the design of cams, gears and quick returns to fulfill specified conditions. Center-line drawings are first made, embodying the solution of the problems, and upon these are built working drawings of the machine parts. An effort is made to follow standard practice in the design of those details usually determined by empirical methods. Velocity diagrams are drawn for the cams and quick returns. Gear teeth are accurately rolled and are drawn from templates prepared by the student. Special emphasis is laid upon the proper selection of views to present the necessary information in convenient form, and to the dimensioning of the drawings. Text, French's Engineering Drawing.

180. KINEMATICS. Lectures and recitations, six hours. Three semester credits. Prerequisites, if taken for credit: Plane Trigonometry, Descriptive Geometry. Persons not taking the work for credit may be assigned to it without these prerequisites, by permission from the head of the department. Assistant Professor Pearce.

An analysis of the motions and forms of the parts of machines constitutes this course. Among the subjects discussed are: bearings, screws, worm and wheel, rolling cylinders, cones, and other surfaces; belts, cord and chains, levers, cams and linkwork, with the velocity and motion diagrams; quick returns, straight-line motions, and other special forms of linkages; wheels in trains; curves for gear teeth. The solution of a large number of graphical and mathematical problems is required in this course. Text, Schwamb and Merrill's Elements of Mechanism.

MANUAL TRAINING AND SHOP PRACTICE

Professor CARLSON
Instructor PARKER
Assistant BUNDY

MANUAL TRAINING METHODS AND ORGANIZATION. Class work, four hours. Professor Carlson.

In this course a study is made of the development of manual training in the United States and abroad. The various kinds of work are considered and their suitability for the different classes of students, as well as the equipment and material required to carry on the work, together with their cost and where they can be secured; also a study of the factors affecting the arrangement and proper installation of equipment.

MANUAL TRAINING FOR PRIMARY GRADES. Laboratory, twelve hours. Two semester credits. Mr. Parker.

The work of this course is planned to meet the need of teachers of primary work. Exercises suitable for the pupils of the various grades are made by the class and a brief study is made of suitable materials and equipment. The work includes paper folding and cutting, cardboard construction, raffia, cord work, weaving, reed work, and elementary tool work in woodworking.

MANUAL TRAINING FOR GRAMMAR GRADES. Laboratory, twelve hours. Two semester credits. Mr. Parker.

This is a course in elementary woodworking planned primarily for the teacher of the upper grades. The work consists of simple, useful problems which brings into use the common woodworking tools. Various woods are used so as to acquaint the student with different kinds of lumber. The finishing consists of staining, filling, and waxing. Considerable emphasis is laid upon the use and care of tools.

MANUAL TRAINING FOR HIGH SCHOOLS. Laboratory, twelve hours. Two semester credits. Professor Carlson and Mr. Parker.

This is a continuation of grade woodwork, the work being of such a nature as to require previous experience with tools. The early part of the course consists of useful problems in elementary furniture construction, a brief study of common woods and methods of finishing them, including staining, filling, waxing, varnishing and rubbing. During the latter part of the course the various woodworking machines are discussed, demonstrated, and instructions given in using them, after which enough work is given to enable the student to operate the woodworking machines.

ADVANCED WOODWORKING. Laboratory, twelve hours. Two semester credits. Professor Carlson and Mr. Parker.

This is a course in advanced cabinet construction, with the use of woodworking machinery and such bench work as is necessary for the assembling and finishing of the problems being constructed. A study is made of the progressive steps or operations in order that a proper use may be made of time. Instruction is given in the use and care of woodworking machinery and in staining, filling, varnishing, rubbing and finishing the problems constructed.

WOOD TURNING. Laboratory, twelve hours. Two semester credits. Professor Carlson.

This course is designed to prepare teachers for teaching wood turning in high schools. The work includes typical application of tools and processes, in turning between centers, on faceplates, and by means of hollow chucks. Exercises are given in turning cylinders, cones, beads, convex and concave surfaces, after which articles are made from drawings which have a practical application in a student's home or social life, such as handles, mallets, rolling pins, circular boxes with covers, Indian clubs, dumb-bells, napkin rings, bowls, towel rings typical vase forms, cups, goblets, frames, ornamental stools, etc. While many of these articles are made from blue prints, it is the aim to have the student make some object of value from his own design, both as a project in turning and as a practical lesson in designing.

FORGING I. Laboratory, six hours. One semester credit. Mr. Bundy.

In this course the field of hand-forging as related to high-school work is covered. The work includes practical exercises in making articles of use, which involve the operations of drawing, upsetting, welding, twisting, splitting and shaping. Sufficient instruction is given in the forging of tool steel to enable the worker to forge, harden and temper many of the tools which are needed in this and other branches of manual training.

Tools required: One pair five-inch outside calipers, one two-foot rule, one ball-peen hammer, weight about two pounds, including handle.

FORGING II. Laboratory, six hours. One semester credit. Mr. Bundy.

Advance work is given in the forging of iron and in the manufacture of tools, such as punches, chisels, drills, scrapers and hammers. Instruction is given in the proper methods of heating, forging, hardening,

tempering, annealing and working the various kinds of tool steel and in the casehardening of mild steel.

Tools required: Same as in Forging I.

FORGING III. Laboratory, six hours. One semester credit. Mr. Bundy.

Special work is given in the forging of iron and steel to impart skill in the different operations. Some practice is given in the making of ornamental iron work.

Tools required: Same as in Forging I.

MACHINE TOOL WORK I. Laboratory, twelve hours. Two semester credits. Professor Carlson and Mr. Bundy.

This course includes both bench and machine tool work, in which practice is given in chipping, filing, shaper and planer work, scraping, drilling, cutting, right- and left-hand and multiple threads, and knurling on the lathe. Practically all of the work is upon parts of machines that are being built in the shops.

Tools required: A four-inch scale, or B. & S. slide caliper rule, one pair five-inch outside calipers, one pair five-inch inside calipers, one center drill, one B. & S. center gage.

MACHINE TOOL WORK II. Laboratory, six hours. One semester credit. Professor Carlson and Mr. Bundy.

This course consists of progressive problems in turning and calipering, boring, reaming and taper turning and threading on the lathe, exercises in chucking, the use of forming tools, practice on the key-seating machine, and the making of a spur gear on the milling machine.

Tools required: Same as in Machine Tool Work I.

MACHINE TOOL WORK III. Laboratory, six hours. One semester credit. Professor Carlson and Mr. Bundy.

This course takes up work on the turret lathe and boring mill; lacings, and methods of belt connections, compound and differential indexing, and the cutting of spiral gears on the milling machine.

Tools required: Same as in Machine Tool Work I.

THE MANUFACTURE OF MUNITIONS. Laboratory, supplemented by lectures, six hours. One semester credit. Professor Carlson.

A course dealing with the construction and methods of machining the various types of shells used in the U. S. and abroad. A study is also made of the gages, jigs, fixtures, etc., used to insure the work coming within the specified limits.

This course would be most suitable for men who have had Machine Tool Work I or its equivalent, though it can be successfully taken by others who are sufficiently interested or who expect to enter the service.

EMERGENCY MACHINE REPAIRS. Laboratory, supplemented by lectures, six hours. One semester credit. Professor Carlson.

A course dealing with the methods used in making emergency repairs to various types of machinery. It will include babbitting, scraping and aligning bearings, belt lacings, soldering, brazing, oxy-acetylene welding, riveting, and general repairs to machinery on the road and in the shop.

FARM ENGINEERING

Instructor SANDERS

FARM MOTORS I. Lectures and recitations, four hours; laboratory practice, six hours. Three semester credits.

This course is designed to teach the operation, care and repair of stationary gas engines, oil engines and steam engines. Some time is also devoted to automobile details, including automobile motors, carburetors, transmission systems, differentials, clutches and starting systems.

TRUCKS AND TRACTORS. Lectures and recitations, four hours; laboratory practice, six hours. Three semester credits.

A study is made of the selection, care and repair of traction engines.

GAS ENGINES AND TRACTION ENGINES. Lectures and recitations, two hours; laboratory practice, six hours. Two credits in the School of Agriculture; no college credit.

Gas engines and gas traction engines are studied as to their construction, operation and care.

Division of Home Economics

MARY P. VAN ZILE, Dean

DOMESTIC ART

Professor BIRDSALL
Instructor FECHT
Instructor JONES

CLOTHING I. Laboratory, twelve hours. Two semester credits. Professor Birdsall and Miss Fecht.

This course includes practice in hand and machine sewing; the making of simple articles, repairing garments, drafting by straight-line system, cutting and making undergarments and shirt waist. Appropriate materials and trimmings are discussed. A study of textile fibers, hygiene and the economics of clothing is made. Notebook work is an important part of the course.

MILLINERY. Laboratory, twelve hours. Two semester credits. Prerequisite: Clothing I or its equivalent. Professor Birdsall.

This course includes a dicussion of practical and artistic principles of millinery; preparation of various materials for trimming; practice in making bows, rosettes, and other forms of hat decoration; making wire and buckram frames; use of velvet, silk and straw; renovating and the use of old materials.

TEXTILES. Class work, four hours. Laboratory, six hours. Three semester credits. Prerequisite: Organic Chemistry. Miss Fecht.

This course considers the textile industry from primitive ages to modern times. The original purpose of the industry, that of furnishing covering for the body, and the later variations from this exclusive purpose, are treated, together with their effect on the composition and design of fabrics. The combination of art, science and mechanics that makes possible the elaborateness of modern textiles is given careful attention.

RED CROSS SURGICAL DRESSINGS. Class to qualify for teacher's certificate. Two hours. Professor Birdsall.

This course includes the making of dressings that are most needed in the hospitals in our own training camps and also in France.

HOSPITAL GARMENTS. Elective. Laboratory, twelve hours. Two semester credits. Professor Birdsall.

This course takes up the making of garments used in the hospitals, such as bed shirts, operating gowns, and pajamas.

DOMESTIC SCIENCE

Instructor SKINNER
Instructor GREEN

FOODS II and III. Class work, six hours; laboratory, twelve hours. Five semester credits. Miss Skinner.

This is a combination course given to meet the needs arising from the change in the course of study. This course will include a study of typical proteins, process of milling, the use of leavening agents, and flours, together with intensive work in food preparation.

FOODS III. Class work, four hours; laboratory, six hours. Three semester credits. Miss Green.

This course is a continuation of Foods I and II. Doughs and bread mixtures, together with the preservation of food, are the subjects studied.

HOUSEKEEPER'S COOKERY. Laboratory, eighteen hours. Three semester credits. Given especially for those who are taking food work for the first time; of especial interest to those interested in conservation of food. Miss ———.

Stoves, stove construction, stove management and fuels are the first topics considered, and this discussion is followed by experiments illustrating the effect of heat upon starch and proteins. The necessary elementary principles involved are then applied to the cooking of cereals, vegetables, beverages, breads, meats, soups, simple cake mixtures, and puddings, and to the canning and preserving of fruits and vegetables. Special attention is given to the planning and serving of meals.

INSTITUTIONAL MANAGEMENT I. Class work, two hours; laboratory, twelve hours. Three semester credits. Prerequisite: Dietetics. Miss ———.

This course is a study of the food problem of institutions, and includes the study of the preparation, marketing and cost of service.

Laboratory. The preparation of food for institutional use and practical experience in the cafeteria of the department are included in the laboratory work.

HOME ART

Assistant Professor HOLMAN

DESIGN. Class work, two hours; studio work, twelve hours. Three semester credits. Assistant Professor Holman.

A study is made of the principles which control the use of color and the selection and arrangement of elements in the production of objects themselves and in their uses as parts of a whole. Many exercises are given in which clothing and home furnishings are scored as to design. A natural motif is adapted to material, function and form.

PUBLIC SCHOOL DRAWING. Studio work, twelve hours. Two semester credits. Assistant Professor Holman.

This course presents representation, color, design, construction work and picture study for rural and grade schools.

Division of General Science

J. T. WILLARD, Dean

BACTERIOLOGY

Professor BUSHNELL

101. GENERAL BACTERIOLOGY. Class work, four hours; laboratory, six hours. Three semester credits.

The course is designed primarily for teachers, but students in General Science, Agriculture and Architecture may obtain credit in this course by special arrangement with the head of the department.

This course consists of a general survey of the subject of bacteriology as related to agriculture, sanitation, the preparation and care of food, etc. Some attention is also given to the method of isolation, cultivation and study of microörganisms. The student becomes somewhat familiar with methods used in the bacteriological analysis of water, milk, etc.; sterilization, sources and modes of infection by pathogenic bacteria, and means of controlling their distribution.

HOUSEHOLD BACTERIOLOGY. Class work, six hours; laboratory, twelve hours. Five semester credits.

This course is especially arranged for students taking domestic science. The credit received in this course is equivalent to that given for the regular college course. Students wishing to take this course should consult the head of the department before entering. See general catalogue for description of work offered, course 121.

SANITARY BACTERIOLOGY. Class work, four hours; laboratory, six hours. Three semester credits. No prerequisite required. This is a special course designed for persons desiring to fit themselves for war work.

As a knowledge of the principles of bacteriology, sanitation and hygiene is essential for those entering the sanitary or hospital service of the army or the Red Cross, and for those engaged in food and dairy inspection, the Department of Bacteriology is making this course particularly attractive for persons desiring such training.

The lectures treat of conditions necessary for the best growth of bacteria; methods of controlling their growth; sources and modes of infection by disease-producing bacteria; bodily defenses and immunity; bacteriology of water, milk, and other foods in their relation to sanitation and disease; disposal of sewage; disinfection; etc.

The laboratory work consists of a study of the making and sterilization of culture media, isolation and study of disease-producing bacteria; laboratory examination of water, milk, etc., according to standard methods; the use of the microscope and bacteriological apparatus; studies on sterilization and disinfection; and other work pertaining to this subject.

BOTANY

Instructor PETERSON
Instructor HAYMAKER

ECONOMIC PLANT DISEASES. Class work, two hours; field and laboratory work, eight hours (two four-hour periods). Three semester credits. Instructor Haymaker.

The diseases affecting the chief economic crops of the field, orchard and garden are studied. Among these are the smuts of cereal and forage crops; the common rusts attacking wheat, oats, rye and barley; the apple blotch, apple scab, Illinois blister canker, brown rot of fruits; potato,

tomato and bean diseases, together with many others. Methods for preventing losses brought about by plant diseases will receive considerable attention. This course is intended to make high-school teachers familiar with the common plant diseases which are causing a great annual loss in Kansas. Time will be devoted to collecting and identifying these diseases in the field. Methods of collecting, preserving and preparing plant diseases for exhibit purposes, especially for high-school work, will receive attention. Text, Diseases of Economic Plants, Stevens and Hall.

FIELD BOTANY. Class work, two hours; field and laboratory work, eight hours (two four-hour periods). Three semester credits. Instructor Peterson.

The purpose of the course is to offer teachers an opportunity to become acquainted with plants in the field, their natural history, habits, distribution and relation to their environment. Excursions will be made to different localities near Manhattan, to study plants of the prairies, woods, swamps, streams, etc. Especial attention will be given to methods of collecting and preserving plants for use in high-school teaching. Part of the laboratory work will consist of determining the names of plants by means of manuals.

BOTANY FOR HIGH-SCHOOL TEACHERS. Class work, two hours; laboratory work, eight hours. Three semester credits for entrance or in the School of Agriculture. Instructor Peterson.

The purpose of this course is to give high-school teachers a method of teaching botany that will bring the subject into closer relation to the farm and its problems. It is an attempt to render possible the study of botany in a scientific sense, but by the use, so far as practicable, of strictly economic plants for laboratory material. Considerable emphasis is laid on the study of plants from the natural-history standpoint. Most of the larger and more important groups of plants are studied from this point of view. Text, Bergen and Caldwell's Practical Botany.

CHEMISTRY

Assistant Professor HUGHES
Assistant Professor BRUBAKER
Instructor HAMMOND

103. CHEMISTRY HE-I. Lectures and recitations, six hours; laboratory, twelve hours. Five semester credits. Assistant Professor Brubaker.

This work begins the study of general chemistry, and is designed, with that of chemistry HE-II, to give the student a knowledge of the fundamental principles of chemistry. As all subsequent progress in this science requires a working knowledge of its principal theoretical conceptions, the principles of nomenclature, the significance of formulas, chemical equations, etc., much attention is given to these, while at the same time, both in class and laboratory, special emphasis is placed upon those facts of everyday life in and about the home which possess special value to young women. Textbook: Inorganic Chemistry for Colleges, by Newell.

Laboratory. As far as time permits, the student performs independently experiments touching the preparation and properties of the more important substances. Preference is given to those operations which illustrate important principles, and the student is required, as far as possible, to study experiments in that light. The laboratory guide is A Laboratory Manual for General Chemistry, by McPherson and Henderson. It is accompanied by mimeographed material on special subjects.

104. CHEMISTRY HE-II. Lectures and recitations, six hours; laboratory twelve hours. Five semester credits. Prerequisite: Chemistry HE-I. Doctor Hammond.

The work in this course for the first half of the term is a completion of the study of general chemistry begun the preceding term. The second half of the term is devoted to the study of the general principles of qualitative analysis as outlined in an Elementary Treatise on Qualitative Analysis, by William McPherson.

Laboratory. In the laboratory the student studies the ordinary methods of separation and detection of the more common metals, nonmetals, acids, bases and salts. The teaching of analysis as such is a secondary object, although the student is held to the exact observation and careful reasoning required in ascertaining the composition of simple substances and mixtures. The effect of the course is to broaden, strengthen and unify the students' ideas of general chemistry.

121. ORGANIC CHEMISTRY HE. Lectures and recitations, six hours; laboratory, twelve hours. Five semester credits. Prerequisite: A college course in general chemistry. Assistant Professor Hughes.

A systematic study is made of the simpler examples of the more important classes of organic compounds in their logical chemical relations. Such substances as touch the everyday affairs of life are treated in greater detail. Opportunity is thus afforded to consider the hydrocarbons, alcohols, organic acids, fats, soaps, sugars, starch, proteins, and other less-known substances. Compounds used for clothing, fuel, light, antiseptics, disinfectants, anesthetics, poisons, medicines, solvents, etc., are included. Text, Norris's Organic Chemistry.

Laboratory. The laboratory work includes preparations and qualitative and quantitative experiments touching the more important compounds studied in the lectures and recitations. Especial emphasis is placed on the organic compounds found in fuels, foods, fabrics, disinfectants, and other materials used in and about the home. Laboratory guide, Experiments in Descriptive Organic Chemistry, by Alice F. Blood.

130. HUMAN NUTRITION. Lectures and recitations, six hours. Three semester credits. Prerequisites: Acceptable courses in human physiology and organic chemistry. Assistant Professor Hughes.

This is a course in the chemistry of foods and nutrition, and includes, among others, the following topics: The composition of the body; the composition of foods, and methods of investigation employed in their study; the changes that the several classes of foods undergo in cooking and digestion, and the functions which they perform in nutrition; daily food requirements, and the balancing of dietaries; food economy. Chemistry of Food and Nutrition, by H. C. Sherman, is used as textbook, but is supplemented by lectures.

265. HOUSEHOLD CHEMISTRY. Lectures and recitations, two hours; laboratory, twelve hours. Three semester credits. Assistant Professor Brubaker.

This course is designed to give the women in the course in Home Economics qualitative and quantitative work in the chemistry of the materials most intimately related to their daily life. Air, water, foods, fuel, fabrics, disinfectants, metals, and other materials used in and about the home are the subjects of numerous experiments touching their properties, usefulness and defects.

COMMERCE

Assistant Professor BURK

SHORTHAND. Class work and recitations, ten hours. Three semester credits.

The Gregg system of shorthand is used. A standard of one hundred words a minute must be attained in order to complete the course successfully.

TYPEWRITING. Class work and practice, ten hours. Three semester credits.

The touch method of typewriting is taught, and systematic and progressive exercises are given to develop speed and accuracy. A large part of the work consists in transcribing letters dictated in the course in shorthand. The use of the tabular keys, cutting stencils, mimeographing, and the use of the adding machine are taught in this course.

OFFICE ORGANIZATION AND MANAGEMENT. Class work and recitations, three hours. One semester credit.

The principles of business organization and the various duties of a stenographer and of a secretary are studied. Instruction is given in modern office filing and record keeping. A limited amount of practice in bookkeeping is included.

COMMERCIAL LAW. Lectures, class work, and recitations, three hours. One semester credit.

A textbook on commercial law is studied and the relations between law and business transactions are discussed. This course is given for those who plan to enter commercial pursuits rather than government service and for others who may be interested in the study of business.

ECONOMICS AND SOCIOLOGY

Professor KAMMEYER
Doctor MERRITT

101. ECONOMICS. Class work, six hours per week. Three semester credits. Professor Kammeyer.

In this course the fundamentals of the science are presented. The economic development of society is traced through the several stages as a preparation and background for the study of economic theory and principles. The consumption and production of wealth, theories and systems of distribution, and the mechanism of exchange are the basic divisions of the subject. These will include a study of such topics as value, rent, wages, interest, profit, money, banking, organization of industry, labor unions, and others that relate to man's wealth-getting and wealth-using activities. To this will be added, as time permits, a consideration of such related subjects as taxation, transportation, socialism, insurance, etc. Instruction by lectures, assigned readings, reports, and class discussions. Text, Ely's Outlines of Economics.

102. AGRICULTURAL ECONOMICS. Class work, six hours. Three semester credits. Doctor Merritt.

A study of the business of agriculture for the purpose of familiarizing the student with the economic principles and forces with which every farmer has to deal. The fundamental principles of production, distribution, and consumption are taken up with especial reference to agriculture. This course is to acquaint the student with the laws of supply and demand, and the influences determining them. The development of the growing complexity of the economic problems as the transition is made from self-sufficing general farming to localized commercial agriculture are shown. The subjects of ownership and tenancy, labor supply, labor-

saving machinery, marketing farm products, coöperation, farmers' organization, prices, credit facilities, rural credit laws, economic improvement of farm life, taxation, transportation, etc., will be discussed. This course will be given with special reference to the conditions existing in this state. Instruction by lectures, assigned readings, and recitations. Text, Taylor's Agricultural Economics.

201. PRINCIPLES OF SOCIOLOGY. Class work, six hours per week. Three semester credits. Professor Kammeyer.

This is a study of the social and political units of organization, and questions of population, such as immigration, urban and rural population, and problems of city life; marriage and divorce, education and employment in their relation to family life; wealth accumulation and institutional means for the promotion of social well-being; remedial measures, legislative or voluntary, for the solution of social and economic problems. Instruction by lectures, assigned readings, reports, and class discussions. Text, Blackmar and Gillin's Sociology.

207. LABOR PROBLEMS. Class work, two hours. One semester credit. Doctor Merritt.

This course begins with a historical review of the rise of the labor class; then the historical development of labor unions will be briefly treated and extended attention will be given to their organization, aims, methods of offense and defense. Studies of the trade agreement, of strikes, the boycott, the lockout, methods of conciliation and arbitration, the application of the injunction in labor disputes, the political activity of labor organizations, employers' liability, legislation, workingmen's insurance, health insurance, profit sharing and coöperation in relation to labor problems, child labor, woman's labor, the minimum wage, the standard day, poverty and unemployment, immigration, the relation of labor and capital, will be made from the viewpoint of present conditions. Instructions by lectures, assigned readings and recitations. Text, Groat's Organized Labor in America.

210. MONEY AND BANKING. Two hours per week. One semester credit. Professor Kammeyer.

This course embraces a study of money, its history, and characteristics as a measure of value and medium of exchange; and of credit currency, its nature, forms, and limitations. The course also includes a study of the principal banking systems of the world, their machinery and methods; branch banks, clearing houses, the mechanism of foreign and domestic exchange, etc. Special attention will be given to the federal reserve act and the federal farm loan act, as to their purpose, provisions, and operation. Instruction by lectures, class discussions and reports. Text, Holdsworth's Money and Banking.

225. RURAL SOCIOLOGY. Class work, six hours. Three semester credits. Doctor Merritt.

This course will deal with the problems of the rural family, the rural school, the rural church, rural societies and associations, the economic and social activities of the community, and the relation of the state to the general welfare. This will lead to the study of the reasons for the increased interest in rural sociology and rural problems; the effect of environment and occupations on community life; advantages and disadvantages of rural life; marketing and transportation as factors of community development; the various social institutions of the community, boys' and girls' clubs, men's clubs, the grange, and their possible economic and social activities; the rural church; the rural school; the country life movement, and the reorganization of rural and social forces. Interdependence of the town, city and rural life from the viewpoint of their economic and social relations and interests as a necessity for their

mutual community development will be studied. The fundamental problems of rural life under conditions in this state will be analyzed. Instructions will be by lectures, assigned readings and recitations. Text, Voght's An Introduction to Rural Sociology.

EDUCATION

Professor HOLTON
Associate Professor ANDREWS
Assistant Professor PETERSON
Assistant Professor HALM
Assistant Professor STRICKLAND
Instructor ZAHNLEY

101. PSYCHOLOGY. Six hours. Three semester credits. Assistant Professor Peterson.

A general introduction is here given to the forms and laws of conscious experience as based on a knowledge of the physiological conditions of mental life. The work of the course includes the study of a text, outside readings, lectures and class experiments.

105. EDUCATIONAL ADMINISTRATION. Six hours. Three semester credits. Associate Professor Andrews.

This course is a study of the organization of state, city and county schools; the interrelation of boards of education, superintendents, principals, teachers. The school law of Kansas is also studied.

109. EDUCATIONAL PSYCHOLOGY. Six hours. Three semester credits. Prerequisite: Psychology. Assistant Professor Peterson.

The course will deal with those aspects of psychology that have a direct bearing upon educational practices. Attention will be paid to the results of experimental investigations in the field. Lectures and library work.

METHODS OF TEACHING. Six hours. Three semester credits. Assistant Professor Strickland.

The aim of this course is the development of good classroom technique through detailed study of child experiences as related to the larger demands of education. The work includes lectures, library assignments, and observation of classes. A feature of the course is individual reports and discussions. Prerequisite: Psychology.

113. HISTORY OF EDUCATION. Six hours. Three semester credits. Associate Professor Andrews.

This course is intended to present the successive relationships that have existed between educational machinery and practices and the changing political, economic, scientific, cultural, and ideal environments from primitive times to the present.

121. HOME ECONOMICS EDUCATION. Four hours. Two semester credits. Assistant Professor Halm.

This course considers problems dealing with the place of Home Economics in modern secondary education; the aims and phases of work in various types of schools; the organization, maintenance, equipment and supervision of such departments. Prerequisite: Educational Administration.

125. AGRICULTURAL EDUCATION. Four hours. Two semester credits. Professor Holton.

A comparative study is made of the provisions for agricultural education in this and other states and countries and the principles underlying such education. The part played in agricultural education by community, county, state and nation is discussed. Types of schools, courses of study, adjustment of school work to community needs, and the equipment and

administration of agricultural schools are studied. The aim of the course is to fit the student to plan, teach and administer or supervise agricultural work, especially in high schools.

131. SPECIAL METHODS IN THE TEACHING OF HOME ECONOMICS I. Four hours. Two semester credits. Assistant Professor Halm.

This course applies the principles of sound teaching to the selection and development of the subject matter of home economics in lessons for high-school pupils and to the conduct of laboratory and classroom exercises. It is supposed to accompany supervised observation and teaching.

SPECIAL METHODS II. Class work, one hour; laboratory, three hours. Two semester credits. Prerequisite: Methods I.

This course is a continuation of Methods I. Demonstration teaching of type studies in Home Economics is done in the laboratory. A review of technique is given in connection with laboratory practices. A small fee is charged to cover expense of materials. Recommended for inexperienced teachers.

INDUSTRIAL EDUCATION. Six hours. Three semester credits. Assistant Professor Strickland.

This course is a study of typical secondary schools of industrial education and departments of industrial education in public schools; of the industrial schools of Germany; of the making of a course of study in industrial education for elementary and secondary schools; of shop equipment and cost; of the pedagogy of vocational subjects. Prerequisite: Educational Administration.

SPECIAL METHODS IN AGRICULTURE. Six hours. Three semester credits. Mr. Zahnley.

Training in planning lessons, organizing materials, and conducting class and laboratory work in agriculture is the purpose of this course. The work will include observation, criticism and reports of class exercises, a study of work done in high schools, and the making and criticism of lesson plans and outlines. Special attention is given to selecting laboratory materials, conducting laboratory exercises, and adapting class and laboratory work to each other.

SEMINAR IN AGRICULTURAL EDUCATION. Four hours. Two semester credits. Professor Holton.

This course is designed for superintendents, principals and college and high-school teachers of agriculture. It consists of lectures, reports and class discussions on topics of agricultural education. Each member of the seminar is expected to choose a topic early in the term for special investigation and to embody the results of the investigation in a paper. Prerequisites: Psychology and Educational Administration.

ENGLISH

Professor MACARTHUR
Associate Professor DAVIS
Assistant Professor RICE

ENGLISH LITERATURE FOR HIGH-SCHOOL TEACHERS. Six hours. Three semester credits. Professor Macarthur.

This course is intended especially for those teaching or desiring to teach English literature in the high shool. The class work consists not only of lectures by the instructor, the interpretation of the works assigned for study, and the writing of critical essays, but of systematic discussion of methods for presenting the classics to the pupils in the high school and of awakening in them a warm, vital appreciation of the best literature.

LITERATURE FROM THE READERS. Six hours. Three semester credits. Assistant Professor Rice.

This course is planned to meet the needs of teachers of rural and grade schools. The aim of the course is to stimulate the teacher's love for good literature until she becomes conscious of her power to interest, impress and inspire boys and girls. Reading is considered both as a fundamental means of acquiring knowledge and as a stepping-stone to the appreciation of the world's best literature. Special emphasis is placed upon teaching children how to study the reading lesson, and upon the necessity to use in the reading lessons more of the literature of rural life. One hour each week is devoted to special methods of teaching reading.

ENGLISH COMPOSITION FOR HIGH-SCHOOL TEACHERS. Six hours. Three semester credits. Associate Professor Davis.

This course aims to do for teachers of English composition in the high school what the preceding course does for the teachers of literature. Both courses consider particularly the needs of the teacher who has had special training in home economics, agriculture, manual training, or general science, but who has not had such training in English. A definite program of work for the high-school year is constructed and discussed. The best conduct of composition work under the conditions met in the rural and smaller high school receives special consideration.

101. COLLEGE RHETORIC I. Six hours. Three semester credits. Professor Macarthur.

This course consists of a rapid review of the principles of sentence structure, outlining, and paragraphing, followed by a study of the elements of effective writing in prose. In connection with the course systematic training is given in the writing of expository themes.

ENGLISH LITERATURE. Six hours. Three semester credits. Assistant Professor Rice.

This course consists of a general survey of English Literature. Lectures are given on the history of English literature from the earliest times to the present day. In addition, works of representative authors of each period are assigned for reading outside of the classroom. These are discussed in class and passages from them interpreted.

122. BUSINESS ENGLISH. Six hours. Three semester credits. Associate Professor Davis.

This course comprises a thorough review of business letter-writing, exercises in writing contracts, notes, mortgages, wills, orders, sale bills, specifications, model story advertisements, and a practical study of other forms commonly used in connection with business.

ORAL ENGLISH FOR WAR WORKERS. Professor Macarthur.

The work of this course consists of a discussion of practical methods of presenting subjects orally. The material used will be drawn from topics related to the war. A survey will be made of the causes of the conflict and of the various means being employed in its prosecution. The work of the Red Cross, of the National Security League, and of other agencies will be considered. All of the foregoing material will be made the basis for class talks. Constructive criticisms will be given by the instructor.

ENTOMOLOGY

Assistant Professor TANQUARY
Assistant Professor MERRILL

101. GENERAL ENTOMOLOGY. Class work, four hours; laboratory, six hours. Three semester credits. Prerequisites: General Zoölogy I and II, or equivalent. Assistant Professor Tanquary.

This is a study of the elementary anatomy and physiology of insects,

complete enough to give a thorough understanding of the life history and habits of the most important species, and the general principles upon which the control of these economic forms is based. It is a study of the more important general facts about insects as a class; the main characters of the different orders and groups; how they become fitted to survive and multiply; and how the structure and habits of one group render it susceptible to certain measures of control, while in other groups entirely different measures are necessary. Field work forms a limited part of the course.

111. APICULTURE. Class work, four hours; laboratory, six hours. Three semester credits. Assistant Professor Merrill.

This course comprises a general study of the structure, life history, general behavior, activities and products of the honey-bee. Special attention is given to practical beekeeping, dealing with the best methods practical among beekeepers. A study is made of bee diseases and of the standard methods to be used in the eradication and control of them. A study is also made of the relation of bees to agriculture and horticulture.

HISTORY AND CIVICS

Professor PRICE
Associate Professor ILES
Assistant Professor TAYLOR
Assistant Professor JAMES

101. AMERICAN HISTORY I (BEGINNINGS OF THE AMERICAN NATION). Six hours. Three semester credits. Professor Price.

This course gives special emphasis to the industrial phases of the origin and development of American nationality and democracy to the end of the War of 1812. It also includes our constitutional and political development, especially with reference to origin, basis, cause, and effect. It aims to develop historic-mindedness; that is, training the student to put himself in the other fellow's place and understand fairly "the why." The European origin and background of American history, the evolution of colonial life, industries, and institutions; why we became an independent nation; our westward expansion; the establishing of nationality, and the development of government by the people, are phases definitely emphasized. Instruction is given by means of lectures, readings, and recitations.

202. AMERICAN HISTORY II (WESTWARD EXPANSION). Six hours. Three semester credits. Professor Price.

This course concerns itself with the industrial conditions, the issues and the leaders of the middle period of our history, from the War of 1812 to the Civil War. Among the subjects investigated are the industrial and political conditions in America in 1816; the Missouri compromise; the antislavery agitation; the Webster-Hayne debate; South Carolina nullification; annexation of Louisiana, Florida, and especially Texas; the Mexican War, and the resulting preponderance of the slavery issue; the compromise of 1850; the Kansas-Nebraska bill and the early Kansas struggle "to the stars through difficulties," including the various constitutions and the final admission to statehood; the origin of the Republican party; the election of 1860; secession and the Civil War.

This course and the one described above are both based on the American History Notebook, approved by the State School Book Commission, and includes a thorough consideration of the state texts, James and Sanford's American History, Foster's History of the United States, and Arnold's History of Kansas.

203. AMERICAN HISTORY III (THE NEW INDUSTRIAL AGE). Six hours. Three semester credits. Professor Price.

This course opens with a review of the industrial conditions in America

just before the Civil War; next a careful examination is made of the industrial effects of that war; finally a study of the political and constitutional history of the last half-century is made in the light of the industrial conditions and developments of the same period. Manufactures, commerce, and especially agriculture, are carefully examined, particularly with reference to the South and West. The new developments in political parties and the new devices in self-government are studied as to developments, cause, and present conditions. The new America, with its spirit of nationality, its emphatic self-government, and its new world power and responsibility are studied especially in the light of the new industrial developments. Instruction is by lectures, recitations, assigned readings, and special reports.

204. AMERICAN AGRICULTURAL HISTORY. Six hours. Three semester credits. Professor Price or Assistant Professor Taylor.

This course is intended primarily for those who wish to make a special study of the rural elements, questions, problems, and changing conditions in our national development. It starts with a study of European background and Indian beginnings. It traces and compares the agricultural development of New England, the South, and the central colonies during the colonial period; then follows the westward movement into the Mississippi valley, with the distinctive American developments in life and manners, and especially in the invention and use of machinery with its epoch-making results. The course gives special consideration to the South, with its cotton; to the Northwest, with its wheat; to the Southwest, with its livestock; and to the Corn Belt, with its varied industries. A special study is made of the last quarter century, when varied industries, more intensive farming and the high cost of living are replacing extensive mining of the soil, with its remarkable era of low cost of living, its rapid accumulation of wealth, and the resulting developments of civilization. The new South, the far West, and the relation of all this to our own state are interesting phases of the course. Instruction is given by lectures and recitations, readings and reports.

105. AMERICAN INDUSTRIAL HISTORY. Six hours. Three semester credits. Assistant Professor Taylor.

This course traces the history of American agriculture, manufactures and commerce with related activities from their colonial beginnings to the present. It includes a survey of the physical basis for American history, the growth of population and its expansion across the continent, and the reflection of these things on our industrial, social and political life. European developments, especially the industrial revolution and the expansion of commerce, are studied for the light they throw on American history. Finally, throughout the course an attempt is made to trace the growth of our national industrial organization and its present-day aspects. This course is based on Outlines of American Industrial History, prepared by the department. A text such as Coman's Industrial History of the United States or Bogart's Economic History of the United States is required, and the student is held responsible (*a*) for the contents of his text, and (*b*) for assigned library work and lectures.

121. ENGLISH HISTORY. Six hours. Three semester credits. Assistant Professor Taylor.

A survey is made of the whole field of English history, with special emphasis on the modern period. The Tudor and Stuart regimes, with their bearings on constitutional and political advance and New World history, the growth and organization of the empire, the commercial and industrial revolutions, and more recent political, social and industrial developments, will be studied in as much detail as the time allows. Throughout, some notice will be taken of contemporary world history and of England's position in international affairs leading up to her part in the Great War. The course is based on Cheyney's Short History of England as a text, with lectures and assigned readings.

223. MODERN EUROPE (SINCE 1814). Six hours. Three semester credits. Associate Professor Iles.

This course traces the evolution of modern European nations since 1814, with special attention to political organization, industrial development, and colonial expansion. Political problems and social and economic adjustments due to the Great War are included. A desirable course for all who wish a large view and clear understanding of the Europe that is now involved in war. Recitations, lectures and assigned readings. Text, Hayes's A Political and Social History of Modern Europe, vol. II.

TEACHERS' COURSE IN HISTORY. Four hours. Two semester credits. Associate Professor Iles.

This is a seminar course of discussions based on Henry Johnson's Teaching of History in Elementary and Secondary Schools, together with Mace's revised work, Method in History, and supplemented by a study of the Report of the Committee of Seven, and of the Committee of Five on History in the Secondary Schools, and the Committee of Eight on History in the Elementary Schools. A critical examination is made of special books on method in history and civics, such as Wayland's How to Teach American History, and of special articles in the History Teachers' Magazine. The different texts in history and civics are critically investigated as to points of excellence or weakness, including lectures on the content or viewpoint of each. Information is also given as to the best illustrative material and helps in the teaching of history and civics. This course reveals the evolution in the writing of history, and the growing importance of history and civics in the modern school curriculum, together with the improving viewpoint as to content of both the history and the civic courses.

207. PAN-AMERICA. Four hours. Two semester credits. Assistant Professor James.

This course will deal, in some measure, with the European background of Spanish, Portuguese and Saxon America. In greater degree, it will comprise a careful study of the conquest, the native civilizations and the institutions and life of the colonial period. As regards Latin America and Canada, considerable stress will be placed upon present-day conditions, political, social, and economic, and upon the relations of these countries with the United States. The work of the course comprises a careful study of a text, supplemented by assigned readings, map work and lectures.

126. CURRENT HISTORY. Two hours. One semester credit. Assistant Professor James.

The subject matter of this course varies each semester from that of any other semester. The student is guided in the study of this course by such weekly magazines as *The Independent* and *The Outlook*, supplemented by such monthly periodicals as *The Review of Reviews*, *World's Work*, *Current Literature*, etc. The course is designed to give the student as wide an outlook on contemporary world movements and as good an understanding of the conditions and institutions in the midst of which he lives as can be crowded into two recitation periods per week. At the same time it directs the student to good habits of news reading of the right sort.

AMERICAN NATION I. Seven and a half hours. Four semester credits in the School of Agriculture, or the first half-unit of American History for college entrance. Assistant Professor James.

This course comprises a survey of American history from the discovery of America to the overthrow of the Federalist party in 1800. It deals with the establishment of the English colonies in America, the growth of social and political institutions in these colonies, the development of an American nationality, the struggle among European nations

for possession of North America, the divergent English and American political theories, the causes and meaning of the American Revolution, the schemes for financing the Revolutionary war, the European diplomatic entanglements, the relations of the Continental Congress and the states, the efforts to solve the problem of imperial organization, the Constitutional Convention, and the Federalist organization of the new government. Along with the political history of this period goes a study of America's economic development to 1800. Texts: West's American History and Government, and Bogart's The Economic History of the United States.

MODERN HISTORY II. Seven and a half hours. Four semester credits in the School of Agriculture, or the last half-unit of Modern History for college entrance. Assistant Professor James.

This course is designed to set forth the history of Europe since the Thirty Years' War. The rise of Prussia and of Russia, the decline of Spain, the ascendancy of France, the great Revolution, the Napoleonic empire, are the chief subjects for study during the early part of the course. The latter part is given over to a study of the growth of nationalities in the nineteenth century, special attention being directed toward the social, political and economic developments of the period, as well as to the international relations, all with the object of making clear in some degree the causes operating to bring about the present Great World War. The text used will be Harding's New Medieval and Modern History, together with Robinson and Beard's Outlines of European History, Part II, and assigned readings.

151. AMERICAN GOVERNMENT. Six hours. Three semester credits. Associate Professor Iles.

This course in civics, or actual government, reviews definitely the fundamental principles and operations of our state and national governments, including the essential principles of constitutional law, but gives special emphasis to the actual present-day conditions and movements in our governmental and political life. Among the subjects especially studied are the initiative and referendum, suffrage and primary elections, the recall, city government and government of territories, the regulation of commerce, conservation of national resources, national defense, taxation and finance, the actual methods of congressional activity, and the function, organization, power, and importance of political parties in our government. The course is primarily based on Beard's American Government and Politics. Throughout this course special and definite attention is given to recent and current events in governmental activities.

CIVICS. Seven and a half hours. Four semester credits in the School of Agriculture, or one-half unit for college entrance. Assistant Professor James.

This course, while designed primarily to meet the needs of teachers of civics in grammar schools and in high schools and of those preparing for college, is intended generally as a preparation for the duties of citizenship. Therefore, the emphasis is laid upon the actual workings of American government, with due attention to recent changes and tendencies in state and nation. The text used is Guitteau's Government and Politics in the United States, Kansas edition, supplemented by assigned readings.

INDUSTRIAL JOURNALISM AND PRINTING

Professor CRAWFORD
Instructor KEITH

107. ELEMENTARY JOURNALISM. Four hours. Two semester credits. This course should be accompanied by Journalism Practice I to give four credits. Professor Crawford.

This course is designed to give the students practical experience in the fundamentals of newspaper work. It is intended to prepare for more advanced courses in journalism or to give necessary training for effective use of the written article in farm bureau, educational, and other vocational activities. Methods of obtaining news of various types, the writing of the lead, and the general style of the news story are carefully considered. The duties of the reporter and the physical, mental and ethical demands made upon him are briefly presented. Attention is given to the history and scope of journalism. In the Summer School, this course takes up also the teaching of news writing in the high school.

110. JOURNALISM PRACTICE I. Eight hours. Two semester credits. Professor Crawford.

This course embodies actual practice in journalism, as closely approximated as possible to actual newspaper work. Students are required to gather news, both assigned and unassigned, and to write the stories in the department work room. The College campus is divided into "runs" which the students cover at regular intervals, and assignments are given at specific times as in a newspaper office. The work is adapted to the needs and qualifications of each student.

CURRENT PERIODICALS. Four hours. Two semester credits. Professor Crawford.

The course comprises a study of current periodicals of various types. Special emphasis is laid on the material that they contain and the nature of its appeal to the reader. It is a nontechnical course, intended to give general students or teachers some knowledge of the field of current periodical literature.

PRINTING PRACTICE. Eight hours. Two semester credits. Instructor Keith.

A study of composition of general printing-shop practice, including cost finding, is made in this course. The work is adapted to the needs of those taking it, but is intended particularly for high-school teachers of printing and for those who expect to have editorial supervision of publications, including high-school papers. Lectures are given on such subjects as the history of printing, artistic typographical arrangement, and the use of printing as an aid in the study of spelling, punctuation, and English composition. More advanced work will be given to students prepared for it.

MATHEMATICS

Associate Professor WHITE
Assistant Professor STRATTON
Instructor FEHN

ALGEBRA I AND II. Seven and a half hours. Four semester credits. Assistant Professor Stratton.

A review course over the usual topics presented in the first year's work in algebra. Treatment is given of linear equations, factoring, fractions, graphs, simultaneous linear equations, involution, evolution, theory of exponents, radicals, quadratic equations, with application to practical problems. Text, Wells and Hart's New High-School Algebra.

PLANE GEOMETRY I AND II. Seven and a half hours. Four semester credits. Mr. Fehn.

The material here studied comprises the principal theorems and constructions of the first year's course in elementary geometry. Problems and original exercises are given an important place. Text, Wentworth and Smith's Plane and Solid Geometry.

SOLID GEOMETRY. Seven and a half hours. Four semester credits. Associate Professor White.

This course comprises the usual theorems and constructions, including the relation of planes and lines in space; the properties and measurements of prisms, cylinders, pyramids, and cones; the sphere and spherical triangle. The solution of many numerical and original exercises is required and mensuration of surfaces and solids is treated. Text, Wentworth and Smith's Plane and Solid Geometry.

PLANE TRIGONOMETRY. Six hours. Three semester credits. Mr. Fehn.

Measurement of angles, functions of any angle, functions of multiple and submultiple angles, sum and difference formulæ are included in this course. Triangles and trigonometric equations are solved. Text, Palmer and Leigh's Plane and Spherical Trigonometry.

ANALYTICAL GEOMETRY. Seven and a half hours. Four semester credits. Assistant Professor Stratton.

Coördinate systems and applications; loci; the straight line, circle, parabola, ellipse, and hyperbola are studied in this course. The subject matter is that of the usual first course. Text, Bailey and Wood's Plane and Solid Analytical Geometry.

CALCULUS II. Six hours. Three semester credits. Associate Professor White.

The subject matter of this course belongs in the main to integral calculus. Emphasis is laid upon the applied side. Problems involving areas, lengths, surfaces, and volumes are treated by methods of single integration. The idea of successive and partial integration is applied to areas, moments, centers of gravity, surfaces, volumes, etc. The types of differential equations which the student of engineering is most likely to meet with in his subsequent work are briefly discussed. Text, Phillip's Differential and Integral Calculus.

TEACHERS' COURSE IN HIGH-SCHOOL MATHEMATICS. Two hours. One semester credit. Associate Professor White.

This course undertakes an examination of the subject matter and methodology of high-school mathematics. It includes a study of high-school needs and of high-school courses in algebra, geometry and trigonometry, with bibliographies and other sources of assistance in teaching high-school mathematics. The course includes also a study of the mathematical situation of the past decade as regards the high-school, with present outlook, problems, and purposes. The work proceeds by readings, lectures, and reports. The student should have as a basis of his work Young's The Teaching of Mathematics.

TEACHERS' COURSE IN ARITHMETIC. Two hours. One semester credit. Assistant Professor Stratton.

This is a course for rural and grade teachers and those interested in the applications of arithmetic to the everyday problems of the farm, shop, and home. Special attention is given to a study of the sources and the preparation of supplementary problems for schools. Some attention is given to the history, recent studies and advancements, and approved methods of presenting the subject. Texts, Stratton and Remick's Agricultural Arithmetic, and Brown and Coffman's How to Teach Arithmetic.

MODERN LANGUAGES

GERMAN

Professor CORTELYOU

101. GERMAN I. Six hours. Three semester credits.

After two periods given to the acquisition of the sounds of the German letters, the student at once begins reading. Vocabularies are learned from the outset, while grammar is acquired gradually through reading. Oral and written work and simple conversational exercises begin with the first reading lesson. In the work of this term there is included the study of articles, declensions of nouns and pronouns, the indicative mode of weak verbs, sentence order, and the comparison of adjectives. Frequent reviews enable the student to digest the facts presented, while the abundant conversation and written work subserves the same end. Text: Vos's Essentials of German (first eighteen lessons).

106. GERMAN II. Six hours. Three semester credits.

The remaining important points of grammar are studied. Students are repeatedly drilled on the grammatical constructions already emphasized in Elementary German I. The general plan of the work is the same as in the preceding term. Essential facts of grammar are insisted upon, but German is taught as a living language. Conversational exercises in German and written translation from English into German are frequent. Text: Vos's Essentials of German (completed).

111. GERMAN READINGS. Six hours. Three semester credits.

This course embraces readings of dialogue selections which deal in detail with German life, customs, history, and mythology. A few of the best and most popular song poems also are studied. Grammatical drill is continued, with occasional sight readings and translations into German. Conversations are based on the readings. The student learns to read and write German script. Text: Bacon's Im Vaterland.

206. GERMAN COMEDIES. Six hours. Three semester credits.

The course comprises the reading of recent one-act comedies of literary merit, and of a realistic, lively and cleanly humorous nature, including the following: Julius Rosen's Ein Knopf, Gustav von Moser's Ein amerikanisches Duell, Hugo Mueller's Im Wartesalon erster Klasse, and Emil Pohl's Die Schulreiterin. Exercises in conversation and sight reading are occasionally introduced. Text, Manley and Allen's Four German Comedies.

SPANISH

Instructor LIMPER

176. SPANISH I. Six hours. Three semester credits.

Because of the practical value of Spanish, particular attention is paid from the very beginning to the spoken language. The vocabulary used consists of words and phrases employed in everyday life. Much drill is given on verb forms. At the end of this course the student should be able not only to express his thoughts in simple Spanish, but also to read newspaper articles and to carry on ordinary correspondence with the assistance of a dictionary. A number of lessons are devoted to business forms. Text, Coester's A Spanish Grammar (Part I).

FRENCH

Instructor LIMPER

151. FRENCH I. Six hours. Three semesters credits.

The phonetic symbols being a great help in the acquisition of accurate pronunciation, the first two days are devoted to learning these symbols and a number of useful expressions in French. The recitations are con-

ducted largely in French and considerable time is devoted to conversation. Nevertheless, conversation is considered merely a means to the acquisition of a reading knowledge of French. The fundamentals of Grammar are covered in this semester and reading matter in the grammar is supplemented by a reader. Text: Olmsted's Elementary French Grammar (first twenty-two lessons) and Allen and Schoell's French Life (thirty pages).

156. FRENCH II. Six hours. Three semester credits.

This course is a continuation of French I. The grammar is completed, special attention being given to irregular verbs. Reading and conversation are continued throughout the course. Students who have had one year of French in high school begin with this course. Texts: Olmsted's Elementary French Grammar (Lesson XXII to the end) and Allen and Schoell's French Life.

161. FRENCH READINGS. Six hours. Three semester credits.

This is essentially a reading course, the purpose being to enlarge the student's vocabulary. Grammar is reviewed and considerable time is devoted to conversation. Fontaine's En France and one other short French text are read.

MILITARY FRENCH. Three hours a week. No outside preparation. No credit. Mr. Limper.

In this course the maxim "We learn to speak by speaking" is kept in mind. Only the most essential points of French grammar are dwelt upon. A vocabulary of several hundred words pertaining to military life is mastered. Much drill is given on the present and past tenses of the most common verbs. Training the ear to understand spoken French receives particular attention. Text: First Lessons in Spoken French for Men in Military Service, by Wilson, Coleman and Huse.

MILITARY TRAINING

Captain O'NEILL
Assistant Professor WENDT

Classes in military training will be formed, the hours to be arranged.

MUSIC*

Professor WESTBROOK
Associate Professor BROWN
Instructor JOHNSTON
Instructor ABERNETHY

PUBLIC-SCHOOL MUSIC. Four hours. Two semester credits. Professor Wesbrook, Associate Professor Brown.

This course is a general survey of music in public schools from the primary grades through the high school. Methods of presenting music to children in the different stages of development are taught and materials for such work are studied. Suggestions for community music work are also given.

VOICE. Private instruction. Professor Wesbrook and Instructor Johnston.

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* The following fees are charged for private instruction in music:

Two half-hour voice lessons per week throughout the term, with Director Westbrook	$16.50
Same, with Instructor Johnston	11.00
Violin or band instruments, with Associate Professor Brown	11.00
Piano, with Miss Abernethy	11.00

The fees named are just one-half of the regular College semester fees.

Hours to suit the convenience of students are arranged for those wishing private vocal instruction. For two half-hour private lessons a week one credit is given.

VIOLIN. Private instruction. Associate Professor Brown.
This work is organized after the same plan as vocal instruction. Credit of one hour is given for private instruction.

PIANO. Private instruction. Instructor Abernethy.
This work is organized the same as Voice and Violin and a special piano teacher is in charge.

HARMONY. Four hours. Two semester credits. Associate Professor Brown.
The course in harmony includes the study of scales and intervals, primary and secondary chords and their inversions, harmonizing given bases and melodies, ear training, the chord of the dominant seventh, and keyboard harmony. Students contemplating teaching music in public schools will find this work invaluable to them, as it is the grammar and mathematics of music. At least five must enroll for harmony or the class will not be organized.

MUSICAL HISTORY. Two hours. One semester credit. Associate Professor Brown.
A brief survey of the primitive development of the art is given, together with special attention to the classical and romantic periods and present-day conditions and tendencies. The work is made especially interesting by use of copious illustrations on the phonograph.

CHORUS. Two hours. Twice a week, one hour periods. One semester credit. Professor Westbrook.
Every student enrolled in the Summer School is urged to sing in the chorus. This work will be the study and public presentation of beautiful choruses.

ORCHESTRA. Two hours. One semester credit. Associate Professor Brown.
Every individual who plays an orchestral instrument is urged to bring that instrument and play in the Summer School Orchestra. High-grade orchestra music is studied and is presented in public performances.

PHYSICAL EDUCATION

COURSES FOR MEN

Courses for men are designed primarily to instruct men who desire expert practical knowledge of the best methods of coaching football, base ball, basket ball, and track and field athletics. These courses should appeal strongly to men who plan to take up coaching as well as men already engaged in coaching in high schools and colleges.

These courses will be conducted by lectures and by practical demonstrations.

Throughout all the courses, lectures and demonstrations will be given on the care and prevention of injuries, how to guard against injuries, how to care for them, and the best methods of bandaging sprains and weak joints.

FOOTBALL. Lectures and recitations, —— hours; field and demonstration work, —— hours. Professor Clevenger.
This course will cover the following phases: spirit of the game, discussion of the rules, tackling the dummy, charging sled, defense in general, line defense, secondary defense, kick-off, punting, place kicking, drop kicking, direct pass plays, systems of offense in general, quarterback pass plays, interference, signals, training, and equipment.

BASKET BALL. Lectures and recitations, —— hours; floor and demonstration work, —— hours. Professor Clevenger.

The work will cover the discussion of the rules, technique of basket shooting, foul throwing, catching and passing, dribbling, reverse turn, different styles of play, offense, defense, team work, selection of players, training and equipment.

BASE BALL. Lectures and recitations, —— hours; field and demonstration work, —— hours. Professor Clevenger.

The course will cover the discussion of the rules, fielding, batting, bunting, base running, sliding, team work, pitching, catching, proper way to play each position, indoor and outdoor practice methods, coaching, signals, training and equipment.

TRACK AND FIELD SPORTS. Lectures and recitations, —— hours; field and demonstration work, —— hours. Professor Clevenger.

This course will cover the discussion of the rules, starting, sprinting, distance running, hurdling, jumping, vaulting, shot putting, discus throwing, javelin throwing, training, dieting, and equipment.

COURSES FOR WOMEN

GYMNASTICS. Lectures and recitations, one and one-half hours; practical work, three hours. One semester credit. Instructor Loring.

This course is especially planned for the needs of the teacher in the public schools where no special teacher in this subject is employed. Lectures are given on the general theory of gymnastics and the physiological reason for each exercise. A notebook is required.

Practical Work. The practical work includes free exercises, hand apparatus, heavy apparatus, and practice teaching.

FOLK DANCING. Lectures and recitations, one hour; practical work, four hours. One semester credit. Instructor Loring.

Lectures are given on the physiological benefit derived from the dances, in costuming, and in the use of the dances in festivals and fetes. A notebook is required.

Practical Work. This course offers graded folk dances of the different nations, suitable for use in schoolrooms, playgrounds, or gymnasiums.

GAMES. Lectures and recitations, one hour; practical work, four hours. One semester credit. Instructor Loring.

Lectures are given on the problems of grading games, and on the physiological benefits received. A notebook is required.

Practical Work. This course offers practice in games for grammar schools, high schools, playgrounds and gymnasiums.

ESTHETIC DANCING. Practical work, three hours. One-half semester credit. Instructor Loring.

Practical Work. This is a class for beginners. Technique and simple esthetic dances are taught. No exercise gives better training in muscle control, poise, and good carriage than does esthetic dancing.

TECHNIQUE OF BASKET BALL, BASE BALL, AND HOCKEY. Lectures and recitations, two hours. Two-thirds semester credit. Instructor Loring.

This course is devoted to the technique of these sports, the physiological benefit derived, and the organization of each into interclass contests.

SWIMMING. Five hours. No credit. Instructor Loring.

PHYSICS

Professor HAMILTON
Assistant Professor FLOYD
Instructor SMITH

GENERAL SCIENCE. Class work, six hours. Three semester credits for admission; no college credit is given. Assistant Professor Floyd.

This course is intended for those teachers who are required to offer courses in general science in public-school work. The course includes class, laboratory and field work. It is based on such everyday problems as: Water supply, air supply, weather predictions, light supply, prime motors, transportation, crops, and similar problems, with a study of what science in general has done and can do to solve them. Text to be selected.

INTRODUCTORY PHYSICS. Class work, four hours; laboratory, six hours. Three semester credits for admission; no college credit given. Instructor Smith.

This course is designed for those teachers who desire some knowledge of elementary physics and yet have not time to take the three regular courses offered in this subject. The entire subject is covered and some time given to working problems. Simple experiments and demonstrations are given. The course is a good review for those who have had high-school physics. Students who expect to take county examinations for certificates to teach are advised to take this course. Text, Black and Davis's physics.

ELEMENTARY PHYSICS I. (H-I, M-I, A-I.) Class work, six hours; laboratory, four hours. Four semester credits in the School of Agriculture. Prerequisite: Algebra III. Assistant Professor Floyd.

This course is intended to give a general view of mechanics, sound and heat. Special emphasis is placed upon principles which will be met again in later work in the same or other sciences. Text, Black and Davis's Physics.

ELEMENTARY PHYSICS II. (H-II, M-II, A-II.) Class work, six hours; laboratory, four hours. Four semester credits in the School of Agriculture. Prerequisite: Elementary Physics I. Instructor Smith.

This is a continuation of Elementary Physics I and includes a study of light, magnetism and electricity. The fundamental laws are studied and illustrated and the working principles of many electrical appliances in daily use are made the subject of class discussion.

TEACHERS' COURSE IN PHYSICS. Class work, four hours; laboratory and library, four hours. Three semester credits. Assistant Professor Floyd.

The course includes a study of the modern texts, manuals and methods in high-school physics. Students are given an opportunity to help assemble apparatus and to assist in lecture demonstrations, such as lantern, X-ray, manipulation of generator and motor, induction coils, storage cells, spectroscope, nickel-plating, etc. The laboratory includes the usual experiments required in the elementary course in physics. The purpose of the course is to discuss methods best adapted to the presentation of those topics which present special difficulty, to advise methods of illustrating and demonstrating the fundamental principles, and to select from a large number of possible laboratory experiments a list which might be used in any of our high schools of Kansas. This course is intended for those who are either teaching or expecting to teach physics in secondary schools.

HOUSEHOLD PHYSICS. Six hours. Three semester credits. Professor Hamilton.

This is a course of lectures and demonstrations, in which the laws relating to principles involved in appliances of the household are explained and illustrated. The work in heat is based upon thermometry, calorimetry, radiation, absorption, and methods of refrigeration and ventilation. The course includes a study of light with its color phenomena and actinic effects; of some of the optical instruments used in scientific work; a study of electric lighting and illumination, and of the home, including suggestions for the proper use and care of electrical apparatus for the protection of the appliances and of the operator.

COLLEGE PHYSICS II. (Engineering Physics II or General Physics II.) Class work, six hours; laboratory, six hours. Five semester credits. Professor Hamilton.

This is an advanced course in electricity and light. It is the same as is required of all engineering and general science students, and gives the student a working knowledge of the units employed in measuring current and of various methods of producing current, and acquaints him with the electrical appliances used in both current production and electrical measurements. The laboratory work includes the work with generators and motors, photometers, lamp tests, spectrometers, and advanced problems in both electrical measurements and light. Text, Kimball's College Physics.

PHOTOGRAPHY. Class work, two hours; laboratory, six hours. Two semester credits. Professor Hamilton.

The importance of a record of exact details, as shown in photography, makes this work valuable to all scientists. The course gives the student some knowledge of chemical and physical principles involved in the art, as well as practice in making good negatives and prints. The lecture and laboratory work deals with: things to be considered in selecting a camera; proper exposures; composition of pictures; proper development of plates; tests of different developers; retouching; reducing and intensifying negatives; printing and mounting; making lantern slides, bromide enlargements, and the prints best adapted for illustrated articles in newspapers and magazines.

130. WIRELESS TELEGRAPHY. Class work, two hours; laboratory, six hours. Two semester credits. Prerequisite: Elementary physics. Professor Hamilton and Assistant ———.

The work includes a study of the most efficient types of receiving and transmission sets, a study of the fundamental principles of electric waves, and of the most important points to be observed in the erection of a good plant.

Laboratory.—The student learns in the laboratory to receive and to transmit messages and as he learns the code he is instructed in field work.

PUBLIC SPEAKING

Professor BURNS

EXTEMPORE SPEECH I. Four hours. Two semester credits.

The work of this course consists in the preparation and delivery of short addresses based on prepared outlines. Careful preparation of material is required. The plan of the speech is made in advance, but the choice of language is left for the moment of speaking. Criticisms and points of theory, given by the instructor, supplement the practice work. Conviction, not entertainment, is the dominant purpose in the course.

DRAMATICS. Four hours. Two semester credits.

This is not an elaborate study of the drama, but aims to give instruction in dramatic presentation. Practice work predominates. Special

attention is paid to "home talent" or amateur theatricals, and methods of coaching are suggested. The "Little Country Theater" idea is developed.

ADVANCED PUBLIC SPEAKING. Two hours. One semester credit.

In this course the work consists of the preparation and delivery by the student of one extended lecture-recital, lecture, or address during the term. This is supplemented by class lectures and practice, and by a study of types. It may include the preparation and delivery of institute talks or of addresses suitable for extension work.

PUBLIC SPEAKING FOR TEACHERS.

This course is designed, first, to give the teacher training in the art of reading and speaking from the public platfrom; second, to give the teacher a knowledge of the principles of public speaking as they apply to pedagogy. Practice work predominates. The situation in the grades and high schools is covered. Special emphasis is placed upon the teaching of reading in the schools.

SUMMER SCHOOL PLAY.

The department prepares and presents during the session one amateur play. The Summer School plays are of a standard type, good royalties being paid to secure them. Any student enrolled in the Summer School is eligible to try out for the cast.

ZOÖLOGY

Professor ACKERT

I. ZOÖLOGY FOR TEACHERS. Class work, three hours; laboratory, twelve hours. Three semester credits. No prerequisites. This course may be substituted for Economic Zoölogy, upon completing enough work to meet the approval of the instructor.

This course consists largely of early forenoon field trips to the various meadows, woods, ponds, and streams in the vicinity of Manhattan. It is a combination of the study of animals in their habitats in relation to each other, to plant life, and to man, and of methods of conducting field trips with children and high-school students. Collections of live forms are made during the trips, and these are studied in more detail in the aquaria and cages in the laboratory. Special study is made of methods of keeping animals alive in aquaria and cages for further observation of habits and forms. Several children are selected from the grade schools and allowed to make a number of the trips and to participate in the studies in the field and laboratory and in the arrangement of the aquaria and cages.

II. ZOÖLOGICAL PROBLEMS. Elective for undergraduates. One or two semester credits. Prerequisites, consult instructor.

Individual problems in heredity, parasitology, cytology and embryology, and animal behavior are assigned by the instructor with whom the work is done.

III. RESEARCH IN ZOÖLOGY. Elective for graduates. Prerequisite, consult instructor.

Individual research problems in heredity and experimental evolution, parasitology, cytology and embryology, and animal behavior are assigned.

Short Summer School Session for Women

June 1 to June 22, 1918

A three-weeks session has been instituted for those women who are unable to avail themselves of the opportunities of the regular nine-weeks Summer School session but desire to take courses of very great practical value in the present war emergency. All of these courses are open to the women of Kansas regardless of their previous education.

COURSES IN THE SHORT SESSION

THE USE AND CONSERVATION OF FOODS.* Fifteen periods of two hours each.

The canning, drying, and preservation of various foods by different methods is fully covered. This course is offered in two sections, and each student may choose the one best suited to her needs.

Section A. A laboratory course† in which each student does the actual work of canning, drying, and preserving, under the direction of a teacher.

Section B. This course is given in daily demonstrations. The student is not required to do any work.

FUNDAMENTALS OF FOOD AND NUTRITION IN RELATION TO THE WAR.* Fifteen periods of two hours each.

The purpose is to teach the principles of nutrition as applied to the planning of the family dietary. Special stress is given to low-cost substitute foods and to war breads. The student may take the work in either one of two sections:

Section A. A laboratory course, in which the student does the work under the direction of the teacher.

Section B. This course is given by demonstrations in which the students do not do the work. Otherwise it is the same as that given under Section B.

GARMENT REMODELING. Twelve hours a week.

The great demand for wool and cotton by the government makes it necessary to economize on our domestic demands for these materials. Linen and knit goods may also be used to advantage. It is the purpose of this course to utilize materials which usually are discarded and to establish among women greatly needed economy and thrift. Students electing this work will bring old garments of any fabric. These must be ripped apart and be thoroughly cleaned. The remodeling of these materials will assist the country to conserve her supply for army and navy use.

RED CROSS SURGICAL DRESSINGS. Six hours a week. The class is to qualify for teachers' certificates.

This course includes instruction in the making of dressings that are most needed in the hospitals in our own training camps and also in France. A call comes to every woman in America to do some distinct service for her country. The Red Cross organization is making an appeal for teachers and workers in surgical dressings and hospital garments.

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*The courses in foods are arranged by the United States Food Administration.

†The fee for each laboratory course is $1; for each demonstration course 25 cents. This covers merely the cost of material. No student is permitted to attend class unless the fee is paid. Those taking laboratory courses should come provided with aprons.

HOSPITAL GARMENTS. Twelve hours a week.

Under the name of the Woman's Bureau of the American Red Cross, an appeal comes to assist in making garments and supplies for hospitals and refugees. Strict conformity must be observed. Official patterns and materials must be used. Articles such as bed shirts, operating gowns, pajamas, hospital linen and supplies are needed.

ELEMENTARY HYGIENE AND HOME CARE OF THE SICK. Seven and a half hours a week.

The object of this course is to teach women personal and household hygiene in order that they may acquire those habits of right living which will aid in the prevention of sickness and assist in the upbuilding of a strong and vigorous people. It is planned to give women simple instruction in the care of the sick in their own homes, so that they may intelligently render such service as may be safely intrusted to them. Those taking this course will find it helpful for their own personal use in the home and in the community. They will also be better able to assist, under the auspices of the Red Cross, in rest rooms, in convalescent homes, and in other activities, should they be required for service in time of war. It is expected that such service will be without compensation. The fee for the Red Cross certificate is 50 cents.

Division of College Extension

EDWARD CARL JOHNSON, *Dean*

The people of Kansas believe in using their educational institutions to their full capacity, not only for the students privileged to come to them, but also for the State at large. They know that the number who complete a College course in agriculture, engineering, or home economics is small in comparison to the great majority of the people who can not go to college, and it is their wish that this majority also may be served. With this desire the Agricultural College is in full sympathy, and it is its ambition not only to give its resident students the best possible training for leadership in life's work but to be of direct service to every community of the State.

As far back as 186X conventions of the farmers of Manhattan and vicinity were held at the College. The first well-organized farmers' institute conducted under the auspices of the faculty was held at Manhattan, November 14, 1868, and this was followed by a similar gathering at Wabaunsee, November 21 and 22 of the same year. In 1868 the Board of Regents adopted a resolution recommending "that a system of lecturing on agricultural subjects at this College and the populous settlements of the several counties of the State should be conducted so that the benefits of farming according to correct agricultural principles may be disseminated throughout the State."

A few meetings were held each year for the next several years, increasing in number from 1879, but no definite appropriation for extension work was made until 1899, when $2,000 per year was appropriated for this purpose by the State legislature. The annual appropriation remained at this figure until 1905, when the legislature appropriated $4,000 for the work, to which the College added $800. Up to 1905 no regular staff for extension work was employed, and all extension activities were conducted by a committee. In October of that year, however, a superintendent to organize the institute work was selected by the Board of Regents, and in July, 1906, the Department of Farmers' Institutes was formally organized.

The interest in extension work throughout the State now developed rapidly. In 1907 the legislature appropriated $10,500 for the two years, to which the College added $1,000. In 1909 the belief in the value of agricultural extension was so great that $52,500 was appropriated by the legislature for the biennium, and this amount has been increased by each succeeding legislature, $35,000 being appropriated for 1912, $40,000 for the year 1913, $45,000 for 1914, and $50,000 for the year ending June 30, 1915.

This rapid development of extension work was made possible not only because the people of the State wished to have such work done, but be-

cause much new light has been thrown on the essentials in agriculture by the effective experimental work done by the Experiment Stations and by the United States Department of Agriculture.

In 1914 the federal government felt that the useful and practical information on subjects connected with agriculture and home economics developed by the experiment stations, by the Department of Agriculture, and by the experience of the best farmers and farm homes should be made more readily available to everyone; and in order that it might be more fully and effectively diffused among the people of the several states and its practical application encouraged, the Congress of the United States, in 1914, passed the Smith-Lever bill, which provides for "coöperative agricultural extension work between the agricultural colleges in the several states receiving the benefits of an act of Congress approved July 2, 1862, and of acts supplementary thereto, and the United States Department of Agriculture." To further this act the Congress provided for an annual appropriation of $480,000, of which $10,000 is paid each year to each State which assents to the provisions of the act. This initial appropriation is increased each year for seven years, such increase being allotted annually to each State in the proportion which the rural population of such State bears to the total rural population of all the states, providing an equal sum has been appropriated for that year by the legislature of such State, or has otherwise been provided from within the State, for the maintenance of the coöperative agricultural extension work.

Under this act the coöperation of the agricultural colleges and the United States Department of Agriculture has been assured, extension work has become a national as well as state project, and its effectiveness has been greatly increased.

The governor of the State and the Kansas legislature of 1914 accepted the provision of the Smith-Lever act immediately, and $10,000, therefore, was secured from the federal government for extension work for the year ending July 30, 1915. The additional sums coming from the federal funds under this act to the State for the year ending June 30, 1916, and 1917, respectively, were $14,555.45 and $26,685, and for the years 1918 and 1919, $38,816 and $50,946, respectively. These sums were offset by an equal appropriation by the legislature of Kansas, and in addition, from the appropriation made to the Agricultural College for all its work, $30,000 was set aside for extension work for the year ending June 30, 1918. The total sum for extension work under the Smith-Lever act and from State funds for the year ending June 30, 1918, therefore, is as follows: From the federal government through the Smith-Lever act, $48,816; from the State through the Agricultural College, $30,000; from the State direct appropriation to offset the Smith-Lever appropriation, $38,816; total, $117,632.

Another act of the legislature, of very great importance to the extension activities of the Agricultural College and to the State, went into effect July 1, 1916. This is known as the county farm bureau law, or "An act providing for State and county appropriations for the support of county farm bureaus." It provides "that whenever there shall be organized in any county in the State of Kansas a county farm bureau

having a membership of 25 percent of the *bona fide* farmers of the county, or as many as 250 farmers, and having for its purpose the giving of instructions in agriculture and home economics to the people of said county through practical demonstrations and otherwise, and the employment of a county agricultural agent or agents to prosecute this work, the Kansas State Agricultural College shall contribute, from federal and State funds granted for demonstrations in agriculture and home economics, not less than $800 nor more than $1,600 per annum, as far as such funds are available, towards the salary of such county agricultural agent; . . . provided, that before such appropriation is made the county farm bureau shall present to the county commissioners of its county a copy of the constitution and by-laws adopted by the farm bureau and approved by the Kansas State Agricultural College, and a certified statement of deposit in a local bank of the county of not less than $800, which shall be used, subject to the order of the county farm bureau, for providing the necessary equipment for said bureau." It is provided further that when these conditions have been fulfilled the "board of county commissioners shall appropriate from the public funds of the county a sum of money not less than $800 per annum and not to exceed $1,600 per annum to assist in the payment of the salary of the county agricultural agent and the expenses of the farm bureau."

The administration of this law was placed in the hands of the Kansas State Agricultural College by a general clause providing that the work of the agricultural agent shall be "under the general direction and supervision of the Kansas State Agricultural College" and "the constitution and by-laws of each bureau and all accounts and expenditures of funds provided for by this act shall be subject to the approval of the director of extension of the Kansas State Agricultural College."

Since this act became effective, July 1, 1915, seven of the original ten county farm bureaus have availed themselves of its provisions, fifteen additional counties have organized farm bureaus that are at work, and many others are organizing.

Soon after the United States entered the war, in 1917, the government initiated legislation to provide funds for placing an emergency county agent in every county in the United States, and a home demonstration agent in as many counties and larger cities as possible. This legislation became effective in August, 1917, and made available an appropriation to cover the salaries, in whole or in part, of a large number of men county agents and a considerable number of emergency home demonstration agents in each State. By January 1, 1918, twenty-three emergency agents, eight assistant county agents, and fifteen home demonstration agents had been placed in Kansas on these funds. Others are being placed as rapidly as men and women qualified for these positions can be secured. The Director of the Extension Service for each State is charged with the responsibility of administering this work, thus serving as the joint representative of the State and the Federal Government.

The rapid growth of extension work has demanded efficient administrative machinery. In the judgment of the President of the College and the Board of Regents it became necessary to create, in December, 1912, a

Division of College Extension coördinate with the other divisions of the College. This at first was subdivided into four distinct sections or departments, but the increase in work and personnel of the division has made necessary a reorganization into eight departments, namely: institutes and extension schools, county-agent work, boys' and girls' club work, home economics, emergency home demonstration - agent work, drainage and irrigation engineering, rural service, and home-study service, each with its own head and staff. The heads of the departments are responsible to the director, who is Dean of the Division of College Extension. Through this organization it is possible to administer the extension work effectively and economically, to reach directly more than 500,000 people in the State each year, and to conduct some activity in every county.

Since the war came to America the policy of the Division of College Extension has been to be directly helpful in winning the war. Maximum production of food, conservation, and economic utilization of farm products, effective organization among farmers, and bringing about a comprehensive understanding of our war aims and a zeal to win on the part of all the people of the State are the underlying purposes of all the work of the division. Whenever a department has needed reorganization to meet these purposes this has been effected.

Publications covering practical subjects in the field of agriculture, home economics and rural engineering are issued from time to time by the Division of College Extension as bulletins, circulars and leaflets. The authors of these publications are the extension specialists or the specialists of the departments in the other divisions of the College. The regular publications of the Experiment Station also are used extensively in the extension work. A series of publications in coöperation with the United States Department of Agriculture is receiving special attention. Extension publications are mailed regularly to a list, composed of members of farm and home institutes, home-makers' clubs, extension schools, and farm bureaus; *i. e.*, to members of organizations coöperating closely with the Agricultural College. Any citizen of the State, however, on request, may secure copies of individual publications.

While the extension work is directed by the Division of College Extension for administrative efficiency, its scope would be limited were it not for the close coöperation of the other divisions and departments of the College, which help not only in supplying lecturers for agricultural meetings and extension schools, material for publication, assistance in demonstration work and helpful counsel, but also are responsible for all subject matter taught by the extension specialists.

Institutes and Extension Schools

A. C. HARTENBOWER, Superintendent
A. S. NEALE, Assistant Superintendent and Dairy Husbandry
GEORGE O. GREENE, Horticulture
H. J. BOWER, Soils
ROSS M. SHERWOOD, Poultry
CARL P. THOMPSON, Animal Husbandry
G. E. THOMPSON, Crops
T. H. PARKS, Entomology
GEO. M. POTTER, Veterinary Medicine
R. W. KISER, Animal Husbandry
W. E. PETERSEN,* Dairy
C. G. ELLING,* Hog Production
L. W. BURBY,* Poultry
F. S. HAGY,† Crops

The Department of Institutes and Extension Schools has direct supervision over approximately three hundred and fifty farm and home institute organizations, all two-day and five-day extension schools in agriculture and home economics, and the work of the extension specialists.

Each farm and home institute of the State is an association or farmers' club, with regular officers, constitution and by-laws, and is required by law to meet at least annually. While some organizations hold six or more monthly meetings, practically all of them have no fewer than three monthly meetings, because no institute organization can obtain State aid unless it has at least three meeetings in addition to the annual meeting at which some representative of the College is present. The College plans to send two specialists, one in agriculture and one in home economics, to present at the annual meeting certain well-defined lessons. The specialists and their subjects are chosen because of a known need or interest in a particular community or a plan to start or encourage certain definite lines of work.

The programs for all annual meetings are based on suggestive outlines sent out by this department.

These are completed and returned by the local officers. Posters are then printed and sent out free. The department furnishes literature, on request, for members who are to take part in the program of an institute, grange, farmers' union, or other organization.

The excellent monthly meetings which are held by many of the local organizations in this State are one of the most important features of the institute work. These meetings are usually held on the second Saturday afternoon of each month from September to May. The Department of Institutes and Extension Schools suggests the subject for discussion, and the same subject is discussed in every institute in the State. In this way certain important timely subjects are being discussed by thousands of farmers and their wives at seasonable times, thus promoting a general uniformity of action.

Each year some special topics, such as farm management, the management of livestock, gardening, some phase of dairying, etc., are made especially important in institute programs, either for the whole State or

* The U. S. Department of Agriculture coöperates in furnishing directly all or a part of the salaries and the franking privilege.
† Temporary.

for certain specified districts. During 1917 the monthly meetings were largely concerned with the consideration of topics of value to farmers and their wives interested in winning the war.

Every institute has a membership paying a membership fee. The membership lists constitute the mailing list for the publications issued by this department. In addition to receiving these pamphlets, each member who fills out and returns a membership blank receives from the College, from the Government or from some State experiment station such other obtainable literature as his interests demand.

EXTENSION SCHOOLS

The demand among men and women for instruction in the essentials of agriculture and home economics is steadily increasing. Owing to the nature of the farm and home institutes they are able to meet this demand only in part, and for that reason extension schools or short courses in agriculture and home economics have been organized in communities which desire more complete courses in these subjects than can be given at the institutes.

The College now conducts extension schools in agriculture and home economics of five days' duration, sending to each school four instructors. Here well-planned, comprehensive courses are given in the various lines of agriculture and home economics, so that in a week's work some of the essentials of these subjects may be learned. The local committees are required to organize the classes and pay the local expenses for each school. The Agricultural College supplies the teachers and pays their railroad fares from funds appropriated to it for this purpose.

In addition to these general schools, special schools in breeding, animal diseases, dairying, poultry, orcharding, road making and cement construction are held in communities desiring them and willing to defray the local expenses. Five-day schools in home economics may be had on request. (See Home Economics, page 342.)

Extension schools are popular where the communities are brought to understand the work given. Almost every community having one school has petitioned for another. During 1917-'18 eighteen five-day schools were held. Because of other seemingly more important war work no attempt was made to push the schools and only those communities which assured the College of more than ordinary interest were given schools.

The number of breeding schools, poultry schools, dairy schools, and other specialized two-day courses has amounted to more than seventy-five.

EXTENSION SPECIALISTS

The specialists of this department work in extension schools and institutes during the winter months only. During the spring, summer, and fall they conduct special campaigns, such as silo building, wheat improvement, grasshopper control, cow testing, hog-cholera control, and other campaigns and coöperative demonstration work. The former are being emphasized by the organization for 1918 of about one hundred

forty special silo and silage-crop meetings, fifty-five wheat meetings and seventy economical hog-production meetings, fifty poultry meetings, five broom-corn meetings, fifteen alfalfa meetings, sixty soil-handling meetings, forty insect-control meetings, eight county campaigns for hog-cholera control with educational meetings in every community, and so on. The latter phase of the work of the extension specialists is being especially met by the organization of coöperative demonstration work in each branch of agriculture in a certain number of counties each year. In much of the coöperative work, each specialist has from two to six coöperators in each county. These men and women work under the direction of the specialists and the supervision of the county agents, keep records of the work, and call demonstration meetings at their farms on each trip of the specialist. The number of visits which each specialist makes to each point varies from two in the case of the specialist in soils to six in the case of the specialists in horticulture and entomology. The aim in all of this coöperative demonstration work is to show as well as to explain. This line of work is especially appreciated, and the representatives of the department have been able to meet only a fraction of the demands upon them.

Educational work for the control of hog-cholera is conducted in counties where hog-cholera-control associations are organized coöperatively by the Agricultural College, the State livestock sanitary commissioner, and the U. S. Department of Agriculture. One veterinarian devotes all of his time to this work, holding educational meetings in every community until every farmer has had opportunity to attend a meeting near his home. During 1916-1917 six counties were covered, with 30 to 60 meetings in each county.

The calls for the extension specialists in all lines of work are so many that it is impossible to meet more than two-thirds of the calls for assistance from county agricultural agents and from farmers' organizations. While the number of specialists is being increased rapidly, yet the work is growing far more rapidly, thus indicating a healthy condition.

Agricultural Agent Work*

H. UMBERGER, County Agent Leader
A. F. TURNER, Assistant County Agent Leader
G. E. PIPER, Assistant County Agent Leader
KARL KNAUS, Assistant County Agent Leader
P. E. MCNALL, Farm Management Demonstrator

EMERGENCY DEMONSTRATION AGENTS AT LARGE

J. M. KESSLER, Topeka
F. A. DAWLEY, Manhattan
C. A. SCOTT, Manhattan

DISTRICT AGRICULTURAL AGENTS

W. A. BOYS, Hays
P. E. CRABTREE, Scott City

COUNTY AGRICULTURAL AGENTS

F. S. TURNER, Anderson County
PRESTON O. HALE, Chase County
CHAS. E. THOMAS, Cloud County
W. W. WRIGHT, Doniphan County
CHAS. H. TAYLOR, Atchison County
F. J. ROBBINS, Franklin County
W. A. WUNSCH, Harvey County
A. E. JONES, Jewell County
I. N. CHAPMAN, Leavenworth County
H. L. POPENOE, Lyon County
F. B. WILLIAMS, Marshall County
O. C. HAGANS, Miami County
E. J. MACY, Montgomery County
A. L. CLAPP, Morris County
V. M. EMMERT, McPherson County
R. S. HAWKINS, Nemaha County
R. P. SCHNACKE, Pawnee County
A. D. FOLKER, Shawnee County
R. W. SCHAFER, Washington County
R. O. SMITH, Wilson County
A. G. VAN HORN, Wyandotte County
O. B. BURTIS, Clay County

ASSISTANT COUNTY AGRICULTURAL AGENTS

EARL C. THURBER, Jewell County
W. C. CALVERT, Leavenworth County
H. F. TAGGE, Lyon County
A. E. PEARSON, Marshall County
J. L. LANTOW, Miami County
C. L. SWENSON, Montgomery County
H. J. ADAMS, McPherson County
FRED BAYER, Shawnee County
CECIL L. MCFADDEN, Scott County

EMERGENCY DEMONSTRATION AGENTS

E. E. ISAAC, Cowley County
CHAS. E. CASSEL, Finney County
JOHN V. HEPLER, Ford County
N. L. RUCKER, Hodgeman County
HARRY S. WILSON, Johnson County
H. L. HILDWEIN, Kingman County
W. J. YEOMAN, Ness County
EDWARD LARSON, Pratt County
L. E. WILLOUGHBY, Rush County
R. F. HAGANS, Stevens County
L. C. CHRISTIE, Seward County

RALPH KENNEY, Riley and Geary Counties
C. A. GILKINSON, Barton and Rice Counties
T. W. ALLISON, Elk and Chautauqua Counties
RALPH SNYDER, Jackson and Jefferson Counties
JOHN A. SHEEL, Osage and Coffey Counties
D. H. GRIPTON, Osborne and Mitchell Counties
BLAINE CROW, Pottawatomie and Wabaunsee Counties
EDWIN I. MARIS, Rawlins and Cheyenne Counties
FRED T. REES, Labette and Neosho Counties
P. H. WHEELER, Kearny and Hamilton Counties
GEO. W. SIDWELL, Greeley and Wichita Counties
EARL J. WILLIS, Crawford and Cherokee Counties
H. B. BAYER, Decatur and Sheridan Counties

The agricultural agents are active in conducting demonstrations in the best methods of production, in assisting farmers with suggestions and plans relative to farm management and the farm business, and in organizing rural activities. The field demonstrations are conducted for the purpose of introducing new crops, and of testing relative values of varieties already grown and methods of cultivation and harvesting.

* The U. S. Department of Agriculture coöperates in furnishing all or a part of the salary of every member of this department. In the case of county agricultural agents, counties, through county farm bureaus, furnish a part of the salaries and of the expenses.

Demonstrations in proper methods of feeding, care and management of livestock are conducted. Methods of controlling insects and diseases of farm crops, orchards, and gardens and diseases of livestock are demonstrated. Surveys of the farm business are made in order to study the conditions prevailing in typical areas and possible improvements in farm-management methods that should be employed. Improved methods of marketing and community welfare in which better social relations are fostered also are important features of this work. The agent interests himself in practically every farm activity, especially where there is need of improvement.

DISTRICT AGENTS. The College employs two district agricultural agents, each one confining his activities to a few counties. One has headquarters at Hays, conducting work in counties along the Union Pacific lines in western Kansas; another at Scott City, working in counties from Rush west to the Colorado line. These men conduct demonstrations on from four to six or more farms in each county in the assigned territory, in the growing of crops, in the handling of stock, and in general farm management.

COUNTY AGENTS. In addition to the district agents, the College has assisted in locating county agricultural agents in the following counties: Leavenworth, Atchison, Harvey, Jewell, Lyon, Miami, Montgomery, Anderson, Chase, Cloud, Doniphan, Franklin, Marshall, Morris, McPherson, Nemaha, Pawnee, Shawnee, Washington, Wilson, Wyandotte and Clay.

Previous to July 1, 1915, the first seven of the counties mentioned were each employing a county agricultural agent who devoted his entire time to agricultural demonstration work in the county. This work was supported partly by means of appropriations from the United States Department of Agriculture, partly from appropriations under the federal Smith-Lever act, and partly from farm-bureau membership fees and private subscriptions.

Following the enactment of the farm-bureau law in January, 1915, these counties raised their membership to more than two hundred fifty and complied with the law providing for county appropriations to support farm-bureau work.

In addition, the fifteen last-named counties have completed farm bureaus and employed agents, making a total of twenty-two counties that now (January 1, 1918) have fully organized farm bureaus and agricultural agents whose work is partially supported from county funds. During 1917 eight new counties hired agents.

In every county where farm bureaus have been organized and county-agent work is now conducted funds are appropriated by the county through the county commissioners, by the State through the Agricultural College, and by the Federal Government through the United States Department of Agriculture, and the work is on a permanent basis.

During the year the demand for the services of county agents has so increased that it has been found necessary to employ assistant county agents in eight counties, as follows: Jewell, Leavenworth, Marshall, Miami, Montgomery, McPherson, Shawnee, Lyon, and one in the western Kansas district.

EMERGENCY-AGENT WORK. Early in April, 1917, Congress initiated legislation to provide an emergency fund for the purpose of extending agricultural-agent work to every county in the United States. This appropriation became available in August, and eleven counties, namely, Johnson, Cowley, Ford, Seward, Stevens, Kingman, Pratt, Finney, Hodgeman, Ness and Rush, have employed agents under that act. The salary of the agent in each case is paid by the Government, and the expenses not exceeding $800 by the county. Ford, Finney, Seward, Hodgeman and Johnson counties already have made the work permanent by organizing farm bureaus, and in the other counties the organization work is well under way.

Since it was the desire of the Federal Government that agricultural agents be located quickly in every county to assist in meeting the agricultural problems growing out of the war, in the fall of 1917 the policy of placing an emergency agent in districts of two counties each was adopted, such agent to serve until each county has organized a farm bureau and is ready to enter into full coöperative relations with the Agricultural College and the United States Department of Agriculture in employing a county agent. In these districts the government pays the salary and traveling expenses of the agent, and some coöperating organization, usually the County Council of Defense, pays office expenses.

Under this plan, by January 1, 1918, agents had been appointed in the following thirteen two-county districts: Riley and Geary, Barton and Rice, Elk and Chautauqua, Jackson and Jefferson, Osage and Coffey, Osborne and Mitchell, Pottawatomie and Wabaunsee, Rawlins and Cheyenne, Labette and Neosho, Kearny and Hamilton, Greeley and Wichita, Crawford and Cherokee, Decatur and Sheridan. It is expected that the majority of these counties will have well-organized farm bureaus within a comparatively short time.

FARM MANAGEMENT DEMONSTRATIONS. Farm-management demonstrations are conducted by a farm-management specialist in coöperation with the agricultural agents. In these demonstrations such records are taken as are essential to the determination of the net profits of the individual farms. These records are classified according to different types of farming, the profits from each type are determined, and individual farm records are compared with the average of all the farm records taken. The results of the study are made known to each farmer interested, in order that he may use the suggestions received in any needed reorganization of his own business. For those who desire it, farm account books are opened and instruction briefly given in keeping simple records. This work was begun in September, 1914, and by January 1, 1918, twenty-two counties had made definite arrangements for farm-management work. The demand for this work was greatly increased by the enactment of the income tax law and the resulting need of business records by which the income might be determined.

Home Economics

Miss Frances L. Brown,* Director
Miss Louise Caldwell,† Assistant in Institutes
Miss Stella Mather,* Assistant in Institutes
Miss Rena Faubion, Assistant in Institutes
Miss Eula Butzerin, Assistant in Institutes
Mrs. Harriet W. Allard, Assistant in Institutes
————, Assistant in Institutes
Miss Minnie Sequist, Specialist in Extension Schools
Miss Lassie Lane, Specialist in Extension Schools
Miss Susanna Schnemayer, Specialist in Extension Schools
Miss Gertrude Lynn, Specialist in Extension Schools
Miss Mary Wright,* Specialist in Extension Schools

Instruction in home economics is secured by about 800 women annually at the Agricultural College, and there are many thousand others throughout the State who have had the advantages of resident instruction either in this or some other institution. Large as this number may seem, it is small when compared to the great number of women and girls of the State to whom these courses are not available. To give as much assistance as possible to this vast majority of women is the aim of the Department of Home Economics in Extension, and with this in view, ten women are regularly employed and two others have been employed part time as special assistants during the year. During the past year, all extension work in home economics has been reorganized with a special reference to home life as influenced by the war. The extension work in home economics is conducted through farm and home institutes, extension schools, special women's meetings, county normal institutes, home-makers' clubs, by judging at fairs, through lectures at chautauquas, and by means of personal correspondence. During the institute season, from October to March, four women spend full time in giving lectures and demonstrations before farm and home institutes and home-makers' clubs conducted in connection with them. From March to September, inclusive, the same specialists assist in women's meetings, in county normal institutes, and in judging at fairs, at chautauquas, and in special extension schools. From May to September, inclusive, two women give their time to community assembly work. For the entire year the remaining four women spend their time in extension schools, and special demonstration meetings.

EXTENSION SCHOOLS IN HOME ECONOMICS

The extension schools in home economics, covering a period of a week in each place and giving definite courses of instruction, enable the women of the State to avail themselves of the opportunities offered by the Agricultural College at their very doors. The sessions of the school are conducted both forenoons and afternoons, each half day being divided into a lecture period of one hour and a demonstration period of one and one-half hours. For any one school two courses from the following list may be selected: Food preparation, home management, home nursing, sewing, canning, dietetics, and home art. The minimum required membership for a school of this kind is twenty, but as many more may become members

* Transferred to home demonstration-agent work, November 1, 1917.
† Resigned January 1, 1918.

as the room in which the school is to be held can accommodate. A tuition fee, usually of $1 per member, is collected by the local committee to be used in defraying the local expenses. Schools in home economics alone are held from March until October, and in connection with extension schools in agriculture, from November until March. During the year 1916-1917 fifty-five schools were held, the attendance being 10,088 individuals.

Special schools in dressmaking are held on request. These are two weeks in length, lasting from Monday afternoon until the second Friday evening. The dressmaking schools are designed primarily to give general instruction in sewing and special suggestion to members desiring to make their own dresses.

Emergency Home Demonstration Agent Work

*Miss Frances L. Brown, Emergency State Home Demonstration Leader
*Miss Stella Mather, Assistant Emergency State Home Demonstration Leader
Miss Marion P. Broughton, Kansas City, Kan.
Miss Mary W. Ward, Topeka, Kan.
Miss Mae McLeod, Hutchinson, Kan.
Miss Isa A. Greene, Fort Scott, Kan.
Miss Iris Livingstone, Wichita, Kan.
Miss Ethel Marchbanks, Pittsburg, Kan.
Miss Anna Allen, Independence, Kan.
Mrs. Marjorie R. Kimball, Riley County
Miss Elsie L. Baird, Anderson County
*Miss Ellen Batchelor, Wyandotte County
Miss Myrtle Blythe, Washington County
Miss Bertha Boyd, Stevens County
Miss Maude M. Coe, McPherson County
Miss Edna M. Danner, Marshall County
Mrs. Clyda Greene, Shawnee County
Miss Mollie Lindsey, Ness County
Miss Ellen Nelson, Seward County
Miss Juanita Sutcliff, Cowley County
Miss Avis Talcott, Atchison County
Miss Ruth E. Wooster, Morris County

The Department of Emergency Home Demonstration Agents was organized November 1, 1917. This department is conducted almost entirely upon federal funds under the supervision of the Extension Division. The federal appropriation is so distributed that ten cities in the State of Kansas can be benefited by having one of these agents, and as many counties as can qualify. The emergency home demonstration agents conduct demonstrations in the economical utilization of food, in improved methods of food preparation, in food preservation by canning and drying, and in the feeding and care of children. They also give special attention to home management and the introduction of labor-saving devices in the home. Their work is conducted by means of demonstrations before organized groups and classes of women and girls, visits to homes, and conferences with the housewives. They are employed for the entire year and devote their entire time to the work.

To secure a home demonstration agent a city must furnish a suitable office, with stenographic and telephone service, and guarantee a fund of $400 to defray the local, impersonal expenses of the agent. These conditions must also be met by the counties desiring an agent, but in addition such counties as have farm bureaus are requested to perfect

a certain organization before they can have an agent. This organization consists of a woman vice-president in every township, who is a member of the farm bureau. These township vice-presidents meet and organize, and their executive committee acts as an advisory committee to the emergency home demonstration agent.

Boys' and Girls' Club Work*

OTIS E. HALL, State Club Leader
LOTTIE MILAM, Girls' Clubs
L. C. WILLIAMS, Garden Clubs
PAUL R. IMEL, Pig and Baby Beef Clubs
E. H. WIEGAND, Poultry Clubs
F. W. KIRK, Clubs for Negroes

Boys' and girls' club work is rapidly becoming a very important phase of extension service. It is divided into club projects, and each project represents some specific farm or home activity, such as corn growing, pig feeding, gardening, canning, sewing, bread baking, etc.

Most of the clubs are conducted in coöperation with farm bureaus, farm and home institute organizations, county boards of education, and business men's organizations. However, almost any community can start a club by interesting six or more boys and girls in one of the club projects and by getting pledges from them to carry on the work as outlined by county and State leaders. Through these clubs the College is able to reach and serve a class of young people which it would neither reach nor serve in any other way. A large number of boys and girls get their first acquaintance with the College through the club work. Very few club groups fail to have a representative direct from the College visit them some time during the year. County agents give frequent and valuable help to these young workers. From College specialists, from county agents, and through special letters and lessons sent out from the state leader's office, the boys and girls learn definitely regarding the results of many of the more important experiments conducted by the experiment stations and regarding farm practices recommended by the College. In fact some of the most valuable methods and practices which the College has to offer are put into actual practice by these young people.

In 1917, 14,000 boys and girls were enrolled in this phase of extension work. They represented 720 club groups. In charge of each group was an adult who was known as the local leader. These local leaders worked under the supervision of the county leader, who in many cases was the county agent or county superintendent of schools.

Complete records showing expenses and receipts are kept by the boys and girls, and they meet now and then with their local and county leaders to consider various matters pertaining to their different projects. The president of the club in most cases is one of the club's own members. In this way valuable experience in leadership is had by hundreds of boys and girls who have no other source for such experience. At the close

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* The U. S. Department of Agriculture coöperates in furnishing a part of the salary of each one in this department, with one exception, namely, the last.

of the club season the different club members send in their records and stories, and many of them exhibit at local, county and State contests. In short, the club boys and girls shoulder responsibilities, meet with failure as well as with success, and do on a small scale what they will be obliged to do on a larger scale if they in later years become successful farmers and home-makers.

Drainage and Irrigation Engineering

CAPT. H. B. WALKER (in Military Service)
J. B. MARCELLUS, Engineer in Charge
HARRISON BROBERG, Assistant Engineer

With increased value of food products, there is a desire to reclaim any unprofitable acres and to make more sure a profitable crop where irrigation is needed. The eastern part of the State has problems of drainage and flood control. Crops on some of the most fertile valleys are ruined by floods. In many instances this has been prevented by formation of drainage districts which straightened stream channels, removed obstructions, and built levees. Individual farms have also been improved and advanced in value by installing a drainage system. In the development of large areas in the western section of the State, irrigation by pumping is becoming an important agency. With increased knowledge of water sources, an appreciation of the benefits of irrigation by pumping, and intelligent application of the best methods of irrigation, these areas will not be subject to any serious fluctuations of crop yields.

The Agricultural College employs and maintains a drainage and irrigation engineer and assistants for the purpose of giving scientific and practical help to persons or communities interested in field irrigation or land drainage. It is the duty of this engineer to render assistance in the organization and management of drainage districts; to give advice to farmers contemplating farm drainage projects; to advise with individuals or communities interested in irrigation development; to prepare and approve plans, estimates and specifications for drainage and irrigation projects; and to carry on a general campaign of education for the best methods of land reclamation. The services of this engineer are free except for the usual charge for traveling and local expenses.

Rural Service

WALTER BURR, Director

The Rural Service Department functions throughout the State of Kansas in the realm of community organization and development. Instruction by lectures is given on community building, coöperative organization, school consolidation, rural high-school development, and social-center work. The relationship of the farm-bureau and county-agent movement to local rural institutions is especially emphasized in this field of work, and assistance given the farm bureau in bringing about local community action.

Lectures are furnished and assistance is given in developing educational and social phases of rural church activities, especially in those matters that have to do with such an organization serving the community.

Each year at the time of the Farm and Home Week at the College this department conducts a rural organization section which takes the place for the State of Kansas of a rural-life conference. This short course serves a large number of leaders throughout the State interested in rural organization work.

In normal times rural community surveys are conducted in communities in the State when requests come from an organized group with influence to inaugurate a program of development based on the results of such a survey.

From an extensive collection of bulletin material, information is secured and given to applicants upon any subject that has to do with organized community activities.

In the war period this department is giving its attention entirely to bringing about community solidarity in war activities. The director is an assistant leader in the emergency demonstration work, relating this important war activity properly to rural community action. The lecture work of the department takes on naturally the phases of war inspiration and education. Regular lecture courses are conducted during the winter months and a lecture service bureau is maintained throughout the year.

Home-Study Service

(Correspondence Study)

M. G. BURTON, Director
W. L. FRENCH,* Agronomy
D. W. ZIEGLER, Animal Husbandry
MARY M. BAIRD, Home Economics
H. H. FENTON, Industrial Subjects
JULIA M. BAKER, English and History
V. L. STRICKLAND, Education

NOTE.—The corps of instructors employed in the Department of Home-study Service devote their entire time to the work of teaching by correspondence. They closely correlate all of their work with the various divisions and departments of the institution, and keep all the credit work under the direct supervision of the regular members of the faculty.

The Kansas State Agricultural College, believing that it is as much a part of the function of the institution to offer its advantages to those who can not attend the College classes as it is to offer instruction to those who are able to undertake residence work, offers to the citizens of Kansas an opportunity to study at home the various lines of agriculture, home economics, mechanic arts, farm engineering, and many high-school subjects.

Opportunity, therefore, is offered for systematic study by correspondence in many subjects which have a direct bearing upon the various problems of the farm, home and community. In order to meet the widely varying needs and conditions of the different classes of people, and to make it practicable for those who are not accustomed to regular habits

* Resigned.

of study as well as for those who are studiously inclined, the service of this department is rendered by three different methods:

I. *By Reading Courses*, each of which is devoted to the discussion of a single subject or problem in a simple, brief and nontechnical way. Every word is right to the point and so clear that it cannot be misunderstood. In order to make these Reading Courses a perfect boon to every home, a very comprehensive list of subjects is offered, and no fee is required for the service. Full explanation of the details, as well as the list of subjects offered under the Free Reading Courses, will be found in Home-study Service Bulletin, Part I.

II. *By Vocational Courses*, in which complete comprehensive courses covering a number of related subjects are presented. This line of service is adapted to the needs of those who are ambitious for scientific training, but who may not have met the requirements for college entrance. It is the nearest possible home parallel to a college education. For full explanation of the vocational courses see Home-study Service Bulletin, Part II.

III. *By College Credit Courses*, where college subjects are offered by the correspondence method for regular credit. For detailed information relative to this work offered for College credit see Home-study Service Bulletin, Part III.

FOR WHOM INTENDED

The work of the Department of Home-study Service has been made sufficiently broad so that it will offer valuable assistance to all citizens who are in any way interested in the various agricultural, mechanic-art and home problems. The vocational and the credit courses will be of special interest to the following classes of persons:

(1) Boys and girls who have completed the common-school course of study, but who cannot immediately attend a high school or other preparatory school;

(2) Young men and women who feel that their school days are over, but who have aspirations, not yet satisfied, for a better education;

(3) Men and women of middle life who wish to know more of the sciences of the farm and of the home;

(4) Men who have been farming along general lines, but who have developed an interest in some special kind of work, such as orcharding or dairying, and who wish to direct their attention chiefly to that field;

(5) Road supervisors who need to know more of the science of road making, the building of culverts, etc., but who cannot afford to stop their work and take a special course;

(6) Men and women who have passed middle life, who are about to retire from active farming, but who intend to keep their minds young by study, and who desire to enrich their own experience by adding what has been discovered by the scientific research of others;

(7) Capitalists and business men who are holding investments in land, and who should know how to make those investments increase in value;

(8) Teachers who desire to teach agriculture or home economics in

special classes, or who wish to learn how to enrich their teaching in the sciences, and who wish to prepare in other subjects for examination;

(9) Mothers' clubs or other organizations, also classes of girls in village and rural schools, who wish to take up some definite line of study.

Only a small percentage of the farming population of Kansas is able to attend the classes in the Agricultural College; about 100,000 people attend the farmers' institutes; several thousand attend the extension schools; many thousand come in more or less direct contact with agricultural agent work. There still remain nearly a million adult people living in the country, few of whom have ever read carefully a single book on farm crops, feeding, dairying, farm management, horticulture, farm drainage, or the like. These are the people for whom this work is designed.

Free Reading Courses

The following Reading Courses, based on free bulletins, have been prepared and are in use. Others will be added as need arises. In ordering any of these courses, the form number and the name of the course desired should be stated.

AGRICULTURE

Soils and Fertility

(Including related subjects)

RA 1. The Soil
RA 3. Humus
RA 4. Barnyard Manure
RA 5. Green Manuring
RA 6. Commercial Fertilizers
RA 7. Waste Land on Farms
RA 8. Farm Drainage
RA 9. Contour Farming

Farm Crops

(Including related subjects)

RA 102. Corn Culture
RA 103. Wheat and Its Culture
RA 104. Wheat in Western Kansas
RA 105. Preparing the Land for Wheat
RA 106. Oats and Their Culture
RA 107. Barley and Its Culture
RA 108. Grain Smuts
RA 109. Growing Sorghums in Kansas
RA 113. Sorghum Sirup Manufacture
RA 114. Sudan Grass and Its Culture
RA 115. Broom Corn and Its Culture
RA 116. Millets and Their Culture
RA 117. Meadow and Pasture Grasses
RA 118. Rape and Its Culture
RA 119. Peanuts and Their Culture
RA 120. Cowpeas and Their Culture
RA 121. Soy Beans and Their Culture
RA 122. Alfalfa and Its Culture
RA 123. Red Clover and Its Culture
RA 124. Sweet Clover and Its Culture
RA 125. Growing an Acre of Corn
RA 126. Corn under Drouthy Conditions
RA 127. Selection of Seed
RA 128. Adulteration of Seeds
RA 129. Uses of Rye
RA 130. Market Hay
RA 131. Bermuda Grass
RA 132. Seed Flax Production
RA 133. Sugar Beet Growing

Garden Crops

(Including related subjects)

RA 201. The Home Vegetable Garden
RA 202. The Potato and Its Culture
RA 203. Potato Diseases
RA 204. Sweet Potatoes and Their Culture
RA 205. Tomatoes and Their Culture
RA 206. Cabbage and Its Culture
RA 208. The Onion and Its Culture
RA 209. Cucumbers and Their Culture
RA 210. Asparagus and Its Culture
RA 212. Popcorn and Its Culture
RA 213. Small Vegetable Garden
RA 214. Home Storage of Vegetables
RA 215. Sweet Potato Diseases
RA 216. Storing and Marketing Sweet Potatoes
RA 217. Okra; How to Grow It
RA 218. Beans
RA 219. Watermelon Diseases
RA 220. Control of Garden Pests

FREE READING COURSE—AGRICULTURE—*Continued*

Orchard Crops

(Including related subjects)

RA 301. Small Apple Orchard
RA 302. Orchard Spraying
RA 303. Pruning
RA 304. Insect and Fungus Enemies of the Apple
RA 305. The Peach and Its Culture
RA 306. Spraying Peaches
RA 307. The Pear and Its Culture
RA 308. Growing Cherries
RA 309. Bridge Grafting

Small Fruits

(Including related subjects)

RA 401. The Home Fruit Garden
RA 402. Plant Propagation
RA 403. Everbearing Strawberries
RA 405. Grapes and Their Culture
RA 409. Blackberries

Ornamental Plants

(Including related subjects)

RA 501. Annual Flowers
RA 502. Lawns
RA 503. Beautifying the Home Grounds
RA 504. Tree Culture
RA 505. Trees for Western Kansas
RA 506. Black Walnuts
RA 507. The Hardy Catalpa

Farm Animals

(Including related subjects)

RA 600. Breeds of Draft Horses
RA 601. Growing Draft Colts
RA 602. Feeding Horses
RA 603. Unsoundness in Horses
RA 604. Blind Staggers
RA 605. Navel Ills
RA 606. Horse-breeding Suggestions for Farmers
RA 607. Breaking and Training Colts
RA 610. Breeds of Dairy Cattle
RA 611. Dairy Farming
RA 612. How to Raise Calves on Skim Milk
RA 613. Production of Clean Milk
RA 614. Feeding Dairy Cows
RA 615. Making and Feeding Silage
RA 616. Foot-and-mouth Disease
RA 617. Tuberculosis
RA 618. Lumpy Jaw
RA 619. Contagious Abortion
RA 620. Breeds of Beef Cattle
RA 621. Feeding Cattle
RA 622. Production of Baby Beef
RA 623. Feeding Grain Sorghums
RA 624. Use of Sweet Clover
RA 630. Breeds of Hogs
RA 631. Hog Feeding
RA 632. Pork Production
RA 633. Self-feeders for Swine
RA 634. Hogging Down Crops
RA 635. Tuberculosis of Hogs
RA 636. Hog Cholera
RA 637. Killing Hogs and Curing Pork
RA 638. Meat on the Farm
RA 640. Breeds of Sheep
RA 641. Farm Sheep Raising for Beginners
RA 642. Sheep Raising
RA 650. Breeds of Poultry
RA 651. Poultry Management
RA 652. Capons and Caponizing
RA 653. Improving the Kansas Egg
RA 654. Incubation of Eggs
RA 655. Brooding of Chickens
RA 656. Poultry Diseases
RA 657. Mites and Lice on Poultry
RA 658. Turkeys
RA 659. Duck Raising
RA 660. Goose Raising
RA 661. Squab Raising

Insects

(Including related subjects)

RA 700. A Study of Insects
RA 701. The Chinch Bug
RA 702. The Hessian Fly
RA 703. Insect Pests of Alfalfa
RA 704. The Spring Cankerworm
RA 705. The Insects Injurious to Stored Grains
RA 706. The White Grub
RA 707. The Stable Fly
RA 708. The Honey Bee
RA 709. Comb Honey Production
RA 710. Treatment of Bee Diseases
RA 711. Outdoor Wintering of Bees
RA 712. White Ants
RA 713. Some Important Insecticides
RA 714. Prevention of Insect Outbreaks
RA 716. The Apple Tree Tent Caterpillar
RA 717. The Round Head Apple Tree Borer
RA 718. Wire Worm
RA 719. Army Worm
RA 720. Cut Worm
RA 721. Cabbage Worm
RA 722. Aphids Injurious to Orchard and Small Fruits
RA 723. Corn Ear Worm
RA 724. Methods of Controlling Grasshoppers
RA 725. Screw-worms and Other Maggots Affecting Animals

FREE READING COURSE—AGRICULTURE—*Continued*

Agricultural Economics and Sociology

RA 801. How to Use Farm Credit
RA 802. The Farmer's Living
RA 803. Community Welfare
RA 804. Livestock Shipping Associations

Miscellaneous Agricultural Subjects

RA 901. Bindweed
RA 902. Canada Thistles
RA 903. Some Useful Birds
RA 904. The Pocket Gopher
RA 906. How to Destroy Rats
RA 907. Weeds; How to Control Them
RA 908. The Prairie Dog Situation
RA 909. Control of Rabbits
RA 910. Control of Field Mice
RA 911. Collection of Plants for School Study
RA 912. Collection of Insects for School Study
RA 913. Instructions for Boys Working Reserve (War Measure).

MECHANIC ARTS

Farm Machinery

RI 1. Gasoline Engines
RI 2. Corn Cultivators
RI 3. Corn Harvesting Machinery
RI 4. Care of the Farm Machinery
RI 5. Farm Tractors

Farm Shop

RI 101. Repair of Farm Equipment
RI 102. The Use of Paint
RI 103. Horseshoeing

Farm Concrete Work

RI 301. Cement, Mortar, and Concrete
RI 302. Use of Concrete on the Farm
RI 303. Concrete Silo Construction
RI 304. Concrete Fence Posts
RI 305. Underground Silos

Roads in the Country

RI 401. Benefits of Improved Roads
RI 402. Sand, Clay, and Burnt Clay Roads
RI 403. The Road Drag and How to Use It

Irrigation and Drainage

RI 501. Information for Beginners
RI 502. The Construction of Small Irrigation Ditches
RI 503. Gardens
RI 504. Orchards
RI 505. Grain Fields
RI 506. Sugar Beets
RI 507. Alfalfa
RI 508. Drainage of Irrigated Lands
RI 509. Windmills in Irrigation
RI 510. Trenching Machinery
RI 511. Drainage on the Farm

Farm Buildings

RI 603. The Farm Home
RI 604. Ice Houses
RI 605. Poultry Houses
RI 606. Hog Houses
RI 608. Care of Farm Buildings

Miscellaneous Industrial Subjects

RI 701. Farm Wood Lot
RI 702. Farm Water-supply Systems
RI 703. Farm Sewage Disposal
RI 704. Farm Drainage
RI 705. Farm Power
RI 706. Farm Lighting
RI 707. Preservative Treatment of Farm Timbers
RI 708. Farm Mechanics
RI 710. Lightning and Lightning Conductors
RI 711. Ice-box Construction
RI 712. Trap Nest Construction
RI 713. Fly Trap Construction
RI 714. Hoppers for Poultry Feeding
RI 715. Bird House Construction
RI 716. Rabbit Trap Construction
RI 717. Supplying Water for Stock
RI 718. Proper Handling of Gasoline

HOME ECONOMICS

All courses on foods and food preparation have been thoroughly adapted to the rules and regulations of the Federal Food Administration.

Foods and Nutrition

RHE 1. Nutrition
RHE 2. How to Select Foods I: What the Body Needs
RHE 3. How to Select Foods II: Cereal Foods
RHE 4. How to Select Foods III: Protein Foods

Preparation of Foods

RHE 101. Bread (War Recipes)
RHE 102. Cheese
RHE 103. Butter
RHE 104. Vegetables
RHE 105. Food for Young Children
RHE 106. School Lunches
RHE 107. Homemade Fireless Cookers and Their Uses

FREE READING COURSE—HOME ECONOMICS—*Continued*

RHE 108. Fresh Fruits and Vegetables as Conservers of Other Staple Foods

Proteins

RHE 201. Milk
RHE 202. Eggs
RHE 203. Legumes
RHE 204. Nuts
RHE 205. Meats
RHE 206. Fish
RHE 207. Mutton
RHE 208. Economy in the Use of Meat
RHE 209. Poultry as Food
RHE 210. Food Value and Uses of Poultry
RHE 211. The Guinea Fowl and Its Uses as Food
RHE 212. How to Make Cottage Cheese on the Farm

Carbohydrates or Starches and Sugars

RHE 301. Sugar as Food
RHE 302. Maple Sugar
RHE 303. Sorghum Sirup
RHE 304. Use of Honey
RHE 305. Root Crops as Food
RHE 306. The Native Persimmon
RHE 307. Fruit as Food
RHE 308. Okra; Its Culture and Uses
RHE 309. The Dasheen

Cereals

RHE 401. Food Value of Corn, Kafir, and Cowpeas
RHE 402. Ways of Using Corn Meal
RHE 403. Popcorn
RHE 404. Corn as Food
RHE 405. Breakfast Foods

Preservation of Foods

RHE 501. Home Care of Foods
RHE 502. Milk
RHE 503. Milk and Its Bacterial Content
RHE 504. Vegetable Canning
RHE 505. Tomato Canning
RHE 506. Peach Canning
RHE 507. Grape Juice
RHE 508. Preserving Apples by Evaporation
RHE 509. Fruits and Jellies
RHE 510. Muscadine Grape Syrup
RHE 511. Canning Instructions
RHE 512. Drying
RHE 513. Fermentation and Salting
RHE 514. Homemade Fruit Butters
RHE 515. Home Uses for Muscadine Grapes
RHE 516. Sugar-beet Sirup

Household Pests

RHE 601. Mosquitoes
RHE 602. Fleas
RHE 603. Carpet Beetle
RHE 604. House Centipede
RHE 605. Cockroaches
RHE 606. Moths
RHE 607. Insects and Their Effect on Health
RHE 608. House Flies
RHE 609. House Ants
RHE 610. Silverfish
RHE 611. Harvest Mites or "Chiggers"
RHE 612. The Bedbug

Fats and Oils

RHE 701. Economical Use of Fats in the Home
RHE 702. Peanut Oil

Household Management

RHE 801. The Farm Kitchen as a Workshop
RHE 802. Removal of Stains

For further information relating to Free Reading Courses, send for Home-study Service Bulletin, Part I.

Vocational Courses

The following Vocational Courses are based on standard textbooks. Each subject consists of from sixteen to twenty assignments.

A period of twelve months from date of enrollment is allowed in which to complete a subject. A fee of $3 per subject is charged for residents of Kansas; for nonresidents the fee is $6. Full details are to be found in Home-study Service Bulletin, Part II.

AGRICULTURAL COURSES

Agronomy

Required subjects:
1. EA 1. Essentials of Agriculture
2. EA 2. Elementary Agricultural Chemistry
3. EA 3. Soils
4. EA 4. Farm Crops
5. EA 5. Forage Crops

(Select three additional subjects from list of electives.)

Horticulture

Required subjects:
1. EA 1. Essentials of Agriculture
2. EA 2. Elementary Agricultural Chemistry
3. EA 3. Soils
4. EA 6. Gardening
5. EA 7. Orcharding

(Select three additional subjects from list of electives.)

Animal Husbandry

Required subjects:
1. EA 1. Essentials of Agriculture
2. EA 2. Elementary Agricultural Chemistry
3. EA 8. Feeds and Feeding
4. EA 9. Animal Breeding
5. EA 10. Types and Breeds

(Select three additional subjects from list of electives.)

Dairying

Required subjects:
1. EA 1. Essentials of Agriculture
2. EA 2. Elementary Agricultural Chemistry
3. EA 8. Feeds and Feeding
4. EA 11. Farm Dairying
5. EA 9. Animal Breeding

(Select three additional subjects from list of electives.)

Poultry Husbandry

Required subjects:
1. EA 1. Essentials of Agriculture
2. EA 2. Elementary Agricultural Chemistry
3. EA 8. Feeds and Feeding
4. EA 12. Poultry Production
5. EA 9. Animal Breeding

(Select three additional subjects from list of electives.)

LIST OF ELECTIVE SUBJECTS APPLYING TO THE AGRICULTURAL COURSES

EA 9. Animal Breeding
EA 26. Beef Production
EA 4. Cereal Crops
EA 21. Dairy Manufacturing
EA 22. Diseases of Animals
EA 25. Dry-land Farming
EA 11. Farm Dairying
EA 19. Farm Forestry
EA 8. Feeds and Feeding
EA 17. Floriculture
EA 5. Forage Crops
EA 16. Greenhouse Management
EA 24. Horse Production
EA 27. Hog Raising
EA 13. Insects Injurious to Farm Crops
EA 15. Insects Injurious to Garden Crops
EA 14. Insects Injurious to Orchard Crops
EA 18. Landscape Gardening
EA 6. Gardening
EA 7. Orcharding
EA 12. Poultry Production
EA 28. Sheep Feeding
EA 29. Sheep Raising
EA 20. Tree Surgery
EA 3. Soils
EA 10. Types and Breeds
EA 30. Bee Keeping

By special arrangement with this department students may choose from other lists of electives described hereafter.

INDUSTRIAL COURSES

Carpentry and Building

Required subjects:
1. EI 1. Shop Mathematics
2. EI 2. Mechanical Drawing, Applied
3. EI 3. Architectural Drawing
4. EI 4. Constructive Carpentry and Inside Finishing
5. EI 5. Heating and Ventilating

(Select three additional subjects from list of electives.)

Farm Engineering

Required subjects:
1. EI 6. Farm Drainage
2. EI 7. Farm Buildings
3. EI 8. Concrete Construction
4. EI 9. Farm Blacksmithing
5. EI 10. Farm Machinery

(Select three additional subjects from list of electives.)

VOCATIONAL COURSES—INDUSTRIAL—*Continued*

Stationary Engineering

Required subjects:
1. EI 1. Shop Mathematics
2. EI 2. Mechanical Drawing, Applied
3. EI 11. Steam Boilers and Engines
4. EI 12. Gasoline Engines
5. EI 13. Blacksmithing

(Select three additional subjects from list of electives.)

Highway Improvement I

Required subjects:
1. EI 15. Highway Construction
2. EI 8. Concrete Construction
3. EI 19. Bridge and Culvert Construction
4. EI 16. Roads and Pavements
5. EI 28. Strength of Materials

(Select three additional subjects from list of electives.)

Highway Improvement II

Required subjects:
1. EI 14. Plane Surveying
2. EI 16. Roads and Pavements
3. EI 28. Strength of Materials
4. EI 2. Mechanical Drawing, Applied
5. EI 30. Structural Engineering

(Select three additional subjects from list of electives.)

Machine Shop and General Repairing

Required subjects:
1. EI 1. Shop Mathematics
2. EI 2. Mechanical Drawing, Applied
3. EI 17. Automobiles
4. EI 13. Blacksmithing
5. EI 18. Machine Shop Work

(Select three additional subjects from list of electives.)

LIST OF ELECTIVE SUBJECTS APPLYING TO THE INDUSTRIAL COURSES

EI 3. Architectural Drawing
EI 17. Automobiles
EI 13. Blacksmithing
EI 19. Bridge and Culvert Construction
EI 4. Constructive Carpentry and Inside Finishing
EI 8. Concrete Construction
EI 20. Elementary Woodworking
EI 9. Farm Blacksmithing
EI 7. Farm Buildings
EI 6. Farm Drainage
EI 10. Farm Machinery
EI 21. Farm Woodworking
EI 22. Foundry Practice
EI 12. Gasoline Engines
EI 23. Gasoline and Oil Traction Engines
EI 15. Highway Construction
EI 5. Heating and Ventilating
EI 18. Machine Shop Work
EI 2. Mechanical Drawing, Applied
EI 24. Pattern Making
EI 14. Plane Surveying
EI 25. Plumbing
EI 26. Practical Electricity
EI 16. Roads and Pavements
EI 27. Sheet Metal Drafting
EI 1. Shop Mathematics
EI 28. Strength of Materials
EI 11. Steam Boilers and Engines
EI 29. Steam Traction Engines
EI 30. Structural Engineering

By special arrangement with this Department students may choose from other lists of electives set forth in this pamphlet.

COURSES IN HOME ECONOMICS

Domestic Science

Required subjects:
1. EH 1. Household Management
2. EH 2. Foods and Cookery I
3. EH 3. Foods and Cookery II
4. EH 9. Home Nursing
5. EH 10. Home Sanitation

(Select three additional subjects from list of electives.)

Domestic Art

Required subjects:
1. EH 1. Household Management
2. EH 5. Sewing I
3. EH 6. Sewing II
4. EH 11. Home Decoration
5. EH 8. Educative Millinery

(Select three additional subjects from list of electives.)

General Course in Home Economics

Required subjects:
1. EH 1. Household Management
2. EH 2. Foods and Cookery I
3. EH 9. Home Nursing
4. EH 5. Sewing I
5. EH 11. Home Decoration

(Select three additional subjects from list of electives.)

VOCATIONAL COURSES—HOME ECONOMICS—*Continued*

LIST OF ELECTIVE SUBJECTS APPLYING TO THE HOME ECONOMICS COURSES

EH 2. Foods and Cookery I
EH 3. Foods and Cookery II
EH 4. Foods and Cookery III
EH 5. Elementary Sewing
EH 6. Sewing I
EH 7. Sewing II
EH 8. Educative Millinery
EH 9. Home Nursing
EH 10. Home Sanitation
EH 11. Home Decoration
EH 12. Personal Hygiene
EH 13. Household Bacteriology
EH 14. Child Life and Care of Children
EH 15. Household Chemistry
EH 16. Costume Design
EH 17. Laundering
EH 18. Dressmaking
EH 19. Dietetics

Credit Courses

GRADES OF WORK. Two grades of correspondence work are offered, that for entrance credit, which is equivalent to the regular accredited high-school work of the State, and that for College credit, which is made as nearly as possible equivalent to work done in residence at the College.

BY WHOM PREPARED. These courses are prepared under the supervision of the heads of departments of the Agricultural College faculty. The subjects are taught by the correspondence-study specialists under the same regulations which govern residence work.

EXAMINATIONS. Examinations may be taken at the College or under conditions approved by the College. In the latter case arrangements can often be made with the local county superintendent or superintendent of schools to conduct the examination.

REGULATIONS. 1. Enrollments for correspondence-study work will be received at any time during the year, and students may continue their work uninterrupted throughout the entire year.

2. Correspondence students will be expected to complete any course for which enrolled within twelve months from the date of enrollment.

3. Not more than two courses may be carried through correspondence at any one time. It is recommended that a student carry but one subject at a time.

4. Each subject listed under the various departments constitutes what is known as a correspondence "course."

5. Students enrolling for correspondence courses must meet the prerequisites the same as if undertaking the work in residence.

6. A student may not be enrolled for correspondence work while in attendance at any institution of learning without special permission from the Dean or proper authorities in the institution of which he is a student.

FEES. An enrollment fee of $10 per year is charged for residents of Kansas; $15 for nonresidents. For this amount the student is entitled to tuition for twelve months, during which period he can carry two courses at a time. No fee is refunded because of the student's inability to enter upon the course for which once registered. Extensions of time can be granted only where the work has been delayed because of personal illness of the student. All such cases must be taken up individually with the director of this Department.

BOOKS AND STATIONERY. Students will be expected to provide all textbooks, drawing outfits, stationery and other materials required in their courses, also to pay postage on lessons one way.

COURSES OF INSTRUCTION

ENTRANCE CREDIT

(*Accredited High-school Branches*)

A number of courses of regular high-school rank are offered in each of the following general subjects:

English	Drawing
Mathematics	Domestic Art
History	Agriculture
Manual Training	

COLLEGE CREDIT

A number of courses from each of the following divisions of the College are offered: Division of Agriculture, Division of Home Economics, Division of Mechanic Arts, and Division of General Science.

Full details regarding each course offered for entrance or College credit may be found in Home Study Bulletin, Part III. This bulletin is sent free on application.

Student Organizations

THE STUDENT COUNCIL

The student council is a representative body which was organized by the students in 1909 and received official sanction from the Board of Regents and the faculty of the College. Its objects are: "(1) To act as a representative body before governing officers of the College in all matters that concern the individual students, student organizations, or the student body as a whole; (2) to act as a body of mediation between different student organizations or enterprises whenever such service is sought by such organizations or enterprises; (3) to take cognizance of all matters that pertain to the good name and scholarship of the student body, to the end that high standards of honor on the campus and elsewhere may be maintained."

This student council consists of four members elected from the senior class, three from the junior, two from the sophomore, and one from the freshman class. In addition, the School of Agriculture elects a delegate, who has the privilege of speaking on subjects pertaining to his school, but has no vote. At each meeting of the council a committee of the College faculty may also be present to participate in the discussions. The members of the council are elected each term, but at each election at least two of the representatives of the senior class and one of those of the junior class must be reëlected.

The student council occupies an interesting and valuable place in the College life, and as a whole may be said to be an unqualified success in establishing a system of representative government among the students touching affairs peculiarly their own, and also in matters involving the faculty. All acts of the council are submitted to the President of the College, and if they concern the rules, regulations or ordinances of the College, are subject to approval by the proper governing body. The council is especially helpful in maintaining a high standard of honor among the students in both individual and organized relations. As a means of securing a better understanding in matters likely to cause friction between the student body and the faculty, the council performs a most important function.

THE CHRISTIAN ASSOCIATIONS

The Young Men's Christian Association and the Young Women's Christian Association are organizations of the greatest worth and value in the College community, forming centers of moral culture and religious stimulus among the young men and women during their developmental period. As is well known, the Christian associations in colleges stand for the best ideals among the students, and are always accorded the cordial support of the authorities. In addition to general moral and spiritual

development, the College Christian associations are of practical and efficient influence among the students in many directions. Active membership in these associations is limited to persons connected with Protestant evangelical churches, but others are admitted as associate members.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION

The College Y. M. C. A. has always been a strong and influential body among the students. Its growth may be indicated by the fact that the organization was able in 1908 to erect a handsome building for its purposes at a cost of $35,000, on the corner of Eleventh and Fremont streets, near the College grounds.

This building contains reading rooms, committee rooms, students' living rooms, gymnasium, etc. All young men are welcome to make use of the privileges of the building, whether members or not. No fixed fees for membership are charged, each member giving whatever he feels able to afford. One of the useful and practical features of the Y. M. C. A. is a students' employment bureau, which is maintained for the benefit of all students seeking employment. The religious work of the organization includes various courses for the study of the Bible and the work of Christian missions, which are maintained through the winter. The regular religious meetings of the association occur on Thursday evenings from 6:45 to 7:30, while occasional Sunday afternoon meetings are also held. Special meetings and receptions, which serve to broaden the acquaintanceship of the students and promote good-fellowship, are arranged from time to time. Especial attention is given the new students on and after their arrival, and assistance is rendered in securing rooms and boarding places for them. The association maintains a regular secretary, with whom prospective students are cordially encouraged to correspond. Address General Secretary, Y. M. C. A., Kansas State Agricultural College, Manhattan, Kan.

THE YOUNG WOMEN'S CHRISTIAN ASSOCIATION

Similar in aim and purpose to the organization of the young men is the Young Women's Christian Association. The Home Economics Hall is the headquarters of the association, to which all young women of the College are at all times cordially welcome. An office for the general secretary and rest rooms for the young women are maintained in this building during the college year.

An employment bureau for women students is maintained by the general secretary, without charge to its beneficiaries. Various committees are responsible for the lines of work of the association. At the opening of the college semesters the incoming trains are met by "Big Sisters," who assist new women students, the "Little Sisters," in securing suitable lodging and boarding places. If any prospective woman student will write to the general secretary of the association, her "Big Sister" will correspond with her during the summer vacation.

During the college year various social functions are held for the young women. The first of these is an informal reception to enable the College girls to become acquainted with one another. Once each year the two associations entertain jointly.

The religious life of the young women is fostered by the weekly vesper services in the Home Economics Hall. The different churches of the city extend a cordial welcome to the College women, and through the efforts of the association they are encouraged to active participation in the services of the church of their choice.

THE NEWMAN CLUB

The Newman Club, an organization of Catholic students, holds a social meeting every other Friday evening, and on the alternate Friday evenings the time is devoted to some line of religious study under the direction of the local pastor. The College authorities recognize this Bible study by allowing a two-hour credit for it when properly certified. In further recognition of the club's efforts the College has placed a set of the new Catholic Encyclopedia on its library shelves. Furthermore, the club has purchased and placed in the College library nearly one hundred dollars' worth of Catholic books and pamphlets.

The club is now on a sound basis and is qualifying for affiliation with a national organization of Newman clubs of the various state universities and colleges. Its aim is to favorably influence new Catholic students in the knowledge and practice of their faith, to foster sound morality and good character.

LITERARY AND SCIENTIFIC SOCIETIES

The literary societies of the College, eight in number, are wholly student organizations, holding weekly meetings in the College buildings. The Alpha Beta and Franklin literary societies are open to both sexes; the Ionian, Eurodelphian and Browning societies admit only young women to membership; the Webster, Hamilton and Athenian societies admit young men only. Students are encouraged to join one of these organizations for the sake of practice in the use of language, training in debate, and general experience in conducting meetings and in dealing with their fellows. These societies jointly maintain a debating council which coöperates with a faculty committee in arranging for all intercollegiate and interstate debates participated in by representatives of the College. The oratorical board, similarly maintained by these societies, arranges for the intersociety oratorical contest.

In the School of Agriculture there are three literary societies: one for young men, the Lincoln; one for young women, the Philomathian; and one for both young men and young women, the Hesperian. These societies have the same general aims and purposes as those in the College.

AGRICULTURAL SOCIETIES

The Saddle and Sirloin Club meets on the first and third Mondays of each month. Membership is open to all animal husbandry students above the freshman year. The object of the club is to promote the interests of animal husbandry in the College and in the State. Livestock problems of all kinds are taken up, and members of the faculty and outside speakers are secured for addresses on special topics. The College section of the American Society of Agronomy meets on call of the president

of the society. The membership includes students and instructors interested in agronomy and in allied subjects. The purpose of the society is to promote the development of agronomic work and methods, in harmony with the purpose of the organization of this name. The Agricultural Association meets Monday evenings. All students interested in agriculture are eligible to membership. The object of the association is to promote the general interests of agriculture in the College and State.

ENGINEERING SOCIETIES

The various technical societies of the Engineering Division meet individually biweekly in departmental seminars for lectures, presentation of papers and discussion of notable articles appearing in the technical press or in the journals of the national societies. On alternate weeks all of the societies meet together as the Engineers' Association in a general seminar for lectures by eminent practicing engineers and members of the engineering faculty of this and other schools.

The students in mechanical and electrical engineering are organized as student branches of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, respectively.

The purpose of these various societies is to acquaint the students with the latest development in the fields of engineering and architecture, to give them more definite ideas as to the opportunities in their professions and the requirements for success in their profession, to promote acquaintance and fellowship among the students, and to further the interest of the engineering division in the College and the State.

THE COLLEGE BAND

The College Band is a military organization, composed of cadets assigned to this duty for the College year in lieu of drill and technical military instruction. The Band is limited in its membership, and attendance of the members upon its exercises is obligatory. It has proved an effective aid to the cadet corps, stimulating a love for martial music, and affording an attractive feature of the various public ceremonial occasions at the College.

THE COLLEGE ORCHESTRA

The Orchestra is a student organization connected with the Department of Music, membership in which is voluntary. Its daily training under competent leadership results in the acquisition of a considerable repertoire of musical compositions of the best quality. Those connected with the Orchestra obtain in this way familiarity with the works of many of the great composers, and among the students at large the Orchestra is an efficient aid in cultivating a taste for and an appreciation of good music.

ATHLETIC ORGANIZATIONS

By means of the gymnasium the College is prepared to give complete physical as well as mental training. This building, which is equipped with all the usual accessories, assists in developing and maintaining

physical tone and health in the student body. In addition to the gymnasium classes, and physical training in the military corps of cadets, all young men are encouraged to develop their physical skill by playing on practice teams in various athletic lines. In the fall football teams are organized; in the fall and winter basketball; while in the spring baseball, tennis, and track athletics prevail. Every possible encouragement is given all students desirous of participating in these games to enter the practice teams and receive the necessary instruction. The most proficient of these have opportunity to enter the first teams and participate in intercollegiate contests. The College authorities encourage all reasonable and sane athletic development, as a means for the training of physical qualities desirable in men everywhere. Professionalizing tendencies are strictly repressed, and the athletic rules adopted by the faculty prevent, by proper regulation, all participation in intercollegiate games on the part of students deficient in their studies.

The women students have equal opportunity for general physical training with the young men. In the gymnasium, under a physical director, they receive training suitable for their needs. Basketball and tennis teams are organized among the young women.

HONORARY ORGANIZATIONS

The honorary organizations consist of fraternities, sororities, and societies. Of these, Alpha Zeta and Gamma Sigma Delta draw their members from students in the Division of Agriculture; Alpha Psi draws its members from the Veterinary Department; Sigma Tau from the Division of Engineering; Omicron Nu from the Division of Home Economics. There are chapters of Sigma Delta Chi, the journalistic fraternity; of Pi Kappa Delta, the debating fraternity; of Zeta Kappa Psi, the debating sorority. The military students have a chapter of "Scabbard and Blade," the national fraternity; and the athletic men have the "K" fraternity. Of honorary societies there are the Quill Club, composed of those who have gained distinction in writing, and the "Forum," for those who have secured forensic honors.

In addition to these student organizations there is a chapter of Phi Kappa Phi, to which students of the highest scholarship are elected. (See "Honor Societies.")

School of Agriculture

(The Secondary School)

HARRY LLEWELLYN KENT, *Principal*

ADA RICE, *Assistant Principal*

J. W. ZAHNLEY, *Assistant Principal*

The School of Agriculture is organized to meet the needs of young men and young women of Kansas who may need instruction more closely identified with the life of the farm, home and shop than that provided by the high schools of the State. It is also intended to meet the needs of those men and women who find themselves for any cause unable to complete an extensive course of collegiate instruction, yet who feel the necessity of a practical training for their activities in life. A large part of the student's time in the School will be spent in the laboratories and in contact with the real objects of his future work. An element of culture and general information is provided for in several terms of English for each course, and in work in history, economics, citizenship, physics, and chemistry.

The School of Agriculture is not a school preparatory to the College. Its sole purpose is to fit men and women for life in the open country, and to make country life more attractive; to make the workshop more efficient; in short, to dignify and to improve industrial life. It is not established to entice students away from the high school. It is for those of every walk in life who wish a larger view and greater skill in doing the world's work.

All the resourses of the College are at the disposal of the School of Agriculture. Its students have every advantage possessed by students in the College.

THE COURSE OF STUDY

The curriculum in agriculture emphasizes the growing of crops and the raising of livestock. A minimum of theory and a maximum of practical work bring the student into close contact with the actual conditions of farm life.

The curriculum in domestic science emphasizes the care of the home. Home decoration, home sanitation, cookery, and sewing receive careful attention.

The curriculum in mechanic arts leads to a trade. It is designed to shorten the time of apprenticeship and to prepare the way for skilled workmanship in shop or factory. The great amount of time spent in the shops should easily lead to skill and eficiency in subsequent work.

ADMISSION

Students who are fourteen years of age or older and who have completed the eighth grade of the public schools are admitted without examination. Students who have not completed the eighth grade are examined in arithmetic, United States history, English grammar, geography, reading, and spelling. Students who have done work in the public high schools receive credit for the work done. Maturity in years and practical experience are given due consideration, but students should not consider these qualifications alone sufficient to admit them. Wherever there is question about a student's qualifications for entering, he should correspond with the Principal of the School of Agriculture before coming.

The Principal of the School of Agriculture is charged with the execution of all College and faculty rules relating to the enrollment of students in classes and their choice of studies. Students entering under the age of seventeen years are required to complete one of the three-year curricula as outlined before they may choose work not included in the curriculum.

It is greatly to the advantage of the prospective student to see to it that his certificate of graduation, properly filled out, be sent to the College as soon as possible after graduation. A permit to register will then be sent him by the Registrar in advance of his coming in September; this will greatly facilitate the work of entrance. The student will present this permit at the registration room in Nichols Gymnasium and will not be compelled to wait his turn to meet the committee on admission.

Upon registration each student receives a certificate of his standing, which he presents to the Principal of the School, who is charged with the duty of enrolling students in classes, selecting and arranging subjects, and assigning hours.

GRADES AND FAILURES

Examinations are held at stated periods and at such other times as the Faculty may provide. Absence from examination, or ten or more unexcused absences from class periods, severs a student's connection with the institution, which connection can be renewed only through the action of the Principal of the School. Any withdrawals from school or class must be authorized by the Principal; otherwise, continued absence is construed as failure. Parents or guardians are furnished a copy of the record of the student's work at the close of any term if they so desire.

Curriculum in Agriculture

(School of Agriculture)

The Arabic numeral immediately following the name of subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

FIRST YEAR

First Semester		Second Semester	
Stock Judging An. Husb. 51	3(0-6)	Fruit Growing Hort. 51	3(2-2)
Beginning Poultry Poult. Husb. 51	2(1-2)	Blacksmithing I Shops 69	2(0-4)
Carpentry I Shop 51	2(0-4)	Gas Engines I Steam and Gas 51, 54	2(1-2)
Elementary Botany Bot. 51	3(2-3)	Elementary Zoölogy Zoöl. 51	3(2-3)
Industrial Arithmetic A Math. 51	4(4-0)	Applied Mathematics A Math. 55	4(4-0)
English I Engl. 51	4(4-0)	English II Engl. 54	4(4-0)
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Music * Music	———	Music * Music	———

SECOND YEAR

First Semester		Second Semester	
Farm Crops Agron. 51	5(4-2)	Dairying Dairy Husb. 51	2(1-2)
Physiology and Hygiene A Vet. 51	3(3-0)	Farm Insects Ent. 61	2(2-0)
Elementary Farm Machinery Farm Mach. 51	2(1-2)	Soils and Fertilizers Agron. 56	3(2-2)
Breeds and Breeding An. Husb. 53	2(2-0)	Livestock Production An. Husb. 55	3(3-0)
Elementary Chemistry Chem. 51	4(3-2)	Elementary Agricultural Chemistry Chem. 53	4(3-2)
English III Engl. 61	4(4-0)	English IV Engl. 64	4(4-0)
Military Science ‡ I Mil. Tr. 51	1(0-3) *or*	Military Science ‡ II Mil. Tr. 52	1(0-3) *or*
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Music * Music	———	Music * Music	———

* Elective.

‡ All male students are required to take Physical Training during the first year of attendance and Military Science during the remaining years.

THIRD YEAR ††

First Semester		Second Semester	
Farm Management Agron. 61	3(2-2)	Agricultural Bacteriology Bact. 51	3(2-2)
Diseases of Farm Animals Vet. 61	2(2-0)	Rural Economics Econ. 52	3(3-0)
Elementary Grain Marketing Mill. Ind. 51	2(2-0)	American Nation † II Hist. 60	4(4-0) *or*
American Nation † I Hist. 59	4(4-0)	Civics Hist. 63	4(4-0)
Physics A-I Physics 51	4(3-2)	Physics A-II Physics 52	4(3-2)
English V Engl. 71	3(3-0)	Farm Writing Ind. Jour. 51	4(2-4)
Military Science ‡ I Mil. Tr. 51	1(0-3) *or*	Military Science ‡ II Mil. Tr. 52	1(0-3) *or*
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Music * Music	———	Music * Music	———

Curriculum in Mechanic Arts

(School of Agriculture)

The Arabic numeral immediately following the name of subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

FIRST YEAR

First Semester		Second Semester	
English I Engl. 51	4(4-0)	English II Engl. 54	4(4-0)
Algebra I Math. 61	4(4-0)	Algebra II Math. 62	4(4-0)
Free-hand and Object Drawing Arch. 51	3(0-6)	Geometrical Drawing Arch. 52	3(0-6)
Gas Engines I Steam and Gas. 51, 54	2(1-2)	Traction Engines I Steam and Gas 66	2(0-4)
Carpentry I Shop 51	2(0-4)	Molding I Shop 96	2(0-4)
Concrete Construction I Ap. Mech. 51, 55	2(1-2) *or*	Elementary Botany Bot. 51	3(2-2) *or*
Elementary Botany Bot. 51	3(2-2)	Concrete Construction I Ap. Mech. 51, 55	2(1-2)
Blacksmithing I Shop 69	2(0-4)	Blacksmithing II Shop 72	2(0-4)
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Music * Music	———	Music * Music	———

* Elective.

† By special permission students nay substitute Ancient History I and II or Modern History I and II for corresponding semesters of American Nation.

†† Third year students may, with the consent of the Principal, elect for substitution: Traction Engines, Gas Engines, Blacksmithing, Concrete Construction, or Nursery Practice.

‡ All male students are required to take Physical Training during the first year of attendance and Military Science during the remaining years.

SECOND YEAR

First Semester		Second Semester	
English III Engl. 61	4(4-0)	English IV Engl. 64	4(4-0)
Plane Geometry I Math. 66	4(4-0)	Plane Geometry II Math. 67	4(4-0)
Physics A-I Physics 51	4(3-2)	Physics A-II Physics 52	4(3-2)
Shop Drawing I Ap. Mech. 75, 80	3(1-4)	Shop Drawing II Ap. Mech. 85, 90	3(1-4)
Machine Shop I Shop 87	3(0-6)	Strength of Materials Ap. Mech. 70	3(3-0)
Military Science ‡ I Mil. Tr. 51	1(0-3) *or*	Military Science ‡ II Mil. Tr. 52	1(0-3) *or*
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Elective, 3 credits from following:		*Elective,* 3 credits from following:	
Concrete Construction II Ap. Mech. 60	3(0-6)	Concrete Construction III Ap. Mech. 65	3(0-6)
Carpentry Shop 54	3(0-6)	Carpentry III Shop 57	3(0-6)
Steam Engines and Boilers I Steam and Gas 75, 78	3(1-4)	Gas Engines II Steam and Gas 57	3(0-6)
Blacksmithing III Shop 75	3(0-6)	Blacksmithing IV Shop 78	3(0-6)

THIRD YEAR

First Semester		Second Semester	
Modern History I † Hist. 55	4(4-0)	Modern History II † Hist. 56	4(4-0)
Solid Geometry Math. 71	4(4-0)	Algebra III Math. 72	4(4-0)
Civics Hist. 63	4(4-0)	Economics Econ. 51	3(3-0)
Electricity I-S Elect. Engr. 51, 55	3(2-2)	English V Engl. 71	3(3-0)
Military Science ‡ I Mil. Tr. 51	1(0-3) *or*	Military Science ‡ II Mil. Tr. 52	1(0-3) *or*
Physical Training M-I Phys. Ed. 51 A	1(0-3)	Physical Training M-II Phys. Ed. 52	1(0-3)
Elective, 5 credits from following:		*Elective,* 5 credits from following:	
Blacksmithing V Shop 81	3(0-6)	Blacksmithing VI Shop 84	3(0-6)
Machine Shop II Shop 90	2(0-4)	Machine Shop III Shop 93	3(0-6)
Carpentry IV Shop 60	2(0-4)	Carpentry V Shop 63	2(0-4)
Gas Engines III Steam and Gas 60	3(0-6)	Gas Engines IV Steam and Gas 63	3(0-6)
Traction Engines II Steam and Gas 69	2(0-4)	Traction Engines III Steam and Gas 72	2(0-4)
Steam Engines and Boilers II Steam and Gas 81	2(0-4)	Shop Drawing III Ap. Mech. 95	2(0-4)

† Ancient History I and II or American Nation I and II may be substituted for Modern History I and II.

‡ All male students are required to take Physical Training during the first year of attendance and Military Science during the remaining years.

Curriculum in Home Economics

(School of Agriculture)

The Arabic numeral immediately following the name of subject indicates the number of credits, while the numerals in parentheses indicate the number of hours a week of recitation and of laboratory, respectively.

FIRST YEAR

First Semester		Second Semester	
English I Engl. 51	4(4-0)	English II Engl. 54	4(4-0)
Sewing I Dom. Art 51	2(0-4)	Sewing II Dom. Art 52	2(0-4)
Cooking I Dom. Sc. 51	3(1-4)	Cooking II Dom. Sc. 52	3(1-4)
General Housekeeping Dom. Sc. 61	3(3-0)	General Housekeeping II Dom. Sc. 62	3(3-0)
Industrial Arithmetic W Math. 52	4(4-0)	Elementary Design Home Art 51	3(0-6)
Household Insects Ent. 51	2(2-0)	Gardening Hort. 56	2(1-2)
		Dairying Dairy Husb. 61	2(1-2) *or*
		Carpentry H Shop 66	2(0-4)
Physical Training W-I Phys. Ed. 75 A	1(0-3)	Physical Training W-II Phys. Ed. 76	1(0-3)
Music* Music	———	Music* Music	———

SECOND YEAR

First Semester		Second Semester	
English III Engl. 61	4(4-0)	English IV Engl. 64	4(4-0)
Elementary Chemistry Chem. 51	4(3-2)	Elementary Household Chemistry Chem. 52	4(3-2)
Sewing III Dom. Art 53	2(0-4)	Sewing IV Dom. Art 54	2(0-4)
Cooking III Dom. Sc. 53	2(0-4)	Cooking IV Dom. Sc. 54	2(0-4)
Economics Econ. 51	3(3-0) *or*	Applied Mathematics W Math. 56	4(4-0)
Civics Hist. 63	4(4-0)	Elementary Home Decoration Home Art 55	3(0-6)
Dress Design and Art Needlework Dom. Art 61	2(0-4)		
Physical Training W-I *or* W-III † Phys. Ed. 75 A *or* 77	1(0-3)	Physical Training W-II *or* W-IV † Phys. Ed. 76 *or* 78	1(0-6)
Music * Music	———	Music * Music	———

* Elective.

† Young women take physical training the first two years of their attendance.

THIRD YEAR

First Semester		Second Semester	
English V Engl. 71	3(3-0)	English VI Engl. 74	4(4-0)
Physics H-I Physics 61	4(3-2)	Physics H-II Physics 62	4(3-2)
Ancient History I ‡ Hist. 51	4(4-0)	Ancient History II ‡ Hist. 52	4(4-0)
Sewing V Dom. Art 55	2(0-4)	El. Textiles and Millinery Dom. Art 62	2(0-4)
Household Bacteriology Bact. 61	3(2-2)	Physiology and Hygiene H Vet. 52	4(4-0)
Elements of Poultry Keeping Poult. Husb. 52	2(2-0)	Physical Training W-II *or* W-IV † Phys. Ed. 76 *or* 78	1(0-3)
Physical Training W-I *or* W-III † Phys. Ed. 75 *or* 77	1(0-3)	Music * Music	———
Music * Music	———	Hygiene and Social Problems W § Phys. Ed. 80	R
Hygiene and Social Problems W § Phys. Ed. 80	R		

Agricultural Courses

AGRONOMY

51. Farm Crops. Second year, first semester. Class work, four hours; laboratory, two hours. Five semester credits. Prerequisite: Botany. Mr. Zahnley.

The course involves a study of both grain and forage crops, approximately one-half semester being given to each. Emphasis is placed upon the economic production of those crops which are of greatest importance in Kansas. The laboratory work is planned to acquaint the student with the different grain and forage plants and their habits of growing. Text: Wilson and Warburton's *Field Crops*.

56. Soils and Fertilizers. Second year, second semester. Class work, two hours; laboratory, two hours. Three semester credits. Prerequisites: Elementary Chemistry; Farm Crops. Mr. Zahnley.

The course involves a study of the physical nature of soils and their adaptation to crops, together with proper methods of handling to maintain good physical condition, to conserve moisture and to prevent washing and blowing. Means of maintaining the fertility of the soil, the care and use of barnyard manure; green manure and commercial fertilizers are also considered. In the laboratory and on field trips different soils are studied with reference to their physical properties and their relation to crops and methods of management. Text: Whitson and Walster's *Soils and Fertilizers*.

61. Farm Management. Third year, first semester. Class work, two hours; laboratory, two hours. Three semester credits. Prerequisites: Farm Crops; Soils and Fertilizers; and Livestock Production. Mr. Zahnley.

The purpose of this course is to correlate the information relating to farming given in other agricultural courses and to make a study of farm-

* Elective.

† Young women take physical training the first two years of their attendance.

‡ American Nation I and II or Modern History I and II may be substituted for the corresponding terms of Ancient History.

§ Unless taken some previous semester. All women students are required to take this course during their first year of attendance.

ing as a business. The course involves a study of types of farming, the selection of a farm, proper distribution of capital in the farm business, arrangement of fields and farm buildings, the relation of livestock farming to crop farming, and the most profitable combination of these, together with their effect upon soil fertility. A system of account keeping that is adapted to farm conditions is considered. Text: Boss's *Farm Management.*

ANIMAL HUSBANDRY

51. STOCK RAISING. First year, both semesters. Laboratory, six hours. Three semester credits. Assistant Professor Paterson and Mr. Gatewood.

This course consists in score-card practice in judging horses, beef cattle, dairy cattle, sheep and swine, in which the students become familiar with the general points to be observed in judging livestock. One-fourth of this time is given to the study of dairy cattle presented by the Department of Dairy Husbandry. Text: Craig's *Judging Livestock.*

53. BREEDS AND BREEDING. Second year, first semester. Class work, two hours. Two semester credits. Prerequisite: Stock Judging. Mr. ———.

This course consists of the study of pure-bred horses, cattle, sheep and swine, and the methods practiced by the best breeders. It also embraces the study of the general principles of breeding, such as variation and heredity. Text: Mumford's *Breeding of Farm Animals.*

55. LIVESTOCK PRODUCTION. Second year, second semester. Class work, three hours. Three semester credits. Prerequisites: Elementary Chemistry, and Breeds and Breeding. Assistant Professor Paterson.

This course involves the study of the comparison and usefulness of various feeds, and a study of successful and economical methods of growing and finishing cattle, sheep and hogs for market purposes, as well as the breeding of both market and pure-bred animals. Text: Henry and Morrison's, *Feeds and Feeding*, abridged edition.

DAIRYING

61. DAIRYING. First year, second semester, in home economics; and second year, second semester, in agriculture. Lecture, one hour; laboratory, two hours. Two semester credits. Mr. Davis.

This course includes lectures on the various breeds of dairy cattle, milk and its composition, Babcock testing, separation and churning. Two individual lectures are given to the agricultural students on feeding the dairy herd, and two additional lectures on cheese making to the home economics students.

Laboratory.—The laboratory work comprises the operation of the Babcock test, separating milk, churning, and soft-cheese making.

51. STOCK JUDGING. (An. Husb. 51.) Associate Professor Fitch.

Four weeks are given over to the judging of dairy cattle. The rest of the course is devoted to the study of the breeding and market types of horses, cattle, sheep and swine, and is presented by the Department of Animal Husbandry.

HORTICULTURE

51. FRUIT GROWING. First year, second semester. Class work, two hours; laboratory, two hours. Three semester credits. Mr. Pratt.

This course includes a study of the principles of vegetable gardening and fruit growing. The first half of the semester is given to the prob-

lems of general fruit growing, and the vegetable gardening comprises practices in garden making and lectures during the last half of the semester.

56. GARDENING. First year, second semester. Class work, one hour; laboratory, two hours. Two semester credits. Mr. Pratt.

The practices and principles involved in the cultivation and care of home and market gardens are here studied.

MILLING INDUSTRY

51. ELEMENTARY GRAIN MARKETING. Third year, first semester. Class work, two hours. Two semester credits. Professor Fitz.

In this course are studied methods of harvesting, handling and storing of grain, together with the marketing of surplus grain from the farm. This involves methods of selling or buying, shipping and grading grain; organization of grain-inspection departments, with their merits and defects; the principal grain markets, with receipts and shipments of grain consumed. The by-products resulting from manufacture of food products from grain will be studied with regard to their feeding value and comparative cost.

POULTRY

51. BEGINNING POULTRY. First year, first semester. Recitation, one hour; laboratory, two hours. Two semester credits. Mr. Fox.

This course takes up a discussion of the various operations that go to make up the art of poultry keeping.

Laboratory.—The laboratory study includes work in dressing, packing and caponizing.

52. ELEMENTS OF POULTRY KEEPING. Third year, first semester. Recitation, two hours. Two semester credits. Professor Lippincott and Mr. Fox.

This course covers the same ground as Beginning Poultry, except that no laboratory work is required.

VETERINARY MEDICINE

61. DISEASES OF FARM ANIMALS. Third year, first semester. Class work, two hours. Two semester credits. Doctor Elder.

This course is intended to teach the student the recognition of disease, the principles involved in the preservation of health, and the application of first aid in disease or accident of farm animals. The various diseases resulting from the use of spoiled foods or the improper or injudicious use of good foods are discussed. The value of food, care and the nursing of the sick animal is thoroughly impressed upon the student. The common infectious diseases and the means of their prevention and eradication are considered. Text: Craig's *Common Diseases of Farm Animals.*

General Science Courses

BACTERIOLOGY

51. AGRICULTURAL BACTERIOLOGY. Third year, second semester. Lectures, two hours; laboratory, two hours. Three semester credits. Prerequisite: Chemistry, one year. Mr. S. J. Pearce.

An elementary course in the principles of bacteriology is here offered, taking up bacteriological problems from an entirely practical standpoint. The course is offered in order to give the student a reading knowledge of the sources and modes of infection; the relation of bacteriology to dairying and to soils and crop production; general sanitation; fermentations, etc.

Laboratory.—General laboratory manipulations. Normal and abnormal fermentations of milk and milk products; quantitative study of bacteria in the soil; a limited study of fermentations, of pathogenic, bacteria, of sewage pollution of water, etc., comprises the laboratory work.

61. HOUSEHOLD BACTERIOLOGY. Third year, first semester. Lectures, two hours; laboratory, two hours. Three semester credits. Prerequisite: Chemistry, one year. Mr. S. J. Pearce.

This course includes a general survey of the science of bacteriology as applied to the home. It includes a discussion of microörganisms as related to air, water, foods, general sanitation, fermentations, etc. An attempt is made to present the subject in as simple a manner as possible. The course is offered in the hope of giving the student a general understanding of the fundamentals, and a reading knowledge of the science.

Laboratory.—Various microscopic forms of importance in fermentation; preservation and spoilage of foods; the influence of various preservatives upon microörganisms common in the home; methods of sterilization and of pasteurization; the handling of infectious material, etc., are the subjects taken up in the laboratory work.

BOTANY

51. ELEMENTARY BOTANY. First year, both semesters. Class work, two hours; laboratory, two hours. Three semester credits. Mr. Peterson.

This course involves an elementary study of the biology of plants, including the simpler facts of their structure and of their physiology. The life history of a seed plant is followed from the germination of the seed to maturity; and the structure and work of the root, stem and leaf system is studied in some detail. The biology of the flower and its peculiar adaptations to insect or wind pollination is emphasized, as well as the manner in which seeds and fruits are distributed. Throughout the course emphasis is laid on the relations of plants to light, air, water and soil, and on the relation of the biology of the plants to agricultural practice.

CHEMISTRY

51. ELEMENTARY CHEMISTRY. Second year, first semester. Lectures and recitations, three hours; laboratory, two hours. Four semester credits. Mr. ————.

The work this term is an elementary study of the general principles of chemistry, using the elements oxygen, hydrogen, nitrogen, chlorine, and

carbon, and their most important compounds, as its basis. Sulphur and phosphorus, and to a slight extent other nonmetals, are studied, and following this a study of the metals and their most important compounds is begun. So far as possible, illustrations are drawn from practical life on the farm and in the home. The laboratory work is designed to give the student some knowledge of the essential features of chemical change, as well as to familiarize him with some of the more important elements and chemical compounds. Textbook: McPherson and Henderson's *First Course in Chemistry.*

52. ELEMENTARY HOUSEHOLD CHEMISTRY. Second year, second semester. Lectures and recitations, three hours; laboratory, two hours. Four semester credits. Prerequisite: Elementary Chemistry. Mr. ———.

In the work of this term the study of the metals is completed, and chemistry is then studied in its more direct application to the household. The course includes not only some special applications of inorganic chemistry, but simple organic chemistry, especially in its relation to foods. The laboratory work is an application of chemistry to various household problems touching water, foods, textiles, and utensils. Textbook: Snyder's *Chemistry of Plant and Animal Life.*

53. ELEMENTARY AGRICULTURAL CHEMISTRY. Second year, second semester. Lectures and recitations, three hours; laboratory, two hours. Four semester credits. Prerequisite: Elementary Chemistry. Mr. ———.

The study of the metals, begun the previous semester, is first completed. The chemical composition and chemistry of the growth of plants and animals is then taken up, and the general principles of chemistry are presented as applicable on the farm in relation to soils, fertilizers, dairy products, feeds, water, etc. The laboratory work follows these lines and is made as practical as possible. Textbook: Snyder's *Chemistry of Plant and Animal Life.*

ECONOMICS

51. ECONOMICS. Second or third year, both semesters. Class work, three hours. Three semester credits. Assistant Professor Merritt.

This course is a study of fundamental principles underlying man's wealth-getting and wealth-using activities, and their application to conditions and problems of the industries of to-day. Instruction is based on a text, assigned readings, and reports.

52. RURAL ECONOMICS. Third year, both semesters. Class work, three hours. Three semester credits. Assistant Professor Merritt.

This course presents briefly the fundamental principles of economics as related to the farm. It deals with the factors of production and the organization of the farm, followed by the principles governing value and a survey of marketing problems. Coöperation and its place with reference to farm needs is treated. The aim of the course is to give a knowledge of the principles that should guide the farmer in his work. Instruction is imparted by lectures, assigned readings, and reports.

ENGLISH

51. ENGLISH I. First year, first semester. Class work, four hours. Four semester credits. Assistant Professor Rice, Miss Leonard, and Mr. Hazlett.

This course has a twofold purpose: to develop in the student the ability to interpret readily from the printed page, and to give instruction in the elementary principles of composition. For the first aim, short

selections from the readers are used, with readings from textbooks, biographies, current periodicals, and works of a vocational nature. In connection with the text, practice work in letter writing and business forms is emphasized. Texts: Searson and Martin, *Studies*, Advanced Course; Hansen, *Two Years' Course in English Composition.*

54. ENGLISH II. First year, second semester. Class work, four hours. Four semester credits. Assistant Professor Rice, Miss Leonard, and Mr. Hazlett.

This course is a continuation of English I. It includes a review of grammar, practice in the use of the dictionary, and a thorough study of the paragraph. Oral composition is required. Emphasis is placed on the writing of themes on topics of keenest interest to the student. Text: Hansen, *Two Years' Course in English Composition,* chapters IX-XIII, inclusive.

61. ENGLISH III. Second year, first semester. Class work, four hours. Four semester credits. Assistant Professor Rice and Miss Russel.

The work of this course consists of a study of American literature. Class readings, class discussions, written sketches, abstracts and outlines are required. The aim of the course is to familiarize the student with the masterpieces of his own countrymen, and to offer continued study in the cultural as well as the practical side of literature and language. Text: Cairns, *American Literature for Secondary Schools,* to page 147.

64. ENGLISH IV. Second year, second semester. Class work, four hours. Four credits. Assistant Professor Rice and Miss Russel.

This course is a continuation of the work in English III, completing the work of the text. Selections from the works of Poe, Webster, Lincoln, Longfellow, Whittier, Emerson, Lowell, Holmes and others are chosen for study, and some written work is required. Text: Cairns, *American Literature for Secondary Schools,* page 147 to end.

71. ENGLISH V. Third year, both semesters. Class work, three hours. Three semester credits. Assistant Professor Rice and Miss Leonard.

This is a course in advanced composition. It includes instruction in the four forms of discourse, practice in the preparation of original themes, oral English, elementary debating, and a continuation of first-year work in commercial usage. Texts: Hansen, *Two Years' Course in English Composition,* Part III; Davis and Lingham, *Business English and Correspondence.*

74. ENGLISH VI. Third year, second semester. Class work, four hours. Four semester credits. Assistant Professor Rice and Miss Leonard.

This is a course in English classics. It includes an intensive study of representative classics. Abstracts, outlines, paraphrases and original themes are required. Texts: Selections from the works of Shakspere, Scott, Burns, Tennyson, and others.

ENTOMOLOGY

51. HOUSEHOLD INSECTS. First year, first semester. Class work, two hours. Two semester credits. Prerequisite: General Biology. Professor Dean.

This course consists of illustrated lectures and reference reading on the habits, life history and general methods of control of the principal insects injurious to house, garden, lawn, and human health.

61. FARM INSECTS. Second year, second semester. Class work, two hours. Two semester credits. Prerequisite: General Biology. Associate Professor Welch.

This is a study of the elementary anatomy, structure and physiology of insects, complete enough to give a clear understanding of the general structure of insects and the underlying facts upon which the scientific application of remedial or preventive measures is based. All of the more important insects of the farm, garden, and orchard are discussed at sufficient length to give a clear idea of their life histories and habits, together with the best means of control. The class work consists of lectures and text.

HISTORY

51, 52. ANCIENT HISTORY I AND II. Third year, first and second semesters. Class work, four hours. Four semester credits for each course. Miss Orem.

The history of civilization in the Nile and the Tigris-Euphrates valleys serves as an introduction to the more serious work of this course in which the emphasis is placed upon the history of Greece and Rome and western Europe down to 800 A. D. In addition to the greater political events characterizing the history of these regions, special attention is given to the institutional life of this period, to the social, economic and intellectual forces at work in the different states as well as to their governmental organization. Text: Westermann's *The Story of the Ancient Nations.*

55, 56. MODERN HISTORY I AND II. Third year, first and second semesters. Class work, four hours. Four semester credits for each course. Miss Orem.

Beginning with 800 A. D., a general survey is made of the development of Europe down to the present time and conditions. The more important events of the eleven centuries comprising this period are treated in as full detail as time will permit. The social, economic, cultural, religious, and diplomatic phases are emphasized. In view of the fact that greater changes have taken place in Europe since 1789 than in the thousand years preceding, special attention is given to the social and economic developments of this period and to the political developments and international relations, especially the changes which have prepared the way for the present European situation. Text: Harding's *New Medieval and Modern History.*

59, 60. AMERICAN NATION I AND II. Third year, first and second semesters. Class work, four hours. Four semester credits for each course. Assistant Professor James.

This course consists of a survey of American history from the discovery of America to the present time. It deals with the establishment of the English colonies in America; the growth of social and political institutions in these colonies; the development of an American nationality; the struggle among European nations for the possession of North America; the causes and meaning of the American Revolution; the formation and establishment of the constitution; the rise of the West and its influence, socially, politically and economically; the growth of sectionalism, the secession movement and the struggle to preserve the Union; and the important events characterizing American history since the termination of the contest between the North and the South. Along with the political history of the United States, a study of its economic development is made for the purpose of understanding the steps by which America, from humble beginnings in the colonial period, has reached its present high position as an industrial state. Texts: West's *American History and Government,* and Bogart's *The Economic History of the United States.*

63. CIVICS. Third year, both semesters. Class work, four hours. Four semester credits. Miss Orem.

This is not a course of the old type, usually called civil government, nor a course in constitutional law, but a vigorous course in the actual workings of our present-day governmental and political activities. Text: Guitteau's *Government and Politics in the United States,* Kansas edition.

65. ELEMENTARY INDUSTRIAL HISTORY. Not offered in 1917-'18. Class work, four hours. Four semester credits. Assistant Professor James.

This course is devoted to a study of American industrial life; how industries have developed, how they have modified our history and government, and how in turn they have been modified by historical development and governmental regulations. The course is based primarily on the third edition of Bogart's *Economic History of the United States.*

INDUSTRIAL JOURNALISM AND PRINTING

51. FARM WRITING. Third year, second semester. Class work, two hours; laboratory, four hours. Four semester credits. Assistant Professor Snow.

The course treats the elementary principles of writing for newspapers and farm publications, on such subjects as the students are likely to encounter in practical life. The student is shown how to obtain effective publicity for worthy enterprises in which he may be engaged. Emphasis is laid on agriculture, rural life, and general community service.

MATHEMATICS

51. INDUSTRIAL ARITHMETIC A. First year, first semester. Class work, four hours. Four semester credits. Assistant Professor Stratton and Mr. Fehn.

The course has two distinct aims: (1) A practical knowledge of the principles of numbers, both integral and fractional; (2) the application of these principles to practical problems of the farm and the shop. A large number of problems arising from actual experience over the whole field of agricultural science will be made the basis of the problem work. Farm investments, farm accounts and farm values will receive special attention. Text: Stratton and Remick's *Agricultural Arithmetic.*

52. INDUSTRIAL ARITHMETIC W. First year, first semester. Class work, four hours. Four semester credits. Miss Zeininger and Miss Holroyd.

This course follows the lines of Industrial Arithmetic A, except that the points of emphasis are varied so as to meet the needs of young women. Text: Same as for the course above.

55. APPLIED MATHEMATICS A. First year, second semester. Class work, four hours. Four semester credits. Assistant Professor Stratton and Miss Holroyd.

The course includes an introduction to the first principles of algebra and geometry; the use and meaning of symbols; simple problems in algebraic reckoning; the solution of simple equations of the first and second degrees; graphical solutions; geometrical constructions; illustration rather than proof of important geometrical theorems; computation of areas and volumes, with emphasis upon the problems arising from building and construction on the farm. Text: Breslich's *First Year Mathematics.*

56. APPLIED MATHEMATICS W. Second year, second semester. Class work, four hours. Four semester credits. Miss Zeininger.

This course presents work similar to that of Applied Mathematics A, with adaptations to the needs of young women. Text: Same as for course preceding.

61. ALGEBRA I. First year, first semester. Class work, four hours. Four semester credits. Miss Zeininger and Mr. Fehn.

This course includes a study of the four fundamental operations, integral linear equations, factoring, and fractions. Text: Wells and Hart's *New High School Algebra.*

62. ALGEBRA II. First year, second semester. Class work, four hours. Four semester credits. Prerequisite: Algebra I. Assistant Professor Stratton and Miss Zeininger.

The subjects considered are ratio and proportion, graphical representation, simultaneous linear equations, involution, evolution, theory of exponents, radicals, quadratic equations, and application to practical problems. Text: Wells and Hart's *New High School Algebra.*

66. PLANE GEOMETRY I. Second year, first semester. Class work, four hours. Four semester credits. Prerequisite: Algebra II. Miss Zeininger and Miss Holroyd.

Books I and II of Wentworth and Smith's *Plane and Solid Geometry* are studied in this course.

67. PLANE GEOMETRY II. Second year, second semester. Class work, four hours. Four semester credits. Prerequisite: Plane Geometry I. Miss Zeininger and Mr. Fehn.

Books III, IV and V of Wentworth and Smith's *Plane and Solid Geometry* are included in this course.

71. SOLID GEOMETRY. Third year, first semester. Class work, four hours. Four semester credits. Prerequisite: Plane Geometry II. Miss Zeininger, Mr. Fehn, and Miss Holroyd.

Books VI, VII and VIII of Wentworth and Smith's *Plane and Solid Geometry* form the subject matter of this course.

72. ALGEBRA III. Third year, second semester. Class work, four hours. Four semester credits. Prerequisite: Algebra II. Miss Zeininger, Mr. Fehn, and Miss Holroyd.

This course includes, besides a rapid review of factoring, fractions, linear equations, roots, radicals, and exponents, a treatment of quadratic forms with graphical work and theory, ratio and proportion, variation, the progressions, and the binomial theorem for positive integral exponents. Text: Hawkes, Luby and Touton's *Second Course in Algebra.*

MILITARY TRAINING

All young men are required to take Military Training during their second and third years in the School of Agriculture. Drills are held for three consecutive hours on Monday mornings. During the fall and spring practical work is taken, and during the winter and inclement weather indoor drill and physical training are held in the large Gymnasium of the College, and lectures and recitations are scheduled to cover the theoretical part of the training. Information as to the uniform worn and to other matters in connection with military training are given under that section in the Division of General Science.

JUNIOR DIVISION, R. O. T. C.

51. MILITARY TRAINING. First semester. Three hours. One semester credit. (*a*) *Practical:* Physical training; infantry drill, School of the Soldier, squad and company in close and extended order; preliminary instruction in sighting, position and aiming drill. (*b*) *Theoretical:*

Theory of target practice; military organization; map reading; personal hygiene.

52. MILITARY TRAINING. Second semester. Three hours. One semester credit. (*a*) *Practical:* Physical training; infantry drill to School of the Battalion; ceremonies; Manual of Interior Guard Duty; bayonet combat; first aid instruction. (*b*) *Theoretical:* Manual of Interior Guard Duty; map reading; camp sanitation for small commands; Infantry Drill Regulations to include School of Company.

53. MILITARY TRAINING. First semester. Three hours. One semester credit. (*a*) *Practical:* Same as course 51 (*a*); fire direction and control; gallery practice. (*b*) *Theoretical:* Lectures, military policy of the United States and the military obligations of citizenship; Field Service regulations.

54. MILITARY TRAINING. Second semester. Three hours. One semester credit. (*a*) *Practical:* Same as course 52 (*a*); first-aid instruction; range and gallery practice; combat firing or collective firing in indoor ranges; entrenchments. (*b*) *Theoretical:* Infantry Drill Regulations to include School of Battalion; Small Arms Firing Regulations; marches and camping; signaling; military hygiene.

MUSIC

Music is offered as an elective for both young women and young men. Instruction is furnished free to all regular students assigned to music classes, but for individual instruction a fee is charged. Further particulars are given in the article on "Music," elsewhere in this catalogue.

PHYSICAL EDUCATION

MEN'S DEPARTMENT

51A. PHYSICAL TRAINING M-I. Both semesters. Three hours. One semester credit. Required of all young men during their first semester in the school. Assistant Professor Bauer.

The course includes elementary free-hand calisthenics; elementary light hand apparatus, including wands, dumb-bells, etc.; elementary heavy apparatus work, and games. All work is graded in progressive order for each semester. Swimming is taught in the spring. A physical examination is made of each student when he enters. During the fall rugby football and soccer football are given. From the first of December to the end of the semester the work is in the gymnasium. Elementary calisthenics and Swedish movements, elementary apparatus, and games are taught.

Hygiene and social problems are discussed. This instruction gives an insight into the practical problems of daily healthful living from a personal point of view. Directions are given for avoiding the common ills of student life, and for maintaining the highest physical and mental condition while in the school, as well as for gaining the highest development of vital power and health for future duties.

52. PHYSICAL TRAINING M-II. Both semesters. Three hours. One credit. Required of all young men during their second semester in the school. Assistant Professor Bauer.

This course is a continuation of Physical Training M-I. In the spring, as soon as weather conditions allow, the work consists of baseball and track and field athletics.

WOMEN'S DEPARTMENT

75A, 76. PHYSICAL TRAINING W-I AND W-II. First and second semesters, respectively. Three hours. One semester credit for each course. Miss Bond and Dean Van Zile.

This is an introductory course. It includes corrective exercises, light apparatus work, folk dancing, games, and swimming. A physical examination is made of each young woman before she enters upon the work.

Instruction in hygiene and social problems is an essential part of course 75A. In these lectures, which are given by Dean Van Zile of the Division of Home Economics, in addition to the problems of hygiene as applied to individual health, the biological truths that lead to serious, respectful consideration of social and sex hygiene are presented.

77, 78. PHYSICAL TRAINING W-III AND W-IV. First and second semesters. Three hours. One semester credit for each course. Miss Bond.

These courses are a continuation of Physical Training W-I and W-II. Esthetic dancing, Swedish gymnastics, games and swimming are taught in these courses.

PHYSIOLOGY

51. PHYSIOLOGY AND HYGIENE A. Second year, first semester. Class work, three hours. Three semester credits. Doctor Elder.

This course includes the study of the anatomical structure and physiological functions of the human body. It includes a careful consideration of such factors in the maintenance of health as fresh air, diet, sleep, bathing and exercise. Text: Conn and Buddington's *Advanced Physiology and Hygiene.*

52. PHYSIOLOGY AND HYGIENE H. Third year, second semester. Class work, four hours. Four semester credits. Doctor Elder.

This course includes the study of the anatomical structure and physiological functions of the human body. It includes a careful consideration of such factors in the maintenance of health as fresh air, diet, sleep, bathing and exercise. Text: Conn and Buddington's *Advanced Physiology and Hygiene.*

PHYSICS

51. PHYSICS A-I. Second or third year, both semesters. Class work, three hours; laboratory, two hours. Four semester credits. Prerequisite: Algebra II. Assistant Professor Stewart, Mr. Pielemeier, and Mr. Smith.

The fundamental laws of mechanics, heat and sound are presented in this course. The application of principles to the common things of everyday life is emphasized. The laboratory work is based upon the work done in class, and is outlined in such a manner as to give the students special drill in exact measurements. Text: Black and Davis's *Practical Physics.*

52. PHYSICS A-II. Second or third year, both semesters. Class work, three hours; laboratory, two hours. Four semester credits. Prerequisite: Physics A-I. Assistant Professor Stewart, Mr. Pielemeier, and Mr. Smith.

This course is a continuation of course A-I. The subjects of magnetism, electricity, and light are considered. An introductory study is made of the units used in measuring electrical energy, the principles involved in current distribution, the uses now being made of electricity, the ordinary phenomena of light, and of questions of modern illumination. Text: Black and Davis's *Practical Physics.*

61. PHYSICS H-I. Third year, both semesters. Class work, three

hours; laboratory, two hours. Four semester credits. Prerequisite: Algebra III. Assistant Professors Floyd and Stewart.

The work given in this course has a direct bearing on the principles of mechanics, sound and heat as they apply to the home. The laboratory work is especially adapted to this phase of the work. Text: Tower, Smith and Turton's *Physics*.

62. PHYSICS H-II. Third year, both semesters. Class work, three hours; laboratory, two hours. Four semester credits. Prerequisite: Physics H-I. Assistant Professors Floyd and Stewart.

This course is a continuation of Physics H-I. The fundamental principles and laws of electricity and light are presented in this course, with special applications of the use of electricity in the home. Laboratory work is based on the study of simple electrical appliances used in the home. Text: Tower, Smith and Turton's *Physics*.

ZOOLOGY

51. ELEMENTARY ZOÖLOGY. First year, second semester. Class work, two hours; laboratory, three hours. Three semester credits. Mr. Hersh.

This course deals with the natural history of animals. The two hours of class work are devoted to résumés of the field and laboratory work and to general matters of animal biology. The laboratory work consists of one three-hour period a week. This work is carried on for the most part out of doors. The ponds and streams, meadows and woodlands are visited and the animals studied in their relation to each other and to their environments. Numbers of animals are brought to the laboratory, where they are kept in vivaria, and such study is given them as is not permitted out in the field.

Mechanic Arts Courses

DRAWING

51. FREE-HAND AND OBJECT DRAWING. First year, first semester. Laboratory, six hours. Three semester credits. Mr. Smith.

The work of this course includes exercises in drawing simple figures illustrating the effects of geometrical arrangement and the laws of design; the principles of perspective are studied and illustrated by drawing from geometric solids and simple objects. Practice is given in free-hand lettering and in sketching objects of the shops and out-of-doors.

52. GEOMETRICAL DRAWING. First year, second semester. Laboratory, six hours. Three semester credits. Mr. Smith.

This course comprises free-hand lettering, the use of drawing board, T-square and instruments, the construction of perpendiculars, parallels, angles, polygons and curves, and simple working drawings. Accuracy is emphasized.

APPLIED MECHANICS

51. CONCRETE CONSTRUCTION I. Recitations. Both semesters. Lectures and recitations, one hour. One semester credit. Assistant Professor Wendt and Mr. Robert.

Instruction is given in the principles governing the selection and preparation of materials, the proper proportioning of materials for different conditions, the construction of forms, mixing and handling concrete, elementary reinforced concrete construction, finishing concrete surfaces,

stucco and plaster work, and waterproofing and coloring concrete. A brief study is made of the application of these principles to the making of concrete foundations, building blocks and bricks, posts, sidewalks, floors, tanks, cisterns, silos, and bridges and culverts. Text: Seaton's *Concrete Construction for Rural Communities.*

55. CONCRETE CONSTRUCTION I, LABORATORY. Both semesters. Laboratory work, two hours. One semester credit. Must accompany or follow Concrete Construction I (Ap. Mech. 51). Assistant Professor Wendt, Mr. Robert, and assistants.

Laboratory and field work is given in hand and machine mixing and handling of concrete, and in the construction of forms, for such objects as machine and building foundations, floors, sidewalks, fence posts and building blocks. Tests are made on concrete cylinders and beams to illustrate the effect of different methods of treatment on the strength and reliability of plain and reinforced concrete.

60. CONCRETE CONSTRUCTION II. Second year, first semester. Laboratory, six hours. Three semester credits. Prerequisites: Concrete Construction I, Laboratory (Ap. Mech. 55). Assistant Professor Wendt.

Field work is given in practical plain and reinforced concrete construction, with lectures on field methods of bending steel, of placing it and securing it in place, and of mixing and placing concrete, with special reference to building and bridge construction. Simple laboratory tests of steel, of concrete and of reinforced concrete beams are also included.

65. CONCRETE CONSTRUCTION III. Second year, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Concrete Construction II (Ap. Mech. 60). Mr. Robert.

This course includes standard tests for fineness, specific gravity, soundness and strength of cement, for voids, uniformity coefficient and cleanness of sand and stone, and for the effect of variation of these factors on the strength of mortars and concretes.

70. STRENGTH OF MATERIALS. Second year, second semester. Class work, three hours. Three semester credits. Prerequisite: Concrete Construction I, Laboratory (Ap. Mech. 55). Mr. Robert.

The course embraces a study of the strength of beams, columns and other structural and machine elements, of wood, steel, concrete and other materials.

MECHANICAL DRAWING

75. SHOP DRAWING I, LECTURE. Second year, first semester. Lectures and recitations, one hour. One semester credit. Prerequisite: Geometrical Drawing. Geometry I (Math. 66) must accompany or precede this course. Assistant Professor Pearce and Mr. Robert.

A study is made of the selection, use and care of drawing instruments, lettering, orthographic, cabinet and isometric projections, and the development of surfaces. Text: French's *Engineering Drawing.*

80. SHOP DRAWING I. Second year, first semester. Drafting-room practice, four hours. Two semester credits. Must accompany the lecture (Ap. Mech. 75). Assistant Professor Pearce and Mr. Robert.

Practice is given in lettering, in the construction of orthographic and isometric projections of objects and in the development of surfaces. The following supplies are required: Triangles, T-square, scale, pencils, pens, ink, erasers, thumb tacks, drawing paper, and a set of drawing instruments. Students are advised not to purchase these supplies until after consultation with the instructor. Text: French's *Engineering Drawing.*

85. SHOP DRAWING II, LECTURE. Second year, second semester. Lectures and recitations, one hour. One semester credit. Prerequisite: Shop Drawing I (Ap. Mech. 80). Assistant Professor Pearce and Mr. Robert.

A continuation of the preceding course, with the study of conventional methods of representation, working drawings, technical sketching, and methods of reproducing working drawings. Text: French's *Engineering Drawing.*

90. SHOP DRAWING II. Second year, second semester. Drafting-room practice, four hours. Two semester credits. Must accompany the lecture (Ap. Mech. 85). Assistant Professor Pearce and Mr. Robert.

Working drawings are made from plates during the first part of the semester. Later, free-hand sketches are made of simple machine parts, and working drawings are made from these sketches. Practice is given in making tracings and blue prints.

95. SHOP DRAWING III. Third year, second semester. Drafting-room practice, four hours. Two semester credits. Prerequisites: Shop Drawing II (Ap. Mech. 90). Assistant Professor Pearce and Mr. Robert.

Practice is given in making working drawings from free-hand sketches of machine parts, assembly drawings, and in designing simple machine parts by empirical methods.

ELECTRICITY

51. ELECTRICITY I-S. Third year, first semester. Class work, two hours. Two semester credits. Prerequisites: Physics II (Physics 52) and Geometry II (Math. 67). Mr. ———.

This course embraces a study of wiring materials and electrical machinery; line work; illumination; open and concealed wiring; wiring in conduit and metal molding; installation and operation of both direct- and alternating-current motors, generators, lamps, and heating appliances.

55. ELECTRICITY I-S, LABORATORY. Third year, first semester. Laboratory, two hours. One semester credit. Must accompany Electricity I-S (Elect. Engr. 51). Mr. ———.

The student is here given practice in the connecting of generators, instruments and storage batteries, which compose the small electric plants used in lighting of rural residences; in the inspection, testing and care of various types of storage batteries; in the connection of motors and starting resistances, for use on both the isolated direct-current plants and on alternating-current transmission lines. A study is also made of the different methods of wiring farm houses and other buildings, and of the construction of outside pole lines connecting these various buldings.

FARM ENGINEERING

51. ELEMENTARY FARM MACHINERY. Second year, first semester. Class work, one hour; laboratory, two hours. Two semester credits. Instructor Collins.

In this course the student is taught the principles underlying the construction, operation and adjustment of the different types of farm machinery. Instruction is also given in fencing, rope work and belt splicing. Proper adjustment and operation of machines is taught in the laboratory and in the field.

66. ELEMENTARY TRACTION ENGINES I. First year, both semesters. Laboratory, four hours. Two semester credits. Prerequisite: Gas Engines I (Steam and Gas 51, 54). Mr. Sanders and assistants.

A study of gas traction engines, including motors, frames, transmission systems, cooling systems, ignition systems, lubricating systems, and carburetors; operation, care, repair and testing of gas traction engines.

69. ELEMENTARY TRACTION ENGINES II. Elective, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Traction Engines I (Farm Eng. 66). Mr. Sanders and assistants.

Operation, care and testing of various types of gasoline and kerosene traction engines, including belt tests, road tests and field tests.

72. ELEMENTARY TRACTION ENGINES III. Elective, second semester. Laboratory, four hours. Two semester credits. Prerequisite: Traction Engines II (Farm Eng. 69). Mr. Sanders and assistants.

A continuation of Traction Engines II, including special tests on gas traction engines.

SHOP WORK

51. CARPENTRY I. First year, both semesters. Laboratory, four hours. two semester credits. Mr. Parker and Mr. Ball.

A course of exercises in constructive carpentry, which are so graded as to give the student the principles of general carpenter work, and training in the proper use of tools and in the reading of drawings and blue prints. Some work is given to bring out the principles of framing and building operations, and practice is given in the use of paints and varnishes as protective coverings for woodwork.

54. CARPENTRY II. Elective, first semester. Laboratory, six hours. Three semester credits. Prerequisite: none. Mr. Parker and Mr. Ball.

Exercises in turning cylinders, cones, beads, convex and concave turning, and exercises that will involve the use of all the different turning tools, and turning between centers, on the face-plate and with hollow chucks. Some of the exercises are: tool handles, dumb-bells, rolling-pins, napkin rings, table legs, porch posts, ballusters, built-up and solid newel posts, columns and rosettes.

57. CARPENTRY III. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Carpentry I (Shop 51). Mr. Parker and Mr. Ball.

This course includes a combination of machine and hand work where the material is worked up on the machines and then fitted by hand. Some of the work consists of making plain and fancy casings, plate rails, picture moldings, picture frames, and simple pieces of furniture, which are stained, varnished or otherwise finished.

60. CARPENTRY IV. Elective, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Carpentry III (Shop 57). Mr. Parker and Mr. Ball.

This course consists of hand work with the rabbet, router, beading and matching planes, and with the dado, plow, and fillister in making window sashes and frames, doors and frames, grooved flooring, door jambs, and molding.

63. CARPENTRY V. Elective, second semester. Laboratory, supplemented by lectures, four hours. Two semester credits. Prerequisite: Carpentry IV (Shop 60). Mr. Parker and Mr. Ball.

The fundamental factors to be taken into consideration in the construction of buildings, as selection of the building site, laying out and squaring the foundation, excavating, types of foundations, form building for concrete, anchoring, placing of the sills, joists, bridging and studding, and bracing, rafter cutting and fitting, are studied in this course. The laboratory work consists of exercises along the lines given above.

66. CARPENTRY H. First year, second semester. Laboratory, four hours. Two semester credits. For women only. Mr. Parker and Mr. Ball.

A practical course in woodwork, in which the student makes simple articles, the making of which gives the proper training in the use of tools, and familiarity with the different kinds of woods, stains, varnishes, and paints. Supplementary lectures are given along with the laboratory work in order to bring out the different points more clearly.

69. BLACKSMITHING I. First year, first semester. Laboratory, four hours. Two semester credits. Mr. Lynch and Mr. Bundy.

This is a very practical course in the forging operations, such as drawing, upsetting, welding, bending, twisting and punching, together with instruction in the proper use and care of the fire and tools, and in handling the metals in the forge. Tools required: A two-foot rule, a pair of five-inch outside calipers, a center punch and a ball-pien hammer weighing, with handle, about two pounds.

72. BLACKSMITHING II. First year, second semester. Laboratory, four hours. Two semester credits. Prerequisite: Blacksmithing I (Shop 69). Mr. Lynch and Mr. Bundy.

This work consists of the making of such tools as punches, chisels, drills, scrapers, hammers, and other tools that are used in the trade. Tools required: Same as for Blacksmithing I.

75. BLACKSMITHING III. Elective, first semester. Laboratory, supplemented by lectures, six hours. Three semester credits. Prerequisite: Blacksmithing II (Shop 72). Mr. Lynch and Mr. Bundy.

A practical course in the various forging operations, with practice both as a blacksmith and helper, including the planning and laying out of work with special provisions for duplicate parts. Forging and forming tools are made as the nature of the work requires. Lectures are given so that the principles underlying the different operations may be thoroughly understood. Tools required: Same as for Blacksmithing I.

78. BLACKSMITHING IV. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Blacksmithing III (Shop 75). Mr. Lynch and Mr. Bundy.

This course includes the theory of hardening, tempering and annealing, case- and pack-hardening; a study of the nature of the different grades of carbon tool steel; tool forging, including the proper manipulation of the various lathe, planer and shaper tools; forging and heat treating special and high-speed steels. Instruction is by lectures and demonstrations. Tools required: Same as for Blacksmithing I.

81. BLACKSMITHING V. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Blacksmithing IV (Shop 78). Mr. Lynch and Mr. Bundy.

General shop work is here given, in which emphasis is laid on the quantity as well as the quality of the work, the idea being to give the student a knowledge of the amount of time required to do certain work. The work is varied so that the knowledge acquired will be as complete as possible. Tools required: Same as for Blacksmithing I.

84. BLACKSMITHING VI. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Blacksmithing V (Shop 81. Mr. Lynch and Mr. Bundy.

This is a continuation of Blacksmithing V, with practice with the oxyacetylene and thermit processes of welding. Tools required: Same as for Blacksmithing I.

87. MACHINE SHOP I. Second year, first semester. Laboratory, six hours. Three semester credits. Mr. Jones, Mr. Yost, and Mr. Holmes.

Practical machine work in the building and assembling of gas engines and wood lathes. Exercises are given to bring into use the various machines in the shops. Tools required: A four-inch scale, or B. & S. slide caliper, one pair five-inch outside calipers, one pair five-inch inside calipers, one center drill, and one B. & S. center gage.

90. MACHINE SHOP II. Elective, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Machine Shop I (Shop 87). Mr. Jones, Mr. Yost, and Mr. Holmes.

This course embraces practical work in making repairs on machinery, such as babbitting and fitting bearings, aligning shaftings and pulleys, lacing and fitting belts, and general repair work on engines and other machinery.

93. MACHINE SHOP III. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Machine Shop II (Shop 90). Mr. Jones, Mr. Yost, and Mr. Holmes.

A continuation of the preceding term's work, with work on the milling machines and universal grinder.

96. MOLDING I. First year, both semesters. Laboratory, four hours. Two semester credits. Mr. Grant.

This course consists of floor and bench molding with a great variety of patterns, along with which the student gets experience with different kinds of sand and facings; also, open sand work, sweep molding, machine molding, core making, setting of cores, gates and risers, and different methods of venting.

STEAM AND GAS ENGINES

51, 54. GAS ENGINES I. First year, both semesters. Class work, one hour; laboratory, two hours. Two semester credits. Mr. Mack and assistants.

A study of gasoline and kerosene engines; four-stroke and two-stroke cycle engines, gas-engine fuels, carburetors, ignition systems, lubrication, governing; selection, erection and operation of stationary gasoline and kerosene engines; fundamental parts of automobiles.

57. GAS ENGINES II. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Gas Engines I (Steam and Gas 51, 54). Mr. Mack and assistants.

A detailed study of gas-engine operation and care, with special attention to ignition systems, carburetors and testing. Automobile parts, including engines, differentials, transmissions, lubricating systems, clutches, systems of ignition, starters and carburetors; tests of ignition equipment and carburetors.

60. GAS ENGINES III. Elective, first semester. Laboratory, six hours. Three semester credits. Prerequisite: Gas Engines II (Steam and Gas 57). Mr. Mack and assistants.

The operation, repairs and testing of gas and oil engines.

63. GAS ENGINES IV. Elective, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Gas Engines III (Steam and Gas 60). Mr. Mack and assistants.

A continuation of Gas Engines III, including gas producers and special tests.

75, 78. STEAM ENGINES AND BOILERS I. Elective, first semester. Class work, one hour; laboratory, four hours. Three semester credits. Mr. Mack and assistants.

The principal parts of a steam-power plant are considered, including fire-tube and water-tube boilers, boiler auxiliaries, piping for boilers, feed-water heaters, firing, and the fundamental details of steam engines. The selection, operation and management of steam engines and boilers and the fundamental parts of the steam traction engine are also considered in this course.

81. STEAM ENGINES AND BOILERS II. Elective, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Steam Engines and Boilers I (Steam and Gas 75, 78). Mr. Mack and assistants.

This course includes operation, care, repair and testing of stationary traction steam engines.

Home Economics Courses

DOMESTIC ART

51. SEWING I. First year, first semester. Laboratory, four hours. Two semester credits. Miss ————.

The purpose of this course is to give a knowledge of textiles and to develop skill in their use as related to clothing. The fundamental stitches are applied in making a laundry bag. Study is made of the economy of mending, with practice on the various weaves and fabrics. The work of the machine is applied to simple garments. Special attention is given to Red Cross work. A notebook is required.

52. SEWING II. First year, second semester. Laboratory, four hours. Two semester credits. Prerequisite: Sewing I. Miss ————.

This course includes a study of general factory conditions; purpose and work of the Consumer's League and child-labor laws as they tend to affect and control the manufacture and sale of factory-made garments. Special attention is given to the selection of materials and trimmings suitable for underwear, with a brief history of lace and embroidery. Patterns are drafted and the following garments constructed: kimono, petticoat, fancy corset cover, and chemise. A notebook is required.

53. SEWING III. Second year, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Sewing II. Miss ————.

A special study is given in this course to appropriate dress as expressed in the selection of designs, material and color of the costume for the individual. Patterns are drafted, alterations made, and the following garments completed: tailored wash skirt, tailored waist, fancy lingerie waist, and a simple cotton dress.

61. DRESS DESIGN AND ART NEEDLEWORK. Second year, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Elementary Design. Miss Hunt.

First nine weeks of the course comprises the study of design, of color harmony and its application to costumes and embroidery, and the making of costumes in pencil and water color. The last nine weeks of the semester the course includes the following stitches in crochet, knitting, cross-stitch, French embroidery, Roman cut work, and their application to undergarments, waists, collars, and household articles.

54. SEWING IV. Second year, second semester. Laboratory, four hours. Two semester credits. Prerequisite: Sewing III and Dress Design. Miss ————.

This course offers a study of commercial patterns, woolen materials, and the conditions governing the price, selection, and wearing qualities

of ready-made garments. A simple woolen dress, a tailored wool skirt or a silk blouse are completed.

55. SEWING V. Third year, first semester. Laboratory, four hours. Two semester credits. Prerequisites: Sewing I, II, III, IV, and Dress Design. Miss ————.

This course emphasizes art in relation to dress; includes practice in cutting, fitting, finishing, and draping of such materials as silks, satins, chiffons, and laces.

62. ELEMENTARY TEXTILES AND MILLINERY. Third year, second semester. Laboratory, four hours. Two semester credits. Miss Fecht and Miss Palmer.

The first nine weeks of the course consists of the history and manufacture of textiles, the development of spinning and weaving, classification and study of fibers, and practical tests for adulterations. The last nine weeks of the semester include a study of the practical and artistic principles of millinery; practice in making bows, rosettes and other forms of hat decoration; the use of velvet, silk and straw, and a brief study of the manufacturing conditions.

DOMESTIC SCIENCE

51. COOKING I. First year, first semester. Recitation, one hour; laboratory, four hours. Three semester credits. Miss Perry.

Carbohydrates and protein foods are studied; their source, composition, manufacture and dietetic value are considered. The laboratory work includes practice in cooking fruits, vegetables, cereals, sugar, milk, and eggs. Six simple meals are served to members of the class, that they may receive instruction in acting as hostess, host and waitress.

52. COOKING II. First year, second semester. Recitation, one hour; laboratory, four hours. Three semester credits. Prerequisite: Cooking I. Miss Perry.

The study of protein food is continued as outlined above, followed by work with various leavening agents. The first part of the semester is devoted to the cooking of legumes and meats, with some work in frying and pastry making. The rest of the semester is devoted to practice in the use of various leavening agents, with emphasis on bread baking. Some special desserts are also studied. Meals are served as in Cooking I.

53. COOKING III. Second year, first semester. Laboratory, four hours. Two semester credits. Prerequisite: Cooking I. Miss Perry.

One-half of the semester is devoted to a study of the principles underlying the preservation of foods, with practice in canning, preserving, and pickling. The latter half of the course is spent in studying foods adapted to certain menus, and developing them into meals which are served in the class.

54. COOKING IV. Second year, second semester. Laboratory, four hours. Two semester credits. Prerequisite: Cooking III. Miss Perry.

The first of the semester's work is a continuation of Cooking III, with special emphasis given to planning and serving of typical farm menus for all occasions. In the second half of the semester practice is given in planning and serving food for large numbers.

61. GENERAL HOUSEKEEPING I. First year, first semester. Recitation, three hours. Three semester credits. Assistant Professor Kennedy and Miss Bartholomew.

Location, heating, lighting and ventilation of the home, rural and municipal water supply and sewage disposal, sanitation of foods, the

transmission and prevention of disease, and home care of the sick are studied in this course. Text: *The People's Health*, by Walter Moore Coleman, amplified by class discussions of outside readings.

62. GENERAL HOUSEKEEPING II. First year, second semester. Recitation, three hours. Three semester credits. Miss Bartholomew.

This course includes arrangement and furnishing of the home; buying of supplies, keeping of accounts; planning of household work in relation to efficiency; cleaning; laundering; care of walls and floors. Notebook work is required, together with outside readings.

HOME ART

51. ELEMENTARY DESIGN. First year, second semester. Laboratory, six hours. Three semester credits. Miss Averill.

The principles underlying pleasing color combinations, fine proportions, and consistent arrangement of parts are studied. Many exercises are given in selecting from objects of clothing and house furnishings those involving color harmonies, consistent shapes, and orderly arrangement. Original problems are given in the application of these principles.

55. ELEMENTARY HOME DECORATION. Second year, second semester. Laboratory, six hours. Three semester credits. Prerequisite: Elementary Design. Miss Averill.

Design, principles of color, form and arrangement are studied in application to all problems involved in home decoration, such as window, door and wall spacings, woodwork, wall coverings and floor coverings; appropriate furniture, and the arrangement of these in different rooms.

Degrees and Certificates Conferred

in the year 1917

First Division, June 21, 1917

DEGREES CONFERRED

Graduate Courses

MASTER OF SCIENCE

Cliff Errett Aubel, B. S., Pennsylvania State College, 1915.
Anson Lane Ford, B. S., Kansas State Agricultural College, 1915.
Frank Clyde Harris, B. S., Kansas State Agricultural College, 1908.
Miner Monroe Justin, B. S., Kansas State Agricultural College, 1907.
Lorenzo Beckley Mann, B. S., Kansas State Agricultural College, 1915.
Robert Ellsworth Mohler, A. B., Mount Morris College, 1912.
Clyde William Mullen, B. S., Oklahoma Agricultural and Mechanical College, 1915.
Herschel Scott, B. S., University of Kentucky, 1915.

CIVIL ENGINEER

Walter Jacob King, B. S., Kansas State Agricultural College, 1909.

MECHANICAL ENGINEER

Rainey Faris, B. S., Kansas State Agricultural College, 1901.
Edward Skillman, B. S., Kansas State Agricultural College, 1910.

ELECTRICAL ENGINEER

Louis Blaine Bender, B. S., Kansas State Agricultural College, 1904.
Benjamin Franklin Hillebrandt, B. S., Kansas State Agricultural College 1912.

Undergraduate Curricula

DIVISION OF AGRICULTURE

BACHELOR OF SCIENCE IN AGRICULTURE

Henry Joseph Adams
Charles Rupe Adamson
Wood Bass
Luster Roy Brooks
Blaine Crow
Jay Howenstine Cushman
Frank Elsworth Dowling
Paul John Englund
Ira Gordon Freeman
Samuel Ray Gardner
Wilbur Ross Gore
Clarence Owen Grandfield
Edward William Harvey
Ferdinand Eugene Hayes
Waldo Frederick Heppe
Lyman Ray Hiatt
Madison Lewelen Holroyd
Louis Edward Howard
Carl Fountain Huffman
Dwight Ellsworth Hull
Glenn William Keith
Floyd Brode Kelly
Ross Bartley Keys
Harold William Luhnow

BACHELOR OF SCIENCE IN AGRICULTURE—*continued*

Roscoe Irwin MacMillan
William Redmond Martin
Lowell Marston Mason
Edgar Cruger Miller
John Rogers Neale
Alfred Carl Nelson
George Raymond New
Arthur Reid Newkirk
Robert Osborn
William Francis Pickett
Frank Irving Reynolds
Lyle Verne Rhine
Harry Weber Schaper
Charles Louis Skelley
Joseph Burton Sweet
Earl Chapman Thurber
Frank Sumner Turner
Reed Weimer
Wilbur William Wright
Wilhelm Alexander Wunsch
Ludwig Albert Zimmerman

DOCTOR OF VETERINARY MEDICINE

John Burton Barnes
Aaron Andrew Brecheisen
Harve Frank
Daniel Milton Purdy
Edward Adolf Schmoker
Warren Robert Sheff
Harry Edward Van Tuyl
Josiah Wistar Worthington

DIVISION OF ENGINEERING

BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING

Jefferson Harold Flora
Joe Anthony Novak

BACHELOR OF SCIENCE IN ARCHITECTURE

James Allison Hull
Oliver Keith Rumbel

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Andrew Earl Dyatt

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

George Andrew Cunningham
William Christoph Ernsting
Carl David Hultgren
Earl Kesinger
William Klooz
Robert Bruce Leydig
Frederick Hemmant Nash
Russell Harry Oliver
Paul Charles Rawson
Lester Tubbs
Carl Adolph Wallerstedt
Horace Alfred Williams

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Albert Cecil Arnold
Charles Cotting Brown
Loren Lupfer
William Ewing Paterson
Gabe Alfred Sellers

DIVISION OF HOME ECONOMICS

BACHELOR OF SCIENCE IN HOME ECONOMICS

Helen Josephine Allis
Essie Jane Anderson
Edith Irene Andrew
Eunice Ann Baird
Mary Maria Baird
Rose Theodora Baker
Mildred Gertrude Barnes
Myrtle Ethel Bauerfind
Lucy Van Baughman
Clara Merle Beeman
Martha Estella Blain
Mabel Luella Botkin
Nelly Elizabeth Boyle
Anna Brandner
May Brookshier
Hallie May Bryson
Lillian Anna Buchheim
Elizabeth Mellvern Burnham
Blanche Clark
Rachel Clark
Alva Lee Cooper
Ruth Christina Daum
Florence Lissa Evans
Rosanna Farquhar
Christina Grace Figley
Grace Gardner

BACHELOR OF SCIENCE IN HOME ECONOMICS—*continued*

Dorothea Pearl Gish
Altha Teresa Goodwyn
Stella Jane Gould
Gladys Mae Grove
Dorothy Etta Hadley
Blanche Mary Haggman
Charlotte Barrett Hall
Mary Alma Hamaker
Elizabeth Lillian Hargrave
Zora Frances Harris
Dorothy Louise Heartburg
Frances Hildebrand
Mabel Ellen Hinds
Pearl Vivien Hinshaw
Elsbeth Ursula Hoffman
Esther Lydia Hostetler
Ellen Elizabeth Howell
Mabel Marguerite Hunter
Pansy Mary Jackson
Celia Belletta Johnson
Inez Eggert Kent
Lelia May Kent
Marion Bell Keys
Flora Einsel Kirk
Amy Alice Lamberson
Lottie Lasswell
Lillian McCarty
Agnes May McCorkle
Vera Anna McCoy
Beulah Lillis McNall
Kittie May
Charlotte Mayfield
Laura Mueller
Anna Monroe Neer
Helen Payne
Clara Viola Peterson
Hazel Luella Pierce
Nellie Pope
Nina Mae Powell
Fern Preston
Elisabeth Quinlan
Laura Mary Ramsey
Mildred Robinson
Fern Martha Roderick
Mabel Letitia Root
Frieda Wilhelmina van der Smissen
Ellen Delpha Speiser
Viola Stockwell
Alice Mae Sweet
Corinne Pearl Sweet
Edith Tempero
Madge Rector Thompson
Adelaide Rebecca Updegraff
Mary Elizabeth Weible
Vida Neil Wilson
Winnie Fay Wilson
Fay Emma Wright
Matilda Louisa Ziller

DIVISION OF GENERAL SCIENCE

BACHELOR OF SCIENCE

Lois Viola Bellomy
James Senter Brazelton
Harry Ray Bryson
Vilona Cutler
Lewis Albert Dubbs
Stella Maude Harriss
Anna Howard
Keith Egleston Kinyon
Riley Edward McGarraugh
Samuel James Molby
Oscar Wallace Park
Vera Grace Peake
John Sellon
Vera Whitmore

BACHELOR OF SCIENCE IN INDUSTRIAL JOURNALISM

Harold Wyllis Snell

CERTIFICATES CONFERRED

THE CERTIFICATE IN HOME ECONOMICS

La Vinnie Applegate
Marian Beardsley
Alyce Bobek
Millie Boomer
Nellie Carlson
Mary Emma Carver
Mona Corkill
Bernice Faye Crawford
Helen Mary Cross
Helen Elizabeth Dale
Mona Derge
Ruby Marie Freeman
Mary McKie Garrett
Helen Elizabeth Gearhart
Louisa Clara Germann
Erva Harmon
Ruth Hendricks
Gertrude Hendricks
Cecil Hill
Blanche Lillian Hiner
Flora Leone Hollenbeck
Mildred Hollister

CERTIFICATE IN HOME ECONOMICS—*continued*

Edna Howell
Ethel Howell
Elsie Johnson
Lula Johnson
Mildred Elvira Johnson
Florence Joyce
Lydia Knabe
Marguerite Laidig
Emmaline Elizabeth Lawrence
Olga Emma Lebeda
Berenice Logan
Elsie Emma Mahler
Martha Metz
Flossie Marguerite Milleson
Anna Evangeline Musil
Marie Nusz
Esther Margaret Oehrle
Mary Louise Ott
Carrie Virginia Parrish
Elsa Adeline Peiman
Martha Pearl Pence
Vangie May Rechel
Katherine Reimer
Bessie Stark
Lena Steward
Leah Augusta Wallace
Eva Williams
Inez Youngquist
Laura Mae Zwiebel

THE CERTIFICATE IN LUNCH-ROOM MANAGEMENT

Eva Case Aiken
Bessie Beaumont
Bertha Jane Boyd
Wilma Lousie Davis
Beryl May Houghton
Ella Viola Kraft
Ruth MacKay

THE CERTIFICATE IN AGRICULTURE

Russell Andrew
Merrill Avery
Dean Beardmore
Claude Levere Bowersox
James Brownrigg
Robert Brownrigg
Millard Bull
William Frederick Carls
Daniel Joe Cass
Ralph Donald Collier
Clarence Corcoran
Charles Dalke
George Dutton
Lawrence Eickman
Samuel Eitzen
Ralph Grimm
Herschel Harmon
Laud Reeves Hill
Harry Hunt
Guy Calvin Jenkins
Frank Larkins
Reuben Larson
J. T. Lear
Guilford Leslie
Arthur Ray Miller
Victor John Morton
Linlie Muck
Walter Nicholson
Albert Penner
Earl Harlan Prentice
Osborne Russell Randall
Kyle McKinley Schlaegel
Hartley Wesley Setchell
Charles Shean
Emil Henry Steuber
Floyd Streator
William Valentine Stutz
George Norman Twell
Claude Guss Wehrman
William Wolting

THE CERTIFICATE IN CREAMERY SHORT COURSE

Harold Stokes Currier
Frank Weeks Wood

THE CERTIFICATE IN STEAM AND GAS TRACTION ENGINES

Warren Thomas Avery
Raymond Houston Branson
Fred Rudolph Geib
Ralph William Glockle
Loyal Dwight Hoyt
Chester Raymond Peterson
Otto Fredric Uppendahl
Ernest Mitchell Walker

THE CERTIFICATE IN VETERINARY MEDICINE

Paul Kitchell Baker
David Maxon Greene
Arthur James Hoffman
Charles Earl Long
Harold Granville Newton

Second Division, August 3, 1917

DEGREES CONFERRED

DIVISION OF AGRICULTURE

BACHELOR OF SCIENCE IN AGRICULTURE

Ernest Baird
James Robert Dawson
Otis Benton Glover
John Lawrence Lantow
Ralph Robinold St. John
Clifford Leverne Swenson
Charles David Thomas
Wilton Terrence White

DOCTOR OF VETERINARY MEDICINE

Henry Alvin Hoffman

DIVISION OF ENGINEERING

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

George Patterson Gray
Lorpaid Carl Teeter
Harry William Tyrrell

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Rufus Stephen Kirk

DIVISION OF HOME ECONOMICS

BACHELOR OF SCIENCE IN HOME ECONOMICS

Anna Dorothea Ernsting
Florence Gladys Guild
Gertrude Bertha Hale
Myrna Grace Lawton
Emily Doris Lofinck
Louisa McIntosh
Ellen Evelyn Nystrom
Alma Luella Pile
Hazel Etta Russell

DIVISION OF GENERAL SCIENCE

BACHELOR OF SCIENCE

Nina Marie Williams

CERTIFICATES

THE CERTIFICATE IN VETERINARY MEDICINE

Newton Allen McCosh

Honors

SENIOR HONORS

JUNE, 1917

Division of Agriculture:

Charles Rupe Adamson
Frederick Waldo Heppe
Harold William Luhnow
William R. Martin

Division of Mechanic Arts:

Jefferson Harold Flora
Gabe Alfred Sellers

Division of Home Economics:

Myrtle Ethel Bauerfind
Anna Brandner
Vera Ann McCoy
Jessie Fern Preston
Alice Mae Sweet

Division of General Science:

Stella Maude Harriss

JUNIOR HONORS

JUNE, 1917

Division of Agriculture:

Fred Carp
Merle Warren Converse
Paul Levi Findley
Walter Wynne Houghton
Charles Otis Johnston
Shepperd Arthur Watson

Division of Mechanic Arts:

Merrill Agustus Durland
Dilts Sprankle McHugh
Charles Forrest Zeigler

Division of Home Economics:

Susan Grace Dickman
Lenore Josephine Frederickson
Helen Mitchell
Frances Elizabeth Stall
Helen Mae Stewart
Stella Strain

Division of General Science:

Benjamin Francis Barnes
Frances Perry

PHI KAPPA PHI

(CLASS OF 1917)

Charles Rupe Adamson
Edith Irene Andrew
Mary Maria Baird
Myrtle Ethel Bauerfind
Martha Estella Blain
Anna Brandner
Jefferson Harold Flora
Stella Maude Harriss
Waldo Frederick Heppe
Vera Anna McCoy
William R. Martin
Jessie Fern Preston
Mabel Letitia Root
Oliver Keith Rumbel
Gabe Alfred Sellers
Alice Mae Sweet
Josiah Wistar Worthington
Ludwig Albert Zimmerman

List of Students

Graduate Students

CANDIDATES FOR MASTER'S DEGREE, 1918

Florence May Alsop, A. B. 1915 (University of Kansas), *Zoölogy*
Wakefield
Myron Garfield Burton, A. B. 1913 (Muncie, Indiana, Normal Institute), *Education*
Manhattan
William Patrick Hayes, B. S. 1913 (Kansas State Agricultural College), *Entomology*
Manhattan
Jay Laurence Lush, B. S. 1916 (Kansas State Agricultural College), *Zoölogy*
Altamont
Ray Ralph Reppert, A. B. 1907 (Baker University), B. S. 1916 (Kansas State Agricultural College), *Entomology*
Valley Falls
Lois Emily Witham, B. S. 1916 (Kansas State Agricultural College), *Chemistry*
Manhattan

GRADUATE STUDENTS WORKING TOWARD MASTER'S DEGREE

William Hiddleson Andrews, A. B. 1900 (University of Chicago), *Education, Mathematics*
Manhattan
Will Ray Bolen, B. S. 1916 (Kansas State Agricultural College), *Agronomy*
Le Roy
Mary Stephen Lane Bowman, B. S. 1916 (Kansas State Agricultural College), *English*
Eskridge
Stella Maude Harriss, B. S. 1917 (Kansas State Agricultural College), *Chemistry*
Fairbury, Neb.
Levi Jackson Horlacher, B. S. 1917 (Purdue University), *Agriculture*
Colby
Harry Llewellyn Kent, A. B. 1912 (Kansas State Normal School), B. S. 1913 (Kansas State Agricultural College), *Agriculture*
Manhattan
William Adams Lippincott, A. B. 1903 (Illinois College), B. S. 1911 (Iowa State College), *Animal Husbandry*
Manhattan
Oscar Wallace Park, B. S. 1917 (Kansas State Agricultural College), *Entomology*
Manhattan
George Laurence Reisner, B. S. 1917 (Pennsylvania State College), *Agriculture*
McConnellsburg, Pa.
Stanley Albert Smith, B. S. 1913 (Kansas State Agricultural College), *Architecture*
Manhattan
Carl Pollard Thompson, B. S. 1904 (Kansas State Agricultural College), *Agriculture*
Manhattan
Rolla Williams Titus, A. B. 1909 (Washburn College), A. M. 1914 (University of Kansas), *Chemistry*
Manhattan
William Preston Tuttle, B. S. 1915 (University of Kentucky), *Agronomy*
Manhattan
Edward Staunton West, A. B. 1917 (Randolph Macon College), *Chemistry*
Stuart, Va.
Lyndell Porter Whitehead, B. S. 1916 (Kansas State Agricultural College), *Biology*
Walnut
Daniel Walter Ziegler, B. S. 1913 (Kansas State Agricultural College), *Animal Husbandry*
Manhattan

GRADUATE STUDENTS NOT WORKING TOWARD MASTER'S DEGREE

Myrtle Alberta Easley, B. S. 1912 (Kansas State Agricultural College), *Home Economics*
Salem, Neb.
Elizabeth Fitzgerald Flora, B. S. 1916 (Kansas State Agricultural College), *Education*
Roswell, N. Mex.
Frank Elmer Fox, B. S. 1915 (Iowa State College), *Chemistry*
Manhattan
Dorothy Gallagher, A. B. 1915 (Trinity College, D. C.), *Botany*
Kansas City, Mo.

Zora Frances Harris, B. S. 1917 (Kansas State Agricultural College), *Education*
Manhattan
Edgar Talbert Keith, B. S. 1909 (Kansas State Agricultural College), *Music*
Manhattan
Helen McClanahan Keith, B. S. 1914 (Kansas State Agricultural College), *Music*
Manhattan
William Redmond Martin, B. S. 1917 (Kansas State Agricultural College), *Agriculture*
Wathena
Fred Weymouth Milner, B. S. 1915 (Kansas State Agricultural College,) *Education*
Hartford
Andrew Minie Paterson, B. S. 1913 (Kansas State Agricultural College), *Animal Husbandry*
Manhattan
Laura Victoria Peterson, B. S. 1913 (Kansas State Agricultural College), *Home Economics*
Randolph
Grace Ellen Shelley, B. S. 1910 (Kansas State Agricultural College), *Education*
McPherson
Harold Wyllis Snell, B. S. 1917 (Kansas State Agricultural College), *Physics*
Manhattan
Lucile Berry Wolf, B. S. 1913 (Kansas State Agricultural College), *Music*
Jewell

Seniors

AGRICULTURE

James Malcolm Aye, Manhattan
Lester Ford Barnes, Fontana
Dee Daniel Bird, Great Bend
Hobart McNeil Birks, Hays
Frank Otto Blecha, Severy
Orville Thomas Bonnett, Winfield
Donald Jacobs Borthwick, Great Bend
Curtis Angel Brewer, Abilene
William Harrison Brookover, Eureka
Daniel Madison Bursch, Buffalo
Helen F. Carlyle, Stillwater, Okla.
Fred Carp, Manhattan
Edward Albert Clawson, Manhattan
Harry Colglazier, Larned
Merle Warren Converse, Manhattan
Lewie Elven Crandall, Jr., Burlington
David Earl Curry, Dunavant
Neil Edwin Dale, Kansas City
William Davis Denholm, Tonganoxie
John Elwyn DuBois, Wichita
John Frederick Eggerman, Manchester, Okla.
Ebenezer Torrey Englesby, Manhattan
Charles Ranger Enlow, Harper
William Raymond Essick, Eureka
Edward Raymond Frank, Manhattan
William Paul Gaiser, Wichita
George Calvin Gibbons, Topeka
Fred Griffee, Winfield
Benjamin Franklin Griffin, Manhattan
Ford Haggerty, Greensburg
W. Carleton Hall, Coffeyville
Albert Cecil Hancock, Stanley
Carl Laurence Hedstrom, Dinas
Douglas Abijah Hine, Manhattan
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Lea Nathan Jewett, Burlington
Charles Otis Johnston, Harper
Charles Vincent Kershaw, Garrison
Charles Wilbur McCampbell, Manhattan
Donald Eugene MacLeod, Holton
Avery Cleveland Maloney, Kalamazoo, Mich.
George Edwin Manzer, Corpus Christi, Tex.
Ralph Waldo May, Williamstown
Samuel M. Mitchell, Kansas City, Mo.
Samuel James Molby, Baldwin
Russell V. Morrison, Sterling
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Dean Orr, Kanona
Howard Waitman Phillips, Hutchinson
Ira Lewis Plank, Sylvia
Ernest Henry Ptacek, Emporia
Lee William Randels, Anthony
Harry DuMont Reed, Larned
Chester Lee Reeve, Garden City
George Willis Rhine, Manhattan
Carl John Rodewald, Vassar
Loyal K. Saum, Norton
Simon Peter Shields, Lost Springs
Joseph Earl Taylor, Manhattan
Lee Richard Thomas, Baxter Springs
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Charles Washington Bower, Perry
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Walter Harold Hilts, Kansas City
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Charles Francis Layton, Blue Rapids
Carleton Glen Libby, Glen Elder
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Oscar Willy Felix Paulsen, Manhattan
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Lyman Rae Vawter, Manhattan
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Otto B. Githens, Republic
Lester Lawrence Howenstine, Manhattan
Lester Gould Hudson, Winchester, Mo.
Theodore Legrand Shuart, Hutchinson

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Charles Leroy Caldwell, Manhattan
Robert Kerr, Jr., Wakefield
Clyde Cecil Key, Wichita
William Axtell Norman, Beaumont, Tex.
Ira Rogers, Lyndon
Frank Miller Sisson, Gretna
Charles Forrest Zeigler, Manhattan

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Merrill Augustus Durland, Centralia
Robert Albert Graves, Abilene
Olind Arthur Hindman, Rush Center
Yueu Foo Lim, Canton, China
William Charles McGraw, Manhattan
Leroy Nelson Miller, Carthage, Mo.
Ohmer Roger Miller, Norton
Joseph Lloyd Puckett, Partridge
Marshall Howard Russell, La Crosse
Wallace Lynn Thackrey, Valentine
Ralph Andrew Van Trine, Salina
Carey Ray Witham, Manhattan

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Ralph Mickle, Crete, Neb.

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Gustav Peter Toews, Newton

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Mildred Mary Barackman, Howard
Enid Alta Beeler, Mankato
Lora Hoag Bell, Manhattan
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Genevieve Vador Bruce, Manhattan
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Edna Halce Butler, Marysville
Evangeline Casto, Wellsville
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Myrtle Antonia Collins, Essex, Iowa
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Helen Hope Harbaugh, Minneapolis
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Esther Gladys Hilbish, Lewis
Leona Mae Hoag, Mankato
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Evelyn Julia Humphreys, Manhattan
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Evelyn Nellie Kizer, Manhattan
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Gertrude McQuaid, Fairbury, Neb.
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Helen Mitchell, Manhattan
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Comfort Amanda Neale, Manhattan
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Amanda Christine Olson, Brookville
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Golda Lucille Rader, Manhattan
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Letha Elizabeth Richhart, Nickerson
Ruth Myrtle Ridley, Topeka
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Margaret Robinson, Soldier
Maud Ernestine Sjolander, Topeka
Dorothy Skinner, Springfield, Mo.
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Ursula Mae Stites, Hope
Stella Strain, Phillipsburg
Rosa Elizabeth Straka, McPherson
Girlie Strowig, Paxico
Alta Carol Tayler, Wichita
Bess Thomen, Junction City

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Mrs. Helen Boyd Petrie, Norton
Mrs. Gladys Garnand Rude, Wellington
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Phillip Hsun Young, Hangchow, China

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Belford Quinton Shields, Lost Springs

Juniors

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Herbert Nickson Baker, Tonganoxie
Turner Barger, Protection
Carroll Mueller Barringer, Conover, N. C.
Sherman Floyd Bell, Perry
W. Walter Bell, Beattie
George Yoeman Blair, Mulvane
Chester Bondurant, Ness City
William Henry Borland, Clay Center
Arthur Newton Burditt, Ness City
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Clarence B. Chapman, Manhattan
John A. Clarke, Manhattan
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Joseph Hamilton Cool, Glasco
Emmett Anderson Cox, Memphis, Tenn.
Warren Eugene Crabtree, Manhattan
Vernon Simpson Crippen, Langdon
Kenneth Robert Crow, Kansas City
Arthur Reginald Denman, Manhattan
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Abijah Wilcox Foster, Fairchild, Wis.
Blanch Shirley French, Hamilton
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Bernie Edward Gleason, Jericho, Vt.
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Glenn Griffith, College Springs, Iowa
Joe Cunningham Gulledge, Manhattan
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Orin Willard Hinshaw, Eureka
Samuel James, Riley
William Curtis Janssen, Lorraine
Clare Kimport, Dellvale
Russell Lake, Lake City
Ernest Cyril Lindholm, Cheney
Frank M. Lindsay, Bunkerhill
Dorothy Elizabeth Lush, Altamont
C. W. McCampbell, Corpus Christi, Tex.
Ernest Lee McIntosh, Manhattan
George Ward McVicar, Onaga
John Long McNair, Holmdel, N. J.
Glenn Hagen Marsh, Wichita
Edgar Martin, Siloam Springs, Ark.
Albert Metz, Anthony
Chester Howard Middleton, Caldwell, Tex.
John Delmont Montague, Anthony
Joseph Clare Morton, Bunkerhill
Manoog M. Muguerditchen, Manhattan
Arthur Leroy Myers, Windom
Jesse Bowman Myers, Milton
Harry Hibbard Nelson, Wakarusa
Ralph Dale Nichols, Scranton
Ralph Damen Nixon, Council Grove
Everett Jacob Price, Baileyville
Leo Dewey Ptacek, Emporia
Louis Vernon Ritter, Memphis, Tenn.
Louis Henry Rockford, Osborne
Carl Otto Roda, Paradise
Winfield Foster Runyen, Topeka
Francis Aloysius Slattery, Jewell
Raymond Leslie Spangler, Longmont, Colo.
Giles Sullivan, Wamego
Arthur Fretchief Swanson, Norcatur
Eugene Field Tebow, Jamestown
Francis Totten, Beattie
Carl Fenton Trace, Carterville, Mo.
Mark Florea Upson, Sabinal, Tex.
Ralph Scoles Westcott, Galena
Carl Wettig, Valley Falls
Rupert Kress Wey, Wichita
Edwin Frederick Whedon, Oswego
Ivan Alfred White, Winfield
Homer Bryon Willis, Manhattan
Frank C. Wilson, Manhattan
Theodore Franklin Yost, La Crosse
Fred Frank Young, Pendennis

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Harry Jonas Austin, Manhattan
Arthur Esco Bate, Wichita
Fred Robert Beaudette, Wichita
Russell Fesler Coffey, Iola
Fred Emerson, Ottawa
John Franklin Erdley, Holton
Elijah Harrison Ikard, Manhattan
Howard A. O'Brien, Luray
Roy Reece Parker, Chanute
Evan Hart Richardson, Circleville
August Ernest Schattenburg, Manhattan
Edward Henry Schroer, Manhattan
Gail Maurice Umberger, Elmdale
Ray Weinheimer, Ottawa
Charles Edward Zollinger, Junction City

AGRICULTURAL ENGINEERING

Lloyd Harmon Bunnel, Iola
Walt Ellwood Dickerson, Wichita

ARCHITECTURE

William Thornton Foreman, Kiowa
(Mrs.) Edith Kelly Johnson, Olathe
Myron Ernest Johnson, Olathe
Harold Fred Laubert, St. Joseph, Mo.
Ray Selden Talley, Harper

CIVIL ENGINEERING

Edwin Adee, Manhattan
Hugh Donald Barnes, Blue Mound
Paul Watson Houston, Syracuse
Lloyd William Roberts, Pomona
Keen Umbehr, Alma

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Jesse Alfred Cook, Eureka
Homer Cross, Wichita
Samuel Willet Honeywell, Leoti
Glenn Worth McCracken, Manhattan
William Alfred Nye, Belle Plaine
John Stephen Painter, Beverly
John Henry Reed, Seward
Herbert Gordon Schultz, Manhattan
Morton Stigers, Manhattan
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FLOUR MILL ENGINEERING

Torby Glenn Fletcher, Wichita
Perie Richmond Pitts, Manhattan

MECHANICAL ENGINEERING

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Siebert Fairman, Manhattan
Gordon Wilfred Hamilton, Salina
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Stanley Paul Hunt, Marysville
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James Witburn Johnson, Kansas City
George Albert Kauffman, Coffeyville
Russell Vernon Knapp, Norton
Dan Glenn Lake, Lake City
John Lewis Mickle, Crete, Neb.
George Aaron Miller, Portis
Edgar Andrew Moffat, Great Bend
Clifford Howard Myers, Hutchinson
James R. Sparks, Kiowa
Lawrence Artman Tilton, Garrison

HOME ECONOMICS

Alta Mae Adams, Lyons
Elizabeth Adams, Maplehill
Cora Barbara Akers, Conway
Pearl Eva Althouse, Ottawa
Madge Gladys Austin, Manhattan
Evelyn Alene Beckett, St. Joseph, Mo.
Edna Louise Beckman, Manhattan
Gladys Bergier, Manhattan
Mildred Content Berry, Jewell
Edith Frances Biggs, El Vado, N. Mex.
Sibyl Irene Blackburn, Eureka
Ruth Blair, Hutchinson
Helen Willamine Blank, Emporia
Fayne Vera Bondurant, Ness City
Ruth Borthwick, Manhattan
Berna Mairee Brown, Manhattan
Margaret S. Browne, Burdett
Ravena Elizabeth Brown, Lawrence
Kathryn Velma Browning, Chanute
Mildred Browning, Linwood
Hattie Avis Bryan, Pratt
Phyllis Harriet Burt, Eureka
Lois Ava Burton, Emporia
Lucile Margaret Carey, Manhattan
Quinta Pearl Cates, Manhattan
Fay Gladys Cheesman, Rockport, Mo.
Catherine Aleph Christman, Wichita
Helen Marguerite Combs, Eldon, Mo.
Margaret Elizabeth Crumbaker, Onaga
Mary Grace Crumbaker, Onaga
Elsie Cuthbert, Topeka
Mary Lynne Daugherty, Neosho, Mo.
Maude Elizabeth Deely, Norton
Florence Lillian Dial, Manhattan
Sadie Maud Douglas, Arkansas City
Hattie Estelle Droll, Wichita
Minnie Josephine Dubbs, Ransom
Lenore Maria Edgerton, Randolph
Ruby Anna Ellerman, Potter
Maurine Fitzgerald, Colby
Bertha Edna Flynn, Humboldt
Murl Gann, Springfield, Mo.
Marie Gehr, Manhattan
Hattie Pauline Gesner, Kiowa
Bertha Elizabeth Glenn, Manhattan
Helen Isabel Gott, Arlington
Greeta Hazel Gramse, Perry
Mary Frances Haack, Florence
Edith Theodora Hall, Okmulgee, Okla.
Lucile Halleck, Abilene
Alice Tibbetts Harkness, Lakin
Eva Harvey, Osborne
Alta Sarah Hepler, Manhattan
Sarella Lucile Herrick, Topeka
Ruth Kathrina Huff, Chapman
Lettie Leona Jeffrey, Elmdale
Erma Leota Johnson, Winfield
Gussie Christina Johnson, Wichita
Geraldine Wanda Jones, Leavenworth
Lois Tucker Jordan, Elkhart
Maude Emily Kershaw, Garrison
Mary Elvessa Kirkpatrick, Holdrege, Neb.
Evalene Virginia Kramer, Washington
Elizabeth Ann Lacy, Marshall, Mo.
Alpha Corrine Latzke, Manhattan
Esther Naomi Latzke, Manhattan
Grace Eleanor Lightfoot, Manhattan
Lois Emily Litchfield, Blackwell, Okla.
Lucille Carol Logan, Lyons
Olive Charlotte Logerstrom, Manhattan
Effie Evelyn Lyons, Topeka
Bernice McFarland, Lawrence

JUNIORS—HOME ECONOMICS—*continued*

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Mary Aletha Mason, Belle Plaine
Elizabeth Cora May, Holton
Tressie Edna May, Manhattan
Lora Gertrude Mendenhall, Fairbury, Neb.
Mary Ethel Mitchell, Hymer
Hilda Ruth Moore, Winfield
Ruth Ann Morgan, Neodesha
Mollie Smith Moser, Westphalia
Buenta Myers, Clay Center
Elinor Frances Neal, Topeka
Doris Catherine Nickles, Abilene
Vera Oviatte Olmstead, Moran
Cynthia McGuire Orr, Manhattan
Ruth Elizabeth Orr, Manhattan
Lael Louise Porter, Deadwood, S. Dak.
Edna Winifred Pyle, Morrill
Ruby Maude Roberts, Lyons
Maybell Rodgers, Cherryvale
Frances Elizabeth Russell, Scott City
Vera Leone Samuel, Paola
Adelaide Seeds, Topeka
Nellie Gladys Shoup, Mulvane
Lola Mae Sloop, Manhattan
Eva Jeanette Snyder, Sterling
Millie Oltmans Stein, Halstead
Esther Elizabeth Stonge, Riley
Ethel Gladys Switzer, Emporia
Ruth Georgia Taylor, Tyro
Leona Emma Teichgraeber, Lindsborg
Marie Laura Thomas, Auburn, Ind.
Ruth Elizabeth Thomas, Anthony
Gertrude Uhley, Fairbury, Neb.
Myrtle Cornelia Vanderwilt, Solomon
Aurolyn Agnes Vandivert, Iowa City, Iowa
Martha Coats Webb, Caney
Bula Mae Wertenberger, Manhattan
Edythe May Wilson, Luray
Marian Opal Wishard, Emporia
Elsie Wolfenbarger, Winkler

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Milo Glen Cary, Manhattan
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Frank Harold Collins, Wellsville
Arthur Bright Collom, Maressa, Ill.
Elizabeth Agnes Cotton, Wamego
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Claude Elton Hutto, Manhattan
Myrtel Johnson, Manhattan
Robert Donald MacGregor, Topeka
Pearl Lily Miltner, Wichita
Alice Morton, Ellsworth
Ursula Oldham, Winfield
Flora Roccena Parker, Ottawa
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Boyd Funston Agnew, Yates Center
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Ral Allen Axtell, Dimmitt, Tex.
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Frank Graft Bell, San Antonio, Tex.
William Blakely, Neodesha
Nelson Boyle, Spivey
Henry Howard Braum, Denison
Joseph Oscar Brown, Sanford, Fla.
Bryan Lee Canty, Buffalo
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David Everett Davis, Topeka
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Linn Edmund Eberwein, Lawrence
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Howard Daniel Finch, White Water
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George Albert Gingrich, Wakefield
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Claude B. Harris, Havensville
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* In housekeepers' course, first semester

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William Ellet Robison, Towanda
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Joseph Newton Sawtell, Kansas City
Luella Mabel Clara Schaumburg, La Crosse
Rex Brown Schnatterly, Kinsley
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James Campbell Snapp, Manhattan
Mosse Snider, Mound City
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Merrill Worthing Watt, Topeka
Claude Allen White, Lockney, Tex.
Herbert Lawrence Wilkins, Los Ang., Cal.
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Clark O. Works, Humboldt
John Williamson Ziegler, Lansdowne, Pa.

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Simon Harrington, Manhattan
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Ralph Ward Hixson, Hiawatha
Stuart Laverne Hunt, Blue Rapids
Isaac Tennyson Mock, Idana
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Christel Lorene Atchison, Waverly
Clara Florence Barnhisel, Wichita
*Ellenor M. Boyd, Norton
(Mrs.) Effie Brickell, Americus
Mary Eliza Casement, Manhattan
*(Mrs.) Gladys B. Davis, Mulvane
(Mrs.) Edna Skinner Florell, Jamestown
Alice Rakestraw Fitch, Manhattan
Etta Fay Hall, Winchester, Tex.
*Gladys Leah Heasley, Assaria
Helen Ruth Lawson, Hutchinson
*Ethel Minks, Stafford
Helen Agatha Sawyer, Lancaster, Neb.
*(Mrs.) A. W. Sharpsteen, Wellington
Eugenia Margaret Smith, Manhattan
(Mrs.) Hattie E. Tarleton, Los Ang., Cal.
(Mrs.) Dessie Pope White, Manhattan

ENGINEERING

George Samuel Clinton, Leavenworth
Franz Benedict Mayer, Newton
Jesse Clifton Ralphs, Manhattan
Victor Don Rothenberger, Osborne
Fred M. Worley, Topeka

GENERAL SCIENCE

Charles Royce Abernethy, Omro, Wis.
George Robert Allingham, Manhattan
(Mrs.) N. Elizabeth Askren, Manhattan
Mildred Axtell, Newton
Audrey Bennett, Denver, Colo.
Ella Blachly, Herington
Mary Ona Blackman, Bronson
Grace Ruth Boulden, Pratt
*(Mrs.) Watkins A. Broyles, Manhattan
(Mrs.) Harvey B. Cox, Manhattan
(Mrs.) Abbie D. Coy, Fort Collins, Colo.
Marian Emma Darkes, McCracken
(Mrs.) Jessie Hedden Davis, Manhattan
(Mrs.) Jessie Diefendorf, Manhattan
Odessa Della Dow, Manhattan
Marcia Dunlap, Manhattan
Esther Fayman, Kansas City, Mo.
Hubert Miles Fayman, Kansas City, Mo.
(Mrs.) Eustace V. Floyd, Manhattan
George Albert Foltz, Oswego
Jeanne Elizabeth Forrester, Manhattan
Edith Geneva French, Abilene
Elmer Corpeny Gilbreath, Wichita
Elsie May Glenn, Manhattan
(Mrs.) Edith D. Groves, Manhattan
(Mrs.) Helen Bennett Hall, Manhattan
(Mrs.) Lillian Mollet Harting, Manhattan
George M. Hedges, Howard
(Mrs.) Loy A. Hege, Emporia
Grace Roberta Hesse, Ann Arbor, Mich.
(Mrs.) Isabel March Hiatt, Topeka
Frances Marion Hill, Amarillo, Tex.
Dorothy Moore Hoag, Pueblo, Colo.
Mildred Lee Inskeep, Manhattan
Lott Johnstone, Manhattan
Mary Frances Johnston, Asheville, N. C.
Huldah Blackledge Keith, Manhattan
Hazel M. Kloeffler, Manhattan
Vivian Hazel Larson, Tescott
(Mrs.) Helen Johnston Lewis, Manhattan
(Mrs.) Frieda M. Limper, Manhattan
Frances Alythe Lisk, Lenexa
Letta Dorothy Lisk, Lenexa
Dolly Minerva McCarthy, Mankato
Mattie Annette McComb, Manhattan
*Sarah McCoy, Manhattan
George Milton Nelson, Lindsborg
(Mrs.) Elta Mae Maxwell, Esbon
(Mrs.) Marjorie Parker, Manhattan
Janetta Wade Peterson, Manhattan
Phoebe L. D. Peterson, McPherson
Mary Hazel Phinney, Russell
(Mrs.) Maud Long Quinnis, Manhattan
Lenore Richards, Manhattan
*Ella Eunice Rempel, Hillsboro
Vadah Rose Riley, Spring Hill
Susie Robb, Salina
Tilmon Leeroy Roberts, St. John
Ruth E. Ross, Burr Oak
(Mrs.) Mona L. Ruttencutter, Manhattan
Mary Josephine Sachau, Manhattan
Essie Blanche Schneider, Manhattan
(Mrs.) Laura Oden Schnell, Manhattan
William Gerrold Scoutt, Kearney, Neb.
(Mrs.) W. C. Settle, Kirksville, Mo.
Olive Amy Sheets, Columbus, Ohio
Mary Smith, Manhattan
Everett Southward Stephenson, Wichita
Maud W. Sullenberger, Des Moines, Iowa
Constance Miriam Syford, Lincoln, Neb.
Winona Ethel Van Vleck, Rossville
Anna Louise Walker, Dalhart, Tex.
(Mrs.) A. R. Wallace, Jr., Stockton
Ruth Harvey White, Oklahoma City, Okla.
Minnie L. Wilson, Manhattan

MUSIC

Mary Inez Backman, Manhattan
Mary Elizabeth Baker, Oswego
Lorna Marie Boyce, Minneapolis
Ivy Brook Brush, Alexis, Ill.
Roy Edward Carr, Oakley
Nina Bess Curry, Norton
Ruth Naomi Gehr, Manhattan
(Mrs.) Florence Dent Harvey, Manhattan
Mary Amanda Hilton, Washington
Flora Pearl Hoots, Winfield
Bernice Wilson Klotz, Wilson
Ollie Wilson Klotz, Wilson
Harold Alonzo Knapp, Tenn. City, Tenn.
Millicent Ailene Lemons, Ashland
Ruth Bernetta Rathbone, Manhattan
Esther Hazina Swanson, Manhattan
Wanda Tetrick, Eureka
Mildred Christena Warring, Larned

*In housekeepers' course, first semester.

Summer School

Maria May Abbott, Manhattan
Ruth Adams, Manhattan
Pearl Akin, Manhattan
Estella May Albin, Grainfield
Florence May Alsop, Wakefield
Le Roy Alt, Manhattan
Austin Chandler Andrews, Hiawatha
(Mrs.) Nannie Elizabeth Askren, Manhattan
Joy Carroll Askew, Macksville
Madge Gladys Austin, Manhattan
Inez Mary Backman, Manhattan
Blanche Baird, Valencia
Ernest Baird, Minneapolis
Florence Willetta Baird, Cherryvale
Florence A. Baker, Kansas City
Margaret Ellen Baker, Washington
Mary Elizabeth Baker, Oswego
Muriel G. Baker, Severy
Lowell Edwin Baldwin, Manhattan
Ida May Bare, Protection
Samuel Edwin Barnes, Blue Mound
Anne Estella Barnum, Simpson
Esther Grace Bayles, Manhattan
Frank Harrison Beedle, Manhattan
Clara Merle Beeman, Topeka
Margaret Helen Bell, Manhattan
W. Walton Bell, Marysville
Mabel Rose Bentley, Valhalla
Frank F. Bergier, Manhattan
Gladys Bergier, Manhattan
Milton Cleland Blackman, Hoxie
Nellie Virginia Blackwood, Manhattan
Hale Boyer Blair, Ottawa
Grace Ida Blake, New Ulysses
Otto Theodore Blanke, Garden City
Ella Floy Blosser, Corbin
Emma Margaret Bobek, Caldwell
Orville T. Bonnett, New Salem
Helen Margaret Boyd, Norton
Arthur William Boyer, Abilene
Frank R. Bradley, Stillwater, Okla.
James I. Brady, Manhattan
Ellis J. Braman, Manhattan
Elmer Louis Brown, Great Bend
Inez Elletta Brown, Great Bend
Pearl Brown, Caldwell
Wesley Gordon Bruce, Manhattan
Esther Bruner, St. Joseph, Mo.
Arthur Newton Burditt, Ness City
Ruth Burgett, Alma
Daniel Madison Bursch, Manhattan
Nana Perry Burwell, McPherson
Edna Halce Butler, Marysville
John Lewis Campbell, Manhattan
Frank S. Campbell, Manhattan
Edna Sophia Carlson, Manhattan
Bessie Lavera Carp, Wichita
Effie May Carp, Wichita
Elizabeth Augusta Carruthers, Olathe
Vera Cates, Manhattan
Ora May Chappell, Haddam
Imogen Marjorie Chase, Manhattan
Martha Augusta Chitwood, Ozawkie
Ella Janette Christenson, Winfield
Myrtle Grace Christman, Sterling
Cecil Orr Chubb, Baxter Springs
David Charles Clarke, Manhattan
Edward E. Clark, Topeka
Edward Albert Clawson, Manhattan
Mary Carley Cleavinger, Lowemont
Nellie B. Cloud, Winfield
Miller Livingston Coe, Manhattan
Norris Lawrence Colson, Manhattan
James Dennison Colt, Manhattan
Frances Blanche Compton, Mankato
Ruth Marion Connor, Manhattan
Kathleen Lenore Conroy, Manhattan
Emma Miller Cook, Milford
Jesse Alfred Cook, Eureka
Ethel Mary Crane, Olathe
Helen Crane, Kansas City, Mo.
Fred D. Cromer, Manhattan
C. B. Cross, Manhattan
Edith Nona Crumbaker, Onaga
Mary Grace Crumbaker, Onaga
Dora Fern Curtis, Manhattan
Robert Elliott Curtis, Manhattan
Vilona Cutler, Anthony
May Dahnke, Manhattan
Verla Dahnke, Manhattan
Carrie M. Darkes, McCracken
Mariam Emma Darkes, McCracken
Arlene Lola Davis, Winfield
Hallam Walker Davis, Manhattan
Lulaglee Davis, Winfield
Virgalene Davis, Benton
Alice Virginia Dawson, Belleville
James Robert Dawson, Manhattan
Louise Dawson, Clifton, Ariz.
Lulu Belle Day, Barnston, Neb.
Maude Elizabeth Deely, Manhattan
Margaret DeGraff, Holton
Florence Lillian Dial, Manhattan
Arthur Douglas, Manhattan
Davida Chandler Dow, Salina
Evelyn Mary Doyle, St. Marys
May Dudney, Maplehill
Grace Amanda Dundon, Junction City
Helen Dunlap, Eureka
Marcia Dunlap, Manhattan
(Mrs.) Lourena Dunn, Manhattan
Hugh Durham, Manhattan
Edith Eason, Belleville
Henrietta Alden Edson, Courtland
Bernice Elizabeth Elkins, Wakefield
Faye Luella Elkins, Wakefield
Ruby Anna Ellerman, Potter
John Burton Elliott, Manhattan
Lucy Ellis, Topeka
Nita Ellsworth, Formoso
Madeline Lee Emmert, Manhattan
Olga Gladys Emmert, Manhattan
Anna Dorothea Ernstring, Ellinwood
Martha Dorothea Errebo, Vesper
Florence Lissa Evans, McPherson
Seibert Fairman, Manhattan
Arline Jessie Faley, Manhattan
Gladys Winifred Faley, Manhattan
Chester George Farnsworth, Wichita
Beatrice Carrie Farrell, Manhattan
Ivan L. Farris, Warwick
Addie Mable Fink, Topeka
Irl Ferris Fleming, Manhattan
Anna May Foreman, Kiowa
Mildred French, Meridian, Ida.
Minnie Grace Frey, Manhattan
Clarence G. Fry, Manhattan
(Mrs.) Viva McCray Fry, Manhattan
Joyce Gardiner, Santa Barbara, Cal.
Sarah Jane Gardner, Tampa
Florence May Garinger, Manhattan
Gladys Irene Garnand, Wellington
Ethel Victoria Garrett, Manhattan
Annabel Alexander Garvey, Topeka
George Calvin Gibbons, Manhattan
Josephine Anna Giltner, Madison, Neb.

SUMMER SCHOOL—*continued*

Clara M. Glendening, Denison
George F. Glendening, Denison
George McGrew Glendening, Denison
Gertrude Anna Glenn, Manhattan
Ruth Elizabeth Glenn, Manhattan
Otis Benton Glover, Circleville
Harley Hooker Goodwin, Superior, Wis.
Helen Gordon, Manhattan
Clarence Owen Grandfield, Maize
George Patterson Gray, Manhattan
Maude Rosaleen Greub, Salina
Fred Griffee, Winifred
Beulah Griffith, Burlingame
Garnet Vivean Sunshine Grover, Iola
Florence Gladys Guild, Topeka
Frank Harold Gulick, Winfield
Dorothy Etta Hadley, Topeka
C. M. Haines, Manhattan
(Mrs.) C. M. Haines, Manhattan
Gertrude Hale, Manhattan
Edith Theodora Hall, Okmulgee, Okla.
Mary Dalena Halverstadt, Oxford
Winnifred K. Hamilton, Topeka
Mary E. Hammett, Ada, Okla.
Lois Margaret Hanna, Clay Center
Claude Gustave Hansen, Sedgwick
Frank King Hansen, Manhattan
Mary Editha Harmon, White City
Stella Alta Harman, Manhattan
Norton Lewis Harris, Manhattan
Stella Maude Harriss, Manhattan
Rembert Lydia Harshbarger, Manhattan
Izetta May Hart, Fredonia
Clara Mary Haverkost, Barnes
Floyd Hawkins, Marysville
Anna Mosby Head, Shawnee, Okla.
Carl D. Heady, Parsons
Edith Carol Heiser, Tonganoxie
Helen Lucile Heiser, Tonganoxie
(Mrs.) Sue Vanatta Hemphill, Clay Center.
Agnes Ora Henkle, McPherson
Georgia Gladis Hennon, Netawaka
Alta Sarah Hepler, Manhattan
Ida Viola Hepler, Manhattan
Clind Arthur Hindman, Rush Center
Jackson Benjamin Hinds, Manhattan
Mabel Ellen Hinds, Pleasanton
Helen Georgia Hobson, Kingman
Pauline Janet Hobson, Kingman
Helen May Hodgin, Wilsey
Gladys Evelyn Hoffman, Manhattan
Henry A. Hoffman, Princeton
Myrna May Hoffman, Manhattan
Juanita Hoke, Manhattan
Marvel May Julia Holliday, Manhattan
Chas. Henry Honeywell, Leoti
Lillian Hope, Sylvia
Elmer Hopp, Manhattan
Nellie Maria Hord, Colony
Walter W. Houghton, Emporia
Lyda S. Houston, Syracuse
Doris Lucile Howenstein, Manhattan
Gladys Marie Howenstein, Manhattan
Carl Fountain Huffman, Tonganoxie
James Allison Hull, Stafford
Margaret Louise Hulse, Manhattan
Cora Vernon Hungerford, Manhattan
Nellie Elizabeth Hunt, Manhattan
Charles Axtell Hunter, Blue Rapids
Mary Helen Hunter, Anthony
Bruce Charles Hutchins, Ellsworth
Gertrude Elizabeth Hutchinson, Robinson
Gaye Iden, Eureka
Glee Iden, Topeka
Helen Ann Ingram, Manhattan
Agnes McCord Irwin, Manhattan
Jeanetta James, Manhattan
Lea Nathan Jewett, Burlington
Ada Ruth Johnson, Winfield
Alexander C. Johnson, Cawker City
David Willard Johnson, Olsburg
Floyd William Johnson, Downs
Hattie Sylvia Johnson, Manhattan
Marie Johnson, Alta Vista
Marguerite Jones, Manhattan
Edgar T. Keith, Manhattan
Crystal Helen Kelley, Yates Center
Edith L. Kelly, Olathe
Exie Lee Kelly, Manhattan
Lillian Sarah Kennedy, Winfield
Chester A. King, Emporia
Herbert Hiram King, Manhattan
John Theador King, Wichita
Elizabeth Emily Kirkpatrick, Manhattan
Marion Gibbonney Kirkpatrick, Manhattan
(Mrs.). P. W. Kirkpatrick, Manhattan
Evelyn Nellie Kizer, Manhattan
Hilda Catherine Kline, Tonganoxie
Kathleen Knittle, Manhattan
Evalene Virginia Kramer, Washington
Anna M. Marie Kreth, Onaga
John Lawrence Lantow, Lyons
Ruth Jessie Lathrop, Manhattan
Esther N. Latzke, Manhattan
Myrna Grace Lawton, Newton
Aubrey Mac Lee, Manhattan
Sergia Clair Lester, Norborne, Mo.
Elizabeth Lewis, Horton
Flavel Marie Lewis, Hiawatha
Grace Eleanor Lightfoot, Manhattan
Yuen Foo Lim, Manhattan
Hazel Marie Lindley, Leon
Mollie Lindsey, Wellington
Edith Litton, Glen Elder
Emily Doris Lofinck, Manhattan
Grace Adella Low, Stockton
Jay Laurence Lush, Altamont
Daniel Gale Lynch, Manhattan
Florence Minette McCall, Beloit
Harold Mark McClelland, Manhattan
Henrietta Vera McClelland, Manhattan
Robert Urie McClenahan, Miltonvale
John Robinson McClung, Manhattan
Newton Allen McCosh, Manhattan
Rose Margaret McCoy, Wamego
Glenn W. McCracken, Manhattan
Ethel McDonald, Manhattan
Cynthia Ellen McGuire, Sharon
Calvin Oakley McIntosh, Manhattan
Louisa McIntosh, Lost Springs
Daisy Elizabeth McKee, Horton
Anna Marie McLemore, Walnut Grove, Mo.
Linna Irene McTaggart, Greenleaf
Ounie Macgillwray, Hiawatha
Ora Madden, Agenda
Elva Ione Mall, Manhattan
Veda Margaret Mann, Gallatin, Mo.
Clair Foster Markley, Belle Plaine
Daniel Clair Marshall, Mayfield
(Mrs.) Emily Irene Marshall, Mayfield
Sara Marty, Manhattan
Frances Irene Matter, Manhattan
Elizabeth Cora May, Holton
Hazel Irene May, Manhattan
Arthur Heber Meade, Manhattan
Mary Elsie Medlar, Crete, Neb.
Hazel Alsesta Merillat, Enterprise
Bodie Eleanor Mickelson, Lyndon
John Lewis Mickle, Crete, Neb.
Chester Howard Middleton, Manhattan
Irene Nina Miller, Neodesha
Lloyd Rayburn Miller, Belleville
Minnie Martha Mischke, Long Island
Ernest Walter Mitchell, Holton
(Mrs.) Grace Mitchell, Holton
Isaac T. Mock, Idana
Harriett Alice Moffitt, Manhattan
Leon Newton Moody, Riley

SUMMER SCHOOL—*continued*

Esther Mary Moon, Greenleaf
Riley Earl Morgan, Covert
Ruth Morgan, Neodesha
Ida Katheryne Moriarty, St. Marys
Elizabeth Glenday Mortimer, Delphos
Alice Morton, Ellsworth
Mary Rose Moss, Eureka
Frank Adolphus Moyston, Manhattan
Zenith R. Mullen, Labette
Stella Constance Munger, Manhattan
Bertha Christene Nelson, Lindsborg
Mrs. Sarah H. Nelson, Raymond
Peter L. Netterville, Manhattan
Carrie Aleen Neusbaum, Manhattan
Eulalia Nevins, Dodge City
George Raymond New, Manhattan
Carl F. Newby, Argonia
Eunice Nicolay, Manhattan
B. Lenora Nicolay, Manhattan
Mayme A. Norlin, McCracken
Ellen Evelyn Nystrom, Wellington
Nelle Regina Oldham, Winfield
Ursula Oldham, Winfield
Amanda Christina Olson, Brookville
Edlena O'Neil, Manhattan
Laura Gertrude Palmer, Phillipsburg
Oscar Wallace Park, Manhattan
Grace Irene Pattin, Topeka
Ruth Louise Pattin, Topeka
O. W. F. Paulsen, Manhattan
Nellie Maria Payne, Manhattan
Annette Woodward Perry, Manhattan
Phoebe L. D. Peterson, McPherson
Telford Ruddell Pharr, Manhattan
Paul Pieratt, Hartford
Wm. Dale Pierce, Manhattan
Alma Luella Pile, Liberal
Perie Richmond Pitts, Manhattan
Zelma Roena Platt, Mankato
R. A. Postma, St. Marys
Gloria Mae Powers, Los Angeles, Cal.
Mary Louise Price, Winfield, Iowa
Chas. Lorin Quear, Manhattan
Edith Quigley, Manhattan
George Hemrod Railsback, Peabody
(Mrs.) Anna Marie Reed, Manhattan
Edith Jeanette Reed, Manhattan
Chester Lee Reeve, Garden City
Emma C. Richards, Manhattan
Letha Elizabeth Richhart, Nickerson
Ruth Myrtle Ridley, Topeka
Anna Corinne Riley, Piedmont
Charlotte May Ritter, Manhattan
Ruth Elma Robb, Liberty, Mo.
Edward Sherrill Roberts, Manhattan
James Truman Roberts, Manhattan
Cleo Prudence Roderick, Attica
Maybell Rodgers, Cherryvale
Agnes Caroline Roesler, Junction City
Forrest Lee Root, Centralia
Bessie Rosenberger, Hiawatha
Amanda Christina Rosenquist, Osage
Ruth E. Ross, Manhattan
Clifford Rude, Manhattan
Hazel Russell, Wichita
William Warren Rutter, Topeka
Grace Elvena Sachau, Manhattan
Frank Louis Sahlmann, Manhattan
Ethel Margaret Saintabin, Westphalia
Christine Charlotte Sandell, Manhattan
Myrtle Pearl Schroeder, Norwich
Rena Wilson Schroeder, Tabor, Iowa
Margaret Washburn Schultz, Manhattan
Ursula Susie Senn, Lasita
Aurilla Fidelia Sharp, El Dorado
Gertrude Shehi, Blaine
Maymie Shehi, Blaine
Ulysses Lenard Shelton, Cunningham
Virginia G. Sherwood, Manhattan
Harry Kenneth Shidler, Girard
Laura Edna Shingledecker, Manhattan
Louise Caroline Shinn, Manhattan
Lois A. Sitterley, Manhattan
Maud Ernestine Sjolander, Topeka
Dorothy Skinner, Springfield, Mo.
Lola Mae Sloop, Boyle
Mary Henrietta Smith, Manhattan
Mildred Emily Smith, Burlingame
Stanley Albert Smith, Manhattan
Luella Margaret Snay, Nortonville
Harold Wyllis Snell, Douglas
Viola Frances Snodgrass, Wamego
Tillie Snyder, Topeka
Alfred Sorenson, Effingham
Elma Jane Soupene, Manhattan
Helen Louise Southwick, Wakefield
James Sparks, Kiowa
Charlotte Frances Sparrowhawk, Wakefield
Vida Helen Sparrowhawk, Wakefield
Frances Elizabeth Stall, Kansas City
Prudence Stanley, Topeka
Ethel Mary Stateler, Liberal
Alta Margaret Sterrett, Clay Center
Aurilla Rebekah Sterrett, Clay Center
Ursula Mae Stites, Hope
Ralph Robinold St. John, Wamego
Roscoe Noyes St. John, Manhattan
J. W. E. Stogsdill, Waukomis, Okla.
Stella Strain, Phillipsburg
Mary W. Stratton, Blum, Tex.
Abbie D. Swafford, Manhattan
Jean Clara Swan, Topeka
Eugene Sweet, Manhattan
Clifford L. Swenson, Lindsborg
Ethel Gladys Switzer, Emporia
Hazel Dora Taylor, Winfield
Hazel May Taylor, Manhattan
Lorena Belle Taylor, Manhattan
Merrill Hart Templeton, Jetmore
Wanda Tetrick, Manhattan
Marie Martha Thatcher, Manhattan
Charles David Thomas, Baxter Springs
Helen Anna Thomas, Medicine Lodge
Lee Richard Thomas, Baxter Springs
Ruby A. Thomas, Argonia
Anna Elizabeth Thompson, Horton
Carl Pollard Thompson, Manhattan
Kyle David Thompson, Densmore
Charles Manley Tinkler, Gypsum
Ruth Brown Tulley, Independence
William Preston Tuttle, Manhattan
Harry Tyrrell, Topeka
Gertrude Uhley, Fairbury, Neb.
Susie Unrich, Pawnee Rock
Mary Laura Vaile, Junction City
Blanche Elizabeth Van Buskirk, Iola
Harry Ellsworth Van Campen, Linn
Ethel Grace Van Gilder, Manhattan
Hermione Alice Van Laer, Topeka
Mary Cathryn Van Vleck, Rossville
Winona Ethel Van Vleck, Rossville
Leland Ray Varcoe, Wilsey
Florence Mae Vilven, St. Marys
(Mrs.) Irene Vohringer, Manhattan
John Alexander Vohringer, Manhattan
George Ellsworth Voiles, Manhattan
Bertha May Wagener, Manhattan
Loran Scott Wagener, Manhattan
Margaret Esther Walbridge, Russell
Edith Mary Walsh, Manhattan
Charlotte Pearl Wartenbee, Manhattan
Mame Belle Wartenbee, Manhattan
Florence Elouise Waynick, Wellington
Helen Marie Weir, Winfield
Bula Mae Wertenberger, Manhattan
Ralph Scoles Westcott, Galena
Cecil Frances White, Manhattan
W. Powers White, Le Roy

SUMMER SCHOOL—*continued*

Alma Luella Wilkin, Aulne
Blanche Heddens Williams, Belleville
Florence Maybelle Williams, Manhattan
Nina Marie Williams, Winfield
William Clyde Wilson, Manhattan
Joseph Roy Witmer, Clifton
Mary Dell Witter, St. Marys
(Mrs.) Lucile Berry Wolf, Manhattan
Chester Stanley Wood, Manhattan
Eva Emmelin Wood, Manhattan
Homer Carlton Wood, Manhattan
Everett Wesley Wren, Lane
Mary Emeline Wright, Newton
Nellie Flo Yantis, Garrison
Frank M. Yeoman, Kingman
Phillip H. Young, Manhattan
James Walter Zahnley, Manhattan
Aara Etta Zimmerman, Olathe
Herman Henry Zimmerman, Belle Plaine

Farmers' Short Course

SECOND YEAR

Ruben Anderson, Riley
Walter Glenn Austin, Irving
Herbert John Barr, Larned
Jacob Bartel, Hillsboro
*Alexis E. Bervy, Russia
Francis Eugene Botkin, Fowler
Willis Edward Brune, Bethel
George Leonard Burton, Council Grove
Arthur Clarence Carlson, Marquette
Elmer Joseph Conroy, Manhhattan
Clemens Albert Faeth, Wellington
Ray Byron Flippo, Abilene
George C. Gehrke, Herington
Bruce Stoner Gibbs, Watson, Mo.
George Harold Graham, Logan
Harold Alexander Graham, Winfield
Charles Wesley Hagan, Clayton
Henry Christopher Harries, Wa Keeney
Arthur I. Hawkinson, Marquette
Edwin Chapin Headley, Miltonvale
William Herst, Freeport
Chester Hiram Hudson, Freeport
John Edward James, Mayetta
William Paul Jennings, Little River
Olin Smith Jewett, De Sota
Orval Ernest Jones, Belleville
Howard Alfred Kissinger, Homewood
†John William Lemon, Pittsburg
Adolph Dan Mall, Clay Center
Ernest Jacob Mall, Clay Center
Homer Vincil Moore, Mont Ida
Elmer Ellsworth Murphy, Maplehill
Fred L. Myers, Neosho Falls
Henry John Oltjen, Leona
George McClellen Pope, Udall
Max Duane Roberts, Pomona
John Searl, Morland
Albert Edwin Severson, Leona
Channing Smith, Pittsburg
Eber C. Swanson, Axtell
Dewey Nelson Turner, Fowler
Glenn Rae Vessey, Clayton
Mack Allen Werts, Smith Center
Frederick L. Wiegand, Inman

FIRST YEAR

Lawrence Anderson, Scranton
Kenneth Mackenzie Baird, Edgerton
Russell Pollock Baker, Towanda
Walter Russell Barr, Atlanta, Ill.
*Richard Pauling Barry, Manhattan
Ronald Spencer Bentley, Jerome
Joseph Frank Brown, Desplaines, Ill.
Robert M. Campbell, Kelso
Willie J. Campbell, Wayne
Wayde C. Carlisle, Towanda
Henry Jensie Carr, Jamestown
David Curtis Coons, Chicago, Ill.
William Harold Culner, Lyndon
Truman Hazen Day, Allen
*Victor Di Sante, Wichita
Earl Franklin Douglas, Garden City
Lloyd Thomas Dunlap, Bigelow
Peter Peter Ewert, Hillsboro
Max Gerald Farrar, Lyndon
Fred George Fieser, Norwich
Ellis Johnson Fisher, St. John
Robert Jerome Foulke, Lawrence
Charles Henry Fravel, Larned
Lewis Samuel Geckeler, Independence
Edwin Kinsley Glover, Meriden
Orion Ellsworth Gooding, Girard
Raymond Evans Gould, Bigelow
Lincoln L. Gray, Wabaunsee
Leo V. Grippen, Richmond
Hawey Peter Hanson, Concordia
Paul Hendricks, Glen Elder
Howard William Higbee, Fall River
Harold B. Humburg, Bison
Charles Leo Jackson, Edgerton
Gilbert Franklin Jones, Olsburg
Harvey J. Kelling, Cedar
Arthur C. Kjellberg, Vermillion
Jules Estes Lappin, Logan
Stanley Merritt Lappin, Jetmore
Albert Edwin Legler, Leona
Charles Marvin Liggett, Las Animas, Colo.
Ralph Loomis, Diamond Springs
William Clarence McBride, Dunavant
Frank Doc McFadden, Stafford
*Walt Newton Male, Wakefield
Glenn Wheeler Markley, Augusta
Ray Ellis Markley, Augusta
James Harry More, Anness
Harold Vernon Munson, Lost Springs
Reynold E. H. Nordgren, Olsburg
Clarence Leonard Olander, Little River
Albert Olson, Leonardville
Galen Ferris Olson, Lyndon
Emmet G. Oltjen, Leona
Anders Oveson, Osage City
John W. Parrish, Derby
Iver Laverne Peterson, Burdick
‡Frank Robinson, Eskridge
John Harold Rogers, Atlanta, Ill.
Charles Wesley Romary, Olivet
Francis Chapman Sanford, Belleville
Leo Robert Schumacher, Herington
Donald Everett Sellon, Cunningham
James Walton Shephard, Wayne

*In shop work short course, first semester.
† Special in agriculture, first semester.
‡ Freshman in engineering, first semester.

FARMERS' SHORT COURSE—*continued*

Clifford John Shoebrook, Horton
William Dewey Skinner, Washington
Harold Ralph Stephens, Walnut
Frank Martin Straka, McPherson
‡Mitchell Tessendorf, Onaga
Byron Alexander Vannordstrand, Le Roy
Norman Lemuel Walberg, Pampa, Tex.
David Lawrence Webb, Abilene
Charlie Lee White, Tulia, Tex.
Hubert Wittry, Greely
Roy Victor Zachariasen, Meriden

Traction Engines Short Course

SECOND YEAR

Hiram B. Baxter, Hays
William Thomas Caldwell, Centerville
Ernest William Campbell, Caldwell
Ralph Harmond Campbell, Caldwell
Harold Martin Gates, Seward
Edward Henry Geary, Manhattan
Lawrence Albert Jacobson, Densmore
*Albert James Jackson, Geneseo
Guy Calvin Jenkins, Coldwater
Gurner Arthur Jevons, Wakefield
Henry Herman Koopman, Moundridge
Wilbur Fred Kubin, McPherson
*Lester Carr Lewis, Basehor
Charles Orin Lyon, Detroit
Harold Warren Machmer, Wakefield
Charley T. Read, Longford
Ray Reeder, Derby
Harry Alexander Robson, Carlton
Edward H. Sander, Hilltop
Claude Wesley Shirk, Newton
Albert Everette Sharp, Riley
Carl Frederick Strathe, McCune
Russell Chapman Strickler, Ransom
Cecil W. Sturgeon, Dodge City
William Valentine Stutz, Utica
Frank Wallace True, Peck
Gordan Ray Vance, Dodge City
August Peet Vogts, Moundridge
Harry Eastman Wood, Manhattan
Warren Mack Worrell, Arkansas City
Albert H. Yost, Downs
Edmund Verl Zimmerman, Osborne

FIRST YEAR

Loyd Joseph Abrams, Arkansas City
Clarence Wilford Anderson, Roxbury
Henry Anderson, Neosho Falls
Ralph Edward Andren, Courtland
Ross David Arnold, Manhattan
John Walter Barber, Hays
Henry John Becker, White City
Leo Ernest Berg, Marquette
Lloyd James Boller, Geuda Springs
George Hopkins Cary, Concordia
Charles Vincent Case, Silver Lake
Arthur Cate, Manhattan
Chette Carl Corp, McPherson
Lloyd Elsworth Craig, Baldwin
Guy Sigmond Demaris, Walla Walla, Wash.
Vernal Franklin Dodge, Larned
Howard Raymond Donaldson, Belleville
Ralph James Edgerton, White City
Elof Wicklund Ek, McPherson
Chester Feasel, Richmond
Andrew W. Fitz, Coffeyville
Clyde Dow Frost, Blue Rapids
Christian Paul Garver, Abilene
Ray Emery Gatchell, Wakefield
James Arthur Gorton, Manhattan
Carroll Carson Halbower, Anthony
Floyd Sylvester Hall, Emporia
John Albert Hamill, Robinson
Chris Hans Hanson, Jamestown
Ray Edmond Harrouff, Mound City
Wade Leo Heiser, Anthony
Harry Sylvan Hisey, Lenora
Ernest Edwin Honderick, Bison
Andrew Rice Hummer, Pierceville
Noah Paul Hummer, Pierceville
William H. Jackson, Manhattan
Arvid Nathaniel Johnson, Roxbury
Walter Virgil Johnson, Frankfort
Arthur N. Jones, Manhattan
Robert Lee Kahm, Geuda Springs
Frank Kopfer, Broughton
§Forrest L. Langdon, Kansas City
Gustav Adolph Lueker, Lincolnville
Martin M. Lueker, Jr., Lincolnville
Edwin Clinton Lyons, Lawrence
Clifford Butler Miller, Brewster
Fred William Miller, Solomon
Henry Milton Montgomery, Cedar Vale
Theodore Earl Netz, Irving
Frank Nielson, Wilmore
Ralph Carrol Phillips, Medicine Lodge
Thomas Jesse Renick, Garden City
Floyd Rice, Delphos
Casper Lee Rife, Anthony
†Owen Riley, Murdock
Louis Ethan Schultz, Gypsum
Harry L. Slyter, Fontana
Carl Fred W. Smith, Enterprise
Otis Elmer Stephens, Walnut
Walter Barlow Stevens, Burdick
Noble Stevenson, Atwood
Arthur Eugene Strobel, Garfield
Lyndell Brodley Thomas, Long Island
Howard Thompson, Emporia
Leo Lawrence Wiesner, Meriden
Ivan Lamont Williamson, St. John
Preston Arthur Worrell, Arkansas City
Horace Elliott Yeaton, Lecoma, Mo.

*In shop work short course, first semester.
†Freshman in engineering, first semester.
‡Sophomore in agriculture, first semester.
§ Sophomore in mechanical engineering, first semester.

Shop Work Short Course

Andrew Hugh Barclay, Clay Center
Richard Pauling Barry, Manhattan
Glenn F. Bartley, Powhattan
Alexis E. Bervy, Russia
Wassibj Michael Boyks, Erkee Kiew, Russia
James Earl Bryson, Osage City
Harold Lee Crawford, Paola
Clifford Arthur Cooper, Clyde
Ralph Edith Currah, Edith
Victor Di Santi, Wichita
Leon Dixon, Holton
James Theodore Dubois, Naponee, Neb.
Harvey Earl Gates, Anthony
Leslie Alger Hallock, Ada
William Edwin Haukenberry, Clyde
Hollis Charles Hendricks, Webber
Hiram Julius Hinsdell, Ralston, Okla.
Thomas Daniel Holt, Clay Center
Charles C. Horn, Sedgwick
Alva Alfred Ihde, Hope
Albert James Jackson, Geneseo
Claude Leroy Kerr, Ingalls
Lester Carr Lewis, Basehor
Daniel L. Loewen, Hillsboro
James Monroe McCoy, Coldwater
Ray McDonald, Wakefield
Walt Newton Male, Wakefield
Elmer Fullerton Merritt, Merrill, Ore.
Carl Leander Nohlen, Cleburne
Ralph Otto Ohlson, Atwood
Ray Reeder, Derby
Walter Dewey Sandow, Dillon
Henry William Schmidler, Herkimer
George William Schwab, Madison
Enns Clark Scott, Salina

Housekeepers' Short Course

*Claretta Odessa Allen, Wynnewood, Okla.
Clatie Elizabeth Anderson, Manhattan
Cressie W. Anderson, Minneapolis
Marjorie Margaret Anderson, Topeka
Olliemay Arvilla Anderson, Minneapolis
Jennie Grace Andrews, Everest
Mamie Evelyn Bachura, Wilson
Gladyce Devetta Barrett, Manhattan
Ester Elizabeth Bechman, Randolph
Jane Orva Bell, Manhattan
Nora Ann Borrer, Westphalia
Ellenor M. Boyd, Norton
(Mrs.) Sara B. Brammer, Manhattan
(Mrs.) Watkins A. Broyles, Manhattan
(Mrs.) Mary Briggs, Parsons
(Mrs.) Agnes Ora Burby, Manhattan
Flossie Cole, Sharon
(Mrs.) Mary Margaret Colegrove, Columbus, Ohio
(Mrs.) Gladys B. Davis, Mulvane
Esther Allen Dennen, Manhattan
Ethel Florence Donnell, Manhattan
(Mrs.) Ida Irene Doran, Leavenworth
Hilda Caroline Ekholm, Windom
(Mrs.) Dovie Williams Foster, Greeley
Grace Elizabeth Garver, Abilene
Edwina Gist, Chanute
(Mrs.) Arvilla Forsyth Hale, Manhattan
Erie Louisa Harmon, White City
Elizabeth Hart, Topeka
Laura G. Hawkinson, Marquette
Gladys Leah Heasley, Assaria
Grace Lena Hedges, Courtland
(Mrs.) Edith Walton Herrick, Manhattan
Marian Bessie Hill, Tulsa, Okla.
Sophia Karline Hummel, Chapman
Mae Amelia Humphrey, Denison
Madge Helen Hunt, Belleville
Kate Hutchings, Kansas City
Alice Adine Johnson, Leonardville
Anna Grace Keller, Chapman
Blanche Ethlyn Kessler, Wichita
(Mrs.) Edna Mardis Keller, Manhattan
Elizabeth L. Kuck, Wilson
Letha Sarah Lasswell, Rossville
Edith Esther Latzke, Chapman
Julia Augusta Lindstrom, McPherson
Marjorie Lyle, Glen Elder
Sarah McCoy, Manhattan
(Mrs.) Katherine Graham McCunniff, Manhattan
(Mrs.) Emma Virginia McPherson, Sanborn, Neb.
Gladys Marie Martin, Holton
(Mrs.) Edna Wood Miller, Chicago, Ill.
(Mrs.) Virginia Goode Miller, Manhattan
Ethel Minks, Stafford
Mildred Mueller, Wichita
Otelia Anneta Nyquist, Windom
(Mrs.) Margarite Macumber O'Connell, Manhattan
(Mrs.) Wilma Helmick Pattison, Knightstown, Ind.
(Mrs.) Robert E. Preston, Manhattan
Hazel Irene Price, Everest
(Mrs.) Clarence Edwin Ragsdale, Manhattan
Ella Eunice Rempel, Hillsboro
†Katie Mable Roberts, Manhattan
Christine Dorothy Roediger, Junction City
Neva B. Rogers, Manhattan
(Mrs.) Frank Pletcher Root, Manhattan
Florence Elizabeth Rundell, Stafford
Orra Salmon, Manhattan
Julia Ann Sharp, White City
(Mrs.) A. W. Sharpsteen, Wellington
Gertrude Shehi, Blaine
Hannah May Sherwood, Belleville
(Mrs.) M. I. Shields, Tampa
Franklyn Elmina Silknitter, Rose Hill
(Mrs.) Leon P. Shinn, Manhattan
Alma Jane Smiley, Silver Lake
Ammarrah Lee Stewart, Independence
Hazel Virginia Stewart, Independence
Ida Elizabeth Strauss, Lincolnville
Charlotte Irene Toliver, Abilene
Ethyl Julia Tompkins, Portland
(Mrs.) Chester Davison Walz, Manhattan
(Mrs.) Claudia Hunt Wheaton, Minneapolis, Minn.
(Mrs.) Roscoe Ward, Burwell, Neb.

* Freshman in general science, first semester.
† In School of Agriculture, first semester.

Lunch-room Management Short Course

Laura Maud Anthony, Clay Center
Fannie Katherine Conz, Blue Rapids
Anna Sheaf Davis, Manhattan
Lillian Guthrie, Topeka
Lena Viola Hamilton, Topeka
Jennie Annette Steves, Topeka
Mrs. Margaret Effie Wood, Manhattan
Hazel Jean McCormick, Zeandale

School of Agriculture

THIRD YEAR

Anne Susie Amstutz, Halstead
Emma Marguerite Bobek, Caldwell
John Thomas Brownrigg, Mont Ida
John Harold Cowen, Fort Scott
Ygnacio Vazquez Gomez, San Antonio, Tex.
Harold William Johnson, Cleburne
Scott Elijah Kelsey, Topeka
Eunice Nicolay, Manhattan
Raymond William Oehrle, Lawrence
Arthur John Sahlberg, Osage City
Dean Ralph Stanley, Manhattan
Frank Arvid Swanson, Manhattan
Ben Abraham Thompson, Densmore

SECOND YEAR

Ralph Waldo Anderson, Manhattan
Reuel Vernon Barrington, Sedan
Ernest Bernard Benne, Morrowville
Myra Lorena Blue, Detroit
Alice Bobek, Caldwell
Nelson Rudolph Brooks, Winfield
Isaac Ethelbert Brownrigg, Mont Ida
Dee Orin Coleman, Funston
Ida Augusta Conrow, Manhattan
Harvey Dewey Dam, Marysville
Jedediah Silas Dewey, Manhattan
Arthur Noble Easter, Saffordville
Agnes Elvera Freeman, Scandia
Clarence Raymond George, Manhattan
Emilio Vazquez Gomez, San Antonio, Tex.
Paul Peter Guinn, Mulvane
Christie Cynthia Hepler, Manhattan
Rush Kelly, Harris
Emma Christina Larson, May Day
Martha Etta Low, Manhattan
Cordelia Estella Masterson, Manhattan
Onie Linsey Norton, La Cygne
Esther Peterson, Dwight
Irene Pieratt, Hartford
Leo James Parsons, Manhattan
Katie Mabel Roberts, Manhattan
Thurman Allen Schooler, Hiawatha
Mary Almeda Shaner, Riley
John Raymond Smithheisler, Danville
Marion Velthoen, Manhattan
Thelma Geraldyne Wilkerson, Topeka.

FIRST YEAR

Ione Baldwin, Manhattan
Galen Andrew Barber, Bluff City
Keith Wilfred Beardmore, Concordia
Roy Vernon Bolz, Hesston
Oscar Earl Boyer, Abilene
James Richard Brasche, Alma
Christian Lovina Brewbaker, Manhattan
Henry David Briggs, Sedan
Merle Raymond Brown, White City
Grant Edmund Buckley, Ames
Louis Vencil Burlie, Bluff City
Thomas Martin Butler, Glasco
Earl Roy Carl, Mulvane
Earl T. Carroll, Liberal
Jake Deckert, Pawnee Rock
Mary Anne Fankhauser, Madison
Minnie Metta Fankhauser, Madison
Vernett Edward Fletcher, Ozawkie
Margaret Theresa Florell, Randall
Harvey Bartlett Freeman, Wichita
George William Freeto, Wichita
John Samuel Fridolph, Zybach, Tex.
Raymond Glenn Frye, Freeport
Otis Gould, Jr., Topeka
Lester Lymon Harmon, White City
Leona Berneice Hartman, Overbrook
Elijah Taylor Hayden, McCune
Edwin Hedstrom, Dinas
William Franklin Hendry, Edmond
Randall Conrad Hill, Manhattan
Florence Amelia Jacobs, Mayetta
Floyd Sherman James, Rossville
John Melville Kimball, Manhattan
Joseph Palmer Larkin, Lyndell, Pa.
Clarence Chester Mathews, Kinsley
Albert Emile Matthy, Overland Park
Herman Dennis Metz, Manhattan
William Cloud Mills, Lipscomb, Tex.
John Kenneth Muse, Manhattan
James Raymond Neal, Blue Rapids
Roy Nelson, Zeandale
Alef Alfred Nordeen, Dwight
Monroe Hamman Pieratt, Hartford
James Harry Ramsey, Colony
Alberta Roswurm, Manhattan
Bessie Ellen Roswurm, Manhattan
Earl William Rubart, Great Bend
Charles Milton Schoonover, Byers
Hobart Walter Scott, Peck
Martin David Sibert, Manhattan
Rhoda Martha Sollenberger, Detroit
Verni Martin Stromme, Le Roy
Harry Alcid Swim, Severance
Jessie May Tucker, Manhattan
George Vincent, Jamestown
Benjamin Walters, Highland
Otto Alexander Warner, Iola
Francis Lindley Watson, Peck
William Hargrave Weeks, Belvue
Raymond Taylor Wibking, Junction City
Avis Wickham, Cawker City
Verne Delmar Wickham, Cawker City

SPECIALS

Alexander Warren Adams, Maplehill
Henry Rolland Adams, Wayside, Tex.
Lynn Edgar Alexander, Council Grove
Everett Frank Allingham, Manhattan
Henry Cribbs Altman, Amy
Harold Clifton Anderson, Manhattan
Max Armstrong, Manhattan
Herbert Searles Axtell, Fort Worth, Tex.
Justus W. Barger, Manhattan
Burton Bernard Bayles, Manhattan
Helen Frances Beck, Manhattan
Thomas Glen Betts, Detroit
Robert Blanks, Manhattan
Ross King Blaylock, Smith Center
J. Donald Blossom, Manhattan
Alva Jonathan Bogue, Manhattan
Carl William Bower, Manhattan
Homer Griffin Bryson, Manhattan
Robert Burns, Keats
Osceola Hall Burr, Manhattan
Clarence Raymond Burrell, Derby
Hazel Dell Chaffee, Bazine
Carl Childress, Galena
Walter J. Coates, Wallace
William Amy Conrow, Manhattan
Dorothy Constance Crewe, Wichita
Arthur Weston Crocker, Matfield Green
George Cromer, Volland
Ruth Brown Crowson, Manhattan
Agnes Alma Dahl, Montrose
Pearl Katherine Day, Dwight
Abbie Clair Dennen, Manhattan
Myrtle Clare Dickerhof, Manhattan
May Dudney, Maplehill
Leo Tharpe Dysart, Douglass
Arnold Englund, Falun
Hardin Guy Fink, Manhattan
Pearl Edith Finney, Odgen
Ada Rae Rachel Flinn, Bogue
Orville Lee Roy Gibson, Havensville
Glover Irwin Godwin, Council Grove
Fannie Harriet Gorton, Manhattan
Marion Abraham Graham, Manhattan
Mary Graham, Manhattan
Joseph Robert Hall, Kansas City
Lawrence Hall, Manhattan
Jane Gladys Hartley, Manhattan
Howard Sparks Harvey, Ashland
Ellen Mathilda Hedstrom, Dinas
William Chester Heynen, Manhattan
Bertha Louise Hill, Manhattan
Ross Wayne Hill, Manhattan
Ward Lucas Hill, Manhattan
Pearl Marie Hodges, Endicott, Neb.
James Wing Honeywell, Leoti
Stella Horchem, Ransom
Cecil B. Howard, Fort Scott
Anson Benjamin Ingels, Larned
Marian Jordan, Manhattan
Carolyn Burton Kimball, Manhattan
Vesta Eulela Kinyon, Vernon
Rudolph Henry Kobes, Manhattan
Charles Walter Koch, Argonia
Edna Mary Kohler, White City
Vernon Lantz, Helena, Mont.
Leora Zella Lewis, Lawrence
Duella Mae Mall, Manhattan
Ross James Maltby, Salina
Rolland Sylvester Mather, Grinnell
Hazel Irene May, Manhattan
Hobart Irwin May, Seward
Herald Eugene Morris, Manhattan
Lee Dewey Mortimer, Manhattan
Ruth Inez Murphy, Manhattan
Ernest Lowell Nicolay, Manhattan
Vernon Carl Noble, Green
Minnie Olivia Norlin, McCracken
Ancil Klein O'Brien, Kansas City
Ailene Hope Oliver, Manhattan
Floyd Robert Oliver, Manhattan
Hazel Verna Olson, Dwight
Harold Temple O'Neil, Winfield
George Virgil Overstreet, Blue Rapids
Henry Overton, Tulsa, Okla.
Paul Norman Pieratt, Hartford
Lenwood Peter Jacob Plaum, Cripple Creek, Colo.
Louis Edwin Plaum, Manhattan
Dennis Alfred Pollard, Kansas City
Albert John Pruitt, Goddard,
James Benjamin Quinlan, Manhattan
Frank Leigh Randall, Wichita
Gordon Redman, Great Bend
Frank Leslie Roark, Manhattan
Warren Homer Robinson, Topeka
Perie Pitts Rumold, Abilene
Ethel May Ruthruff, White City
Lydia Esther Sandow, Dillon
Leslie Earl Schoeffer, Manhattan
Lois Wilma Schlaegel, Vermillion
George Schooler, Stillwater, Oka.
Bess Irene Seitz, Manhattan
Evelyn Ann Sissel, Cuba
Earle Bernice Slason, Stockton
Homer Joseph Sloop, Boyle
George Sherman Smith, Independence
John Shannon Smith, Manhattan
Emma Stutz, Utica
Chester Theodore Teter, Sweet Springs, Mo.
Harold Hetherington Theiss, Hutchinson
Alexander Urbanowich, Newton
Herman Martin Vesper, Topeka
Julia Wade, Manhattan
Etta Elizabeth Walker, Overbrook
George Earl Wallich, Manhattan
Henry Jackson Waters, Jr., Manhattan
Christian Weber, Abilene
Elizabeth Eva Williams, Kansas City
Florence Mabel Williams, Manhattan
Kale Alonzo Williams, Elgin
Cayton Charles Wilson, Manhattan
Mary Frances Wilson, Manhattan
William Clyde Wilson, Kansas City
Clark Curtis Witwer, Topeka
Chester Stanley Wood, Manhattan
Chester Ewart Yenawine, Manhattan

Summary of Attendance, 1917-1918

	Agriculture	Veterinary Medicine	Engineering	Agricultural Engineering	Architecture	Civil and Highway Engineering	Electrical Engineering	Mechanical Engineering	Flour Mill Engineering	Home Economics	General Science		Industrial Journalism		Music Special		Total		Grand total
	Men.	Men.	Men.	Men.	Men.	Men.	Men.	Men.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	
Graduate	10				1					2	13	9					25	11	36
Senior	*65	17			4	8	13	8	3	101	5	8	3	2			125	113	238
Junior	‡82	15		2	*5	5	11	17	2	114	14	16	4	7			153	141	294
Sophomore	†82	19		5		6	27	17	1	139	14	21	7	11			176	173	349
Freshman	*123	13	*120							145	34	35	5	8			293	190	483
Special	18	3	5							19	12	63			3	15	41	97	138
School of Agriculture, Special																	84	41	125
School of Agriculture, First year																	49	13	62
School of Agriculture, Second year																	18	13	31
School of Agriculture, Third year																	10	3	13
Lunch-room Management										8								8	8
Housekeepers' Course										82								84	84
Farmers' Short Course, First year	75																75		75
Farmers' Short Course, Second year	44																44		44
Traction Engine Short Course, First year			68														68		68
Traction Engine Short Course, Second year			32														32		32
Shop Work Short Course			35														35		35
Summer School																	153	328	481
Totals	499	67	260	7	10	19	51	42	6	610	92	154	19	28	3	15	1,381	1,215	2,596
Counted Twice																	80	110	190
Net Totals																	1,301	1,105	2,406

*One woman. †Two women. ‡Three women.

Students by States and Counties, 1917-1918

STATES

Kansas	2,410	Nebraska	29
Arizona	2	New Jersey	1
Arkansas	3	New Mexico	2
California	4	North Carolina	1
Colorado	15	Ohio	1
District of Columbia	1	Oklahoma	32
Idaho	1	Oregon	1
Illinois	9	Pennsylvania	1
Indiana	1	South Dakota	2
Iowa	8	Tennessee	5
Louisiana	1	Texas	21
Michigan	1	Virginia	2
Missouri	32	Wyoming	1
Minnesota	1		
Montana	3	Total	2,591

FOREIGN COUNTRIES

China	2
Russia	2
Greece	1
Total	5

Grand total, 2,596

KANSAS COUNTIES

Allen	19	Logan	3
Anderson	12	Lyon	21
Atchison	11	McPherson	43
Barber	21	Marion	26
Barton	18	Marshall	32
Bourbon	9	Meade	2
Brown	34	Miami	15
Butler	29	Mitchell	10
Chase	10	Montgomery	19
Chautauqua	5	Morris	28
Cherokee	11	Nemaha	9
Clark	8	Neosho	7
Clay	42	Ness	15
Cloud	25	Norton	20
Coffey	20	Osage	29
Comanche	7	Osborne	17
Cowley	48	Ottawa	22
Crawford	10	Pawnee	17
Decatur	7	Phillips	9
Dickinson	54	Pottawatomie	49
Doniphan	12	Pratt	11
Douglas	27	Rawlins	4
Edwards	10	Reno	30
Elk	4	Republic	28
Ellis	7	Rice	23
Ellsworth	14	Riley	688
Finney	17	Rooks	8
Ford	9	Rush	19
Franklin	28	Russell	8
Geary	17	Saline	28
Gove	7	Scott	2
Graham	3	Sedgwick	83
Grant	3	Seward	7
Gray	1	Shawnee	74
Greenwood	28	Sheridan	1
Hamilton	2	Sherman	2
Harper	33	Smith	8
Harvey	25	Stafford	12
Hodgeman	4	Stevens	1
Jackson	32	Sumner	41
Jefferson	23	Thomas	9
Jewell	18	Trego	2
Johnson	19	Wabaunsee	28
Kearny	1	Wallace	4
Kingman	19	Washington	18
Kiowa	3	Wichita	2
Labette	16	Wilson	8
Lane	2	Woodson	12
Leavenworth	20	Wyandotte	36
Lincoln	6		
Linn	10	Total	2,410

Record of Attendance, 1863-1918

College Year	Summer School	Home economics short course	Com'cial creamery short course	Dairy short course	Farmers' short course	Apprentice	Special	Preparatory	Subfreshman	School of Agriculture	Freshman	Sophomore	Junior	Senior	Graduate	Counted twice	Total	Graduated
1863–64	....	....	....	....	....	....	....	93	....	....	14	....	....	....	....	....	107	....
1864–65	....	....	....	....	....	....	....	90	....	....	14	8	1	....	....	....	113	....
1866–67	....	....	....	....	....	....	....	154	....	....	11	7	1	5	....	....	178	6
1867–68	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	168	....
1868–69	....	....	....	....	....	....	....	146	....	....	11	10	2	....	1	....	170	....
1870–71	....	....	....	....	....	....	....	164	....	....	13	7	5	5	....	....	194	5
1871–72	....	....	....	....	....	....	....	162	....	....	22	10	3	2	3	....	202	3
**1873	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	*217	2
1873–74	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	183	5
**1874	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	*243	....
**1875	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	237	2
**1876	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	303	5
**1877	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	228	9
1877–78	....	....	....	....	....	....	....	75	....	....	42	23	5	5	....	....	150	4
1878–79	....	....	....	....	....	....	1	....	....	....	89	89	16	12	....	....	207	9
1879–80	....	....	....	....	....	....	1	....	....	....	166	61	35	11	2	....	276	7
1880–81	....	....	....	....	....	....	6	....	....	....	178	48	24	9	2	....	267	8
1881–82	....	....	....	....	....	....	5	....	....	....	227	50	19	11	....	....	312	9
1882–83	....	....	....	....	....	....	4	....	....	....	241	60	30	12	....	....	347	12
1883–84	....	....	....	....	....	....	2	....	....	....	255	92	26	18	2	....	395	17
1884–85	....	....	....	....	....	....	2	....	....	....	271	71	36	16	5	....	401	14
1885–86	....	....	....	....	....	....	1	....	....	....	273	91	35	24	4	....	428	21
1886–87	....	....	....	....	....	....	....	....	....	....	303	100	44	24	10	....	481	21
1887–88	....	....	....	....	....	....	....	....	....	....	305	92	46	27	2	....	472	22
1888–89	....	....	....	....	....	....	....	....	....	....	266	103	41	28	7	....	445	25
1889–90	....	....	....	....	....	....	1	....	....	....	307	105	63	28	10	....	514	27
1890–91	....	....	....	....	....	....	....	....	....	....	343	135	50	53	12	....	593	52
1891–92	....	....	....	....	....	....	....	....	....	....	336	139	62	37	10	....	584	35
1892–93	....	....	....	....	....	....	....	....	....	....	339	110	66	43	29	....	587	39
1893–94	....	....	....	....	....	....	....	....	....	....	275	141	72	42	25	....	555	39
1894–95	....	....	....	....	....	....	5	....	....	....	276	108	89	64	30	....	572	57
1895–96	....	....	....	....	....	....	3	....	....	....	353	121	67	71	32	....	647	66
1896–97	....	....	....	....	....	....	6	67	....	....	321	163	69	62	46	....	734	55
1897–98	....	....	....	6	....	9	15	77	....	....	316	174	77	82	57	10	803	69
1898–99	....	....	....	26	....	35	40	110	....	....	306	177	92	65	40	21	870	53
1899–00	....	24	....	57	47	50	32	162	....	....	376	163	109	69	27	22	1094	58
1900–01	....	47	....	72	109	79	23	318	....	....	348	183	80	74	40	52	1321	60
1901–02	....	41	....	66	125	87	19	298	....	....	396	206	120	65	32	59	1396	52
1902–03	....	63	....	38	123	78	36	342	....	....	471	229	141	86	24	57	1574	55
1903–04	....	51	....	16	122	72	33	443	....	....	403	206	161	114	20	36	1605	102
1904–05	....	88	....	24	99	12	30	500	....	....	289	198	122	117	26	43	1462	107
1905–06	....	92	....	28	118	....	46	598	....	....	373	214	145	110	30	64	1690	96
1906–07	....	134	....	23	179	Shop work, short course.	48	144	511	....	411	269	149	133	24	88	1937	119
1907–08	....	188	....	26	173		42	134	528	....	450	357	202	148	26	82	2192	116
1908–09	....	168	....	18	197		42	134	521	....	491	381	243	171	28	86	2308	139
1909–10	....	152	4	111	124		87	89	453	....	456	417	286	170	26	70	2305	146
1910–11	31	142	9	26	285		94	Traction Engine, S. C.	364	....	533	412	288	248	34	59	2407	204
1911–12	94	160	14	Lunch room management.	280		85		580	....	337	461	288	261	44	81	2523	230
1912–13	282	175	11		289		129		654	....	444	432	355	268	55	166	2928	232
1913–14	370	149	12		223		112		....	658	516	431	324	327	64	159	3027	289
1914–15	472	127	18		199	....	120		....	560	575	368	383	321	48	200	2089	229
1915–16	536	85	17		207	20	175	168	....	484	605	454	305	401	76	219	3314	357
1916–17	586	103	14		228	15	171	176	....	422	693	471	378	282	68	277	3340	210
1917–18	481	92	....		119	35	138	100	....	231	483	349	294	238	36	190	2406	....

* Estimated. ** Calendar year.

College Enrollment, 1917-1918

The Divisions.	Men.	Women.	Total.
The Division of Agriculture	**559**	**7**	**566**
Graduate Students	10	.....	10
Seniors	81	1	82
Juniors	94	3	97
Sophomores	99	2	101
Freshmen	135	1	136
Special Students	21	.....	21
First-year Students, Farmers' Short Course	75	.....	75
Second-year Students, Farmers' Short Course	44	.....	44
The Division of Engineering	**393**	**2**	**395**
Graduate Students	1	.....	1
Seniors	36	.....	36
Juniors	41	1	42
Sophomores	56	.....	56
Freshmen	119	1	120
Special Students	4	.....	5
First-year Students, Traction Engine Short Course	68	.....	68
Second-year Students, Traction Engine Short Course	32	.....	32
Shop Work Short Course Students	35	.....	35
The Division of Home Economics	.....	**612**	**612**
Graduates	.....	2	2
Seniors	.....	101	101
Juniors	.....	114	114
Sophomores	.....	139	139
Freshmen	.....	145	145
Special Students	.....	19	19
Students in Lunch Room Management Course	.....	8	8
Students in Housekeepers' Course	.....	84	84
The Division of General Science	**113**	**194**	**307**
Graduates	13	10	23
Seniors	8	11	19
Juniors	18	23	41
Sophomores	21	32	53
Freshmen	39	43	82
Special Students	15	78	93
The School of Agriculture (Secondary School)	**163**	**68**	**231**
Students in Agriculture	61	.....	61
Students in Mechanic Arts	19	.....	19
Students in Home Economics	.....	28	28
Special Students	83	40	123
Summer School	**153**	**328**	**481**
Totals	1,381	1,215	2,596
Counted twice	80	110	190
Net Totals (not including lists cited below)	**1,301**	**1,105**	**2,406**
The Division of College Extension	.....	.....	**5,258**
Students in Credit Courses	.....	.....	575
Students in Vocational Courses	.....	.....	628
Students in Reading Courses	.....	.....	4,058
The Division of Engineering	**1,130**	.....	**1,130**
Soldiers, one day of training	820	.....	820
Soldiers, two days' training	190	.....	190
Soldiers, four days' training	120	.....	120

Home-Study Service Courses

There were 5,258 active students taking Home-Study Service courses from July 1, 1917, to February 1, 1918. These students were classified as follows: Reading courses, 4,058; extension or vocational courses 628; credit courses, 572.

The names and addresses of those taking reading courses are not given; the list of students taking vocational and credit courses follows:

Extension or Vocational Courses

H. H. Adams, Pleasanton
Chas. Airwood, Lansing
Chas. H. Allison, Lansing
Edward C. Almquist, Herington
Roy N. Anderson, Overbrook
Tom W. Anderson, Spivey
Grace Armstrong, Salina
Edith Arnold, Summerfield
A. N. Austin, Lansing
C. R. Babcock, Lansing
G. M. Babcock, Lansing
Francis Baird, Minneapolis
Earl Baird, Minneapolis
Ruth Baker, Aulne
W. W. Baker, Sharon
Elsie Bales, Courtland
Elliott Bamfield, McPherson
Floyd Bare, Douglass
Myrtle Barker, Frankfort
Amos Barley, Formoso
Walter J. Barnes, Oswego
Oscar Barnhardt, Overbrook
Sallie Barnum, Burdett
Grace Bartlett, Walnut
Mrs. W. H. Barth, Mifflin, Pa.
M. Alice Beeby, Dresden
Joe Belgrade, Lansing
Lois V. Bellomy, Offerle
F. Bennett, Lansing
A. Bersch, Lansing
A-421 Bethel, Pontiac, Ill.
R. L. Bevens, Lansing
Effie Beverly, Lansing
Lee Bidwell, Lansing
C. Bigger, Lansing
B. Billinger, Lansing
Geo. Billings, Roswell, N. M.
Ernest Bingham, Narka
Albert Birch, Lansing
Marion Black, Overbrook
John Blackburn, Overbrook
May Bliss, Osborne
K. A. Bluett, Lansing
James Blunt, Greeley
Louis E. Bockholtz, Stockton, Cal.
P. F. Boese, Buehler
Hazel Bogart, Oronoque
B. T. Bolen, Kiowa
Arlie Boltz, Amy
Inez Boothe, Waverly
A-334 Borland, Pontiac, Ill.
Mrs. Mark Borror, Manhattan
Gladys E. Bowell, Marquette
Belle Bowen, Ransom
E. T. Bowman, Lansing
Lucy Bowman, Lansing
M. E. Bowman, Clifton
Herbert Boyce, Lansing
Ralph Bradshaw, Coldwater
V. Branch, Lansing
Marion Branson, Overbrook
Gerhardt Bredehoeft, Independence
Emma Brelsford, Long Island
Chas. Brewer, Jr., Victoria
Nellie Brewer, Glasco
Wm. Briggs, Lansing
Effie Brittain, Buffalo
Grace I. Brooks, Oswego
W. B. Broom, Falun
Ada Brown, Bazaar
E. J. Brown, Lansing
J. B. Brown, Lansing
J. H. Brown, Gridley
James G. Brown, Lansing
Will Brown, Beattie
Millie S. Brown, Onaga
R. Browning, Lansing
Wesley G. Bruce, Tonganoxie
Myrtle Buehler, Lucas
Louis Burch, Lansing
Charlie Burchard, Satanta
Wm. Burditt, Ness City
Lurena Burnham, Newton
Twila Byler, Newton
Thomas J. Cahill, Leavenworth
Charles Cannon, Salina
Leslie Carle, Burlingame
John Carroll, Lansing
Helen Cassidy, Leavenworth
Velma Castner, Wamego
Marie Childs, Rexford
Louis Christenson, Hays
A. C. Clark, Ottawa
F. H. Clark, De Soto
W. Clemens, Lansing
Jim Clyce, Lansing
P. W. Cockerill, Salina
C. L. Coffyn, Gardner
Harlan Collet, El Dorado
S. C. Collier, Coffeyville
Grant Colverd, Lansing
Allan Compton, Lansing
Wm. T. Compton, Ray
Minnie Conrad, Broughton
Supt. J. H. Cook, Overbrook
Commodore F. Cool, Plainville
Ethel Cooper, Liberty
John Cordell, Lansing
Chas. E. Cordts, Overbrook
John W. Cordts, Overbrook
Bruce Cornett, Lansing
Anna Coufal, Belleville
Blanche Cox, Sutherland, Neb.
988-1 Cox, Pontiac, Ill.
Fay Cree, Grigsby
Lorenzo Dow Crotchett, Linden
A-300 Crutchfield, Pontiac, Ill.
Alice Curtis, Lansing

EXTENSION OR VOCATIONAL COURSES—*continued*

Ethel Dague, Scott City
E. W. Dales, Eureka
Stella Dallas, Severy
Lock Davidson, Wichita
Wilbur S. Davidson, Chanute
Clara Davies, Leonardville
9899-Davis, Pontiac, Ill.
Juanita Davis, Belleville
Lloyd Davis, Sharon
Marietta Davis, Straight Creek
Orpha Davison, Tribune
Ruth Daum, Piedmont
James R. DeArmond, Wilson
Sam R. Deen, Lewis
Joe Dehaven, Lansing
Wm. P. Dykes, Sedgwick
M. Dellande, Lansing
Chas. Dellinger, Lansing
Theodora Deming, Derby
Lola DeMoss, Leon
Anna Dennison, Edmeston, N. Y.
C. O. DeVore, Washington, D. C.
L. E. DeVoss, Alta Vista
Marie Dick, White Water
Emma Dickerman, Ionia
Mabel Dimery, Lansing
Mrs. Beatrice Dodd, Detroit, Mich.
Frank Doll, Greenwich
Mrs. Edith Donnewald, Lansing
O. T. Doran, Minneola
Zora Dorsey, Wichita
C. H. Dougherty, Lansing
C. A. Douglass, Alexander
Mrs. W. H. Douglass, Texhoma, Okla.
M. Thornton Dow, St. John
J. M. Dow, Lawrence
Mrs. O. P. Drake, Huron, S. D.
Walter F. Draney, Sabetha
J. A. Duerkson, Inman
E. J. Dumond, Garden City
Lula Dunbar, Coldwater
Dr. H. E. Dunham, La Harpe
Mary Dunlap, Eureka
Ada Dupree, Lansing
Daisy Dye, Lansing
Forrest Eagle, Nickerson
Grace C. Eaton, Wamego
Ernest Edge, Wathena
Chas. Edwards, Lansing
Ruth Eiselein, Abilene
Samuel Eitzen, Hillsboro
Bernice Elkins, Broughton
R. W. Ellenberger, St. John
Maggie Ellis, Westmoreland
Clarence P. Emery, Esbon
P. W. England, Holcomb
George Engstrand, Leonardville
Clara Erickson, Bridgeport
A. H. Errebo, Denmark
Silent Evangel, Indianapolis, Ind.
Faye R. Fair, Cherryvale
M. Fansler, Lansing
H. W. Felton, Natoma
Nellie Fenner, Blue Rapids
E. W. Fent, Melvern
Blanche Fincham, Fellsburg
Sister Firmina, Marienthal
Fred Fisher, Overbrook
Nettie Fisher, Fredericksburg, Ind.
Harold Fisher, Overbrook
Florence Fitzpatrick, Lansing
L. J. Fitzsimmons, Moundridge
E. Flannagan, Winnetka, Ill.
Katherine Fletcher, Jamestown
Ida Fogelsburg, Pittsburg
Ed. Ford, Lansing
Cornelius Foster, Hamilton
Hester Frazer, Coldwater
Matilda Freed, Scott City
O. L. Freeman, McAllister
Mattie L. Fruit, Ellinwood
Eva Fry, Lansing
Wm. Fulgham, Lansing
P. C. Funk, Madison
Margaret Funkhouser, Hiawatha
Sam Gamble, Lansing
S. R. Gardner, Hartford
Blanche Gates, Sedgwick
Andrew Geffert, Greenleaf
Dola Geiger, Willis
Minnie George, Lansing
William George, Oakley
George Georges, Lansing
J. H. Gibson, Leon
Gertrude Gilmore, Geneva
G. F. Glendenning, Dennison
Richard Glotzback, Paxico
J. A. Glover, Wichita
Martha M. Gogelmann, Great Bend
Clara Goodrich, Stockton
C. E. Gordon, Independence
Alvin G. Gore, Formoso
9996-Gorman, Pontiac, Ill.
H. H. Green, Eskridge
A-47 Green, Pontiac, Ill.
John E. Geiger, Syracuse
A. V. Grody, Gardner
Earl Guilkey, Lansing
Albert Gunn, Lansing
Mrs. G. G. Guthrie, Norton
Esther Gygax, Covert
John H. Hackley, Concordia
R. W. Hafey, Wichita
J. P. Haggard, Baldwin
Alice Haigh, Elmont
Mary Halford, Topeka
Anna B. Hall, McPherson
Mrs. Jennie Hall, Lansing
Victor Hall, Osage City
Abram Hammitt, Topeka
L. W. Hamphill, Princeton
L. W. Hamhpsire, Ransom
Louis Hanne, Overbrook
Leon Harden, Nickerson
J. I. Harkness, Overbrook
Mrs. John Harmon, Herington
Dean Harris, Lansing
George Harris, Lansing
L. Harris, Lansing
W. A. Harshaw, Lansing
P. E. Hawkins, Greensburg
Everett Hays, Moline
Eli Heberling, Overbrook
Edith Heiser, Tonganoxie
Roy Heller, Herndon
Cassie Hemenway, Rush Center
Ethel Henderson, Wells
Louis E. Henderson, Richmond
Irl A. Hendrickson, Burden
Beulah Hildreth, Burr Oak
Frank C. Hill, Arma
Mrs. F. L. Hill, Chicago, Ill.
F. L. Hill, Chicago, Ill.
F. R. Hine, Le Roy
G. C. Hitchcock, Sylvan Grove
G. L. Holford, Topeka
James Hollister, Quincy
Clarence Horstman, Kansas City, Mo.
Lela Hough, Cherryvale
J. H. Houston, Blue Rapids
Lois Hudges, Williamston, S. C.
Floyd Hull, Portis
J. W. Hullinger, Lansing
W. H. Hume, Lansing
Inez Hunter, Burr Oak
Jessie Husband, Dwight
N. M. Hutchinson, Ramona, Okla.
O. L. Isaacs, Peabody

EXTENSION OR VOCATIONAL COURSES—*continued*

Floyd Jackson, Lansing
James L. Jacobson, Salina
Ruth Jacobson, Formoso
George Jeffries, Lawrence
H. C. Jent, Clearwater
A. C. Johnson, Cawker City
Emil Johnson, Ellis
John Johnson, Lansing
S. C. Johnson, Rantoul
A. R. Jones, Wathena
Ethel Jones, Lindsborg
Will Jones, Lansing
John Jordon, Lansing
Lillie Jordon, Lansing
S. A. Joy, Shoenchen
Wm. P. Joyce, Atlanta, Ga.
Tillie Kalusha, Lansing
Roy Karnes, Overbrook
Chas. Kavanaugh, Lansing
L. M. Kelleher, Burlingame
C. C. Kelly, Mayetta
Alfred Kemp, Atlanta, Ga.
Joy Kennedy, Independence
Josiah Kent, Lansing
Wm. Kepler, Kansas City
Hannah E. Kern, Kensington
Mrs. C. N. Kerr, Americus
R. T. Kersey, Garden City
W. A. Keyes, Kansas City, Mo.
Carl C. King, Narka
Daisy Kinsinger, Ness City
Florence Kirkpatrick, Randall
Tom Kirkpatrick, Lewisville, Tex.
Laura Kiser, Bison
John Klinkenberg, Leavenworth
H. H. Konantz, Brownell
Emma Kouns, Randolph
Geo. Kovan, Rossville
Walter Krattle, Turner
O. W. Kunz, Whiting
L. D. Lacy, Covert
Elijah Lane, Lansing
Frank Lane, Atlanta, Ga.
Ella Larson, Jamestown
W. S. Lawrence, Lansing
C. C. Lawrence, Cherryvale
Nellie Laws, Olivet
Goldie Lemon, Blue Mound
Elinor Lennen, Ness City
Hazel Lesh, Garnett
O. F. Linn, Anthony
Benjamin Locker, Atlanta, Ga.
Chas. Logan, Lansing
Dulce Long, Lecompton
R. H. Long, Burlington
Margaret Lormimer, Preston
Mrs. Florence Lowe, Turon
Chas. Lower, Lansing
F. O. Lowery, Lansing
Harry Ludolph, Russell Springs
Floyd E. Lull, Burr Oak
J. S. Lupton, Cimarron
Alta Marie Lux, Kansas City
9918-Magner, Pontiac, Ill.
A-281, Pontiac, Ill.
Lula Magill, Mayfield
J. E. Mahannah, Harper
S. V. Mallory, Morrell
Grace Martin, Waverly
Harry Martin, Utica
S. D. Martin, Horace
Juan Martinez, Lansing
Mae Martinez, Lansing
J. W. Marston, Highland
Lennie Marvick, Story City, Iowa
Bertha Mason, Coats
A-21 Matthews, Pontiac, Ill.
A. Maxwell, Lansing
W. H. Maxwell, Topeka
John S. McBride, Lovewell
W. T. McCarthy, Osborne
J. Roy McClay, Cannon City, Colo.
Sam C. McCampbell, Fowler
Florence McConnell, Quenemo
Frank McCoy, Leavenworth
Mrs. Wilma C. McCreary, Okla. City, Okla.
John McCrow, Lansing
Harry McGuire, Kiowa
A. McKechnie, Glen Elder
Helen McKibben, Larned
Geo. H. McKee, Kensington
T. B. McKee, Mulberry
John Menehan, Beattie
Leonard Merrifield, Kincaid
Cecil Merritt, Peabody
Roy F. Metcalf, Wichita.
Jennie Meyers, Garnett
W. J. Meyer, Ellinwood
F. R. Mick, Mayetta
Frank Miller, Lansing
Gladys Miller, Ellis
(Mrs.) Nellie Miller, Marion
(Mrs.) Mabel A. Miller, De Soto
Mary Miller, Formoso
(Mrs.) Nellie Beach Miller, Omaha, Neb.
Ward L. Miller, Sterling
Ethel Milstead, Russell
Jake Mitchell, Lansing
Wilson Mitchell, Lansing
Albert Mohring, Lansing
O. Monk, Lansing
Lillie Moore, Bison
Bertha Moore, Sedgwick
Wm. H. Moore, Wellington
Pearl Morest, Lansing
S. B. Mordy, Conway Springs
Henry Morris, Basil
Elva Moser, Mankato
Martha Moser, Oakland
Claude Motton, Lansing
Eugene Moyland, Lansing
Effie Mulford, Hoyt
Zenith Mullen, Labette
Julia Mulloy, Lincoln
Adele Murphy, Jarbalo
J. Kenneth Muse, McPherson
R. H. Mussey, Lansing
Rescoe Mustoe, Cullison
Ben Myers, Manhattan
W. J. Myers, Ellinwood
Nina Neff, Ransom
R. R. Neiswender, Attica
Frank Nelson, Marian
Curtis Nettles, Topeka
Martha Nicewander, Lawson
Clyde Nolder, Dodge City
Leonard Noll, Ness City
Laura L. Norris, Randolph
Jessie Norton, Cawker City
R. W. Nott, Clay Center
Fred Oakman, Lansing
F. J. Odle, Westmoreland
Cyrus Oliver, Lansing
T. E. Osborne, Belle Plaine
F. W. Osterhout, Attica
Homer C. Osterhout, Osage City
Lillian Overbaugh, Lone Star
J. C. Owen, McPherson
Claude Owens, Lansing
A-653 Paaren, Pontiac, Ill.
Rufina Paddock, Lenora
Shirley O. Parr, Rossville
W. S. Pate, Walnut
M. S. Patton, Kansas City
Sister M. Pauline, Axtell
(Mrs.) H. C. Peiffer, Neosho, Mo.
W. H. Penix, Salina
9762-Peoples, Pontiac, Ill.

EXTENSION OR VOCATIONAL COURSES—*continued*

S. O. Perkins, Brownell
L. T. Perril, Plevna
Paul Perry, Nickerson
Laura Perryman, Overbrook
Shirley Peters, Matfield Green
W. Esco Peters, Utica
Leslie L. Petticord, Kansas City, Mo.
Chas. Pew, Nickerson
M. Pewano, Lansing
Frank A. Pflug, Wellsville
Lucille Phillips, Lansing
David Porter, Lansing
James Porter, Lansing
Essie Powell, Bucklin
Mabel Powell, Norcatur
H. E. Powers, St. John
R. N. Prizer, Glasco
Helen A. Quinn, Manhattan
Anna W. Rahe, Waterville
W. L. Rambo, Lansing
P. Ramerez, Lansing
W. F. Ramsdale, Caldwell
Homer P. Ramsour, Milford
Homer S. Rand, Plainville
George S. Randall, Overland Park
Gertrude Raymond, McPherson
Charlotte Rector, Grigsby
C. J. Reed, Lyons
Frank Reed, Lansing
John E. Reeves, Leavenworth
(Mrs.) Myrtle Reeves, Honor, Mich.
Harry Reeves, Conway Springs
Clara Regan, Lebanon
Bertha Reich, Downs
Edward Reitz, Reserve
A. M. Remel, Madison
(Mrs.) William Reuter, Burlington, Iowa
C. E. Reynolds, Dunlap
Ida Reynolds, Mankato
L. D. Reynolds, Clayton
Charles Richards, Overbrook
Robt. P. Richards, Hutchinson
Elizabeth Richmond, Lucas
John Riley, Atlanta
Chas. H. Rinehart, Piedmont
F. J. Robbins, Cherokee
Edna M. Roberts, Agenda
Morris Roberts, Hoisington
Willie Roberts, Lansing
A-290 Robinson, Pontiac, Ill.
John Robinson, Lansing
Harry Roe, Lansing
Adaline Romine, Bird City
P. H. Roose, Belle Plaine
W. D. Royer, Herington
Bertha Runnells, Lansing
Harry Russell, Roswell, N. M.
Mabel M. Russell, Lakin
Bertha Sallee, Hutchinson
Albert Salyer, Lansing
H. W. Sawhill, Dorrance
Ray Sawhill, Montezuma
Will Scheufler, Great Bend
R. Schoenberger, Lansing
Bernice Schultz, Hamlin
9921-Schultz, Pontiac, Ill.
L. S. Schwab, Cherokee
Kate Schwenk, Lansing
Alys Scofield, Garden City
Clyde Scoles, Lansing
Carrie Scott, Leoti
Chas. Scott, Lansing
Ida M. Scott, Apopka, Fla.
Ruby Scott, Bern
Walter E. Scott, Sharon Springs
Florence Sculley, Garnett
Lula Shaw, Conway Springs
Harold K. Shaw, Hiawatha
Velma Shepard, Wright
Chas. Sherlock, Lansing
John W. Sherman, Chase
H. H. Sherrard, Manhattan
S. E. Shinkle, Lansing
Oliver B. Shoemaker, Smuggler, Colo.
Geo. W. Sidwell, Ness City
Alice Simon, Westmoreland
B. F. Sinclair, Arlington
Veda Singleton, Yates Center
H. R. Smee, Republic
(Mrs.) Effie C. Smeelk, Victoria, B. C.
Bessie J. Smith, Madison, Wis.
Inez Smith, Galesburg
Lillian Smith, Wakefield
Marcelene Smith, Overbrook
Ethel Smyth, Wright
Ada Snodgrass, Prescott
Alva Souder, Newton
Lloyd B. Souders, Wakefield
F. Jay South, Wilmore
W. J. Splude, Lansing
E. O. Squire, Baldwin City
D. W. Stallard, Holton
George A. Stannard, Ottawa
C. B. Stebbins, Junction City
Ned F. Steel, Kansas City, Mo.
Velma Stephens, Ellis
Leonard Stevens, Lansing
J. W. Stockebrand, Jewell
Ivar Olsen Stuejord, Hays
Geo. H. Stukenbroeker, Maplehill
Esther Sumey, Lecompton
B. H. Summers, Lansing
H. O. Suteliff, Wheaton
Sena Sutton, Richland
P. L. Swartley, Cheyenne, Wyo.
Frank Swink, Kismet
Benjamin Tanner, Atlanta, Ga.
Ruben Tapper, Marquette
Earl Taton, Overbrook
Vernon Tebo, Lansing
W. R. Terwilliger, Broughton
Frank H. Thiers, Oxford
Chas. Thomas, Taylor, Tex.
Fred D. Thomas, Garrison
Lotta Thomas, Bluff City
Clara Thomasmeyer, Cincinnati, Ohio
(Mrs.) A. Thompson, Chicago, Ill.
R. F. Thompson, Lansing
Alfred Lee Tibbals, Atchison
H. E. Tibbetts, Barnes
Anna Mae Tomlinson, Grenola
Kenneth Topping, Overbrook
A. G. Tritt, Larned
Roy Troyer, Inman
J. W. Truesdale, Oskaloosa
Ruby Trulson, Assaria
Ella Turner, Lansing
Howard Turner, Lansing
Wm. Upright, Lansing
Will Van Orsdall, Eudora
P. C. Vilander, Peabody
Toribio Del Villar, Colon, Cuba
Gladys Vincent, Overbrook
C. A. Waits, Cassody
R. D. Walden, Auburn
Chas. Wallace, Lansing
Nellie Wallace, Lansing
Vernon Walling, Rose Hill
Edith Walsh, Louisville
Maude Walters, Barnes
Marine Warden, Lyons
J. W. Warne, Rose Hill
Flora Warnken, Hartford
J. F. Warnken, Hartford
Geo. Warrenburg, Lansing
W. M. Watson, Belpre
D. A. Weber, Bunkerhill
J. A. Weidlein, Longton

EXTENSION OR VOCATIONAL COURSES—*continued*

Riley Welch, Lyons
Emma Weldon, Lawrence
Lillian Wellrich, Ensign
Faye Wells, Ford
John W. Wells, Elmdale
Gladys Miller Wenger, Atchison
Faith Wertenberger, Hanover
C. Omer West, Netawaka
Margaret West, Colcord, W. Va.
Elta Westrup, Woodbine
E. F. Wespe, Hutchinson
W. P. White, Wellington
John Whitman, Sedan
Mrs. C. S. Whisnant, Goodland
Laura Wisdom, Lansing
James Wilson, Lansing
Murray Wilson, Oswego
T. W. Willey, Lansing
Ralph Williams, Kenneth
R. Williams, Lansing
Winifred Williams, Tecumseh
A. Willis and Co., Ottawa
Robert T. Wing, Lenore
J. C. Winston, Kansas City, Mo.
James Winters, Lansing
John Winters, Lansing
W. N. Wimmer, Robinson
Marguerite Wise, Everest
J. Wolker, Lansing
Emery Woods, Lansing
S. E. Woodward, Ashland
Clara Belle Wright, Arkansas City
Dorothy Wyckoff, Cameron, Mo.
Surkin Yvon, Atlanta, Ga.
R. E. Young, Miltonvale
Elmer E. Zavodosky, Delia

Credit Courses

Walter B. Adair, Miami
Mabel Adams, Garden City
Jessie Adee, Minneapolis
Pearl Akin, Woodriver, Ill.
James Alsop, Wakefield
L. R. Alt, Little River
Pearl Althouse, Ottawa
R. B. Ambrose, Blue Rapids
Helena M. Anderson, Lewis
M. H. Anderson, Garden City
Sudie Anderson, Oskaloosa
Bertha Anderson, Kinsley
Edith Irene Andrews, Madison
W. R. Anthony, Seneca
A. C. Apitz, Manhattan
C. H. Alspaugh, Mt. Vernon, Tex.
Bertha Altus, Holcomb
Charles Atwood, La Cygne
Ethel M. Arnold, Manhattan
L. N. Arnold, Manhattan
Ruth Arbuthnot, Belleville
Geo. Atwood, La Cygne
M. C. Badgley, Cantonment, Okla.
Bagdasar K. Bagdigian, Manhattan
Blanche Baird, Gretna, Neb.
Leland I. Baker, Baldwin
Adda Bailey, Jameson, Mo.
Eunice Ann Baird, Cherryvale
R. C. Baldwin, Manhattan
Clint A. Baldwin, Elmdale
(Mrs.) Flo. E. Ballard, Bethany, Mo.
Alva J. Ballentine, Olathe
Mildred Barackman, Howard
(Mrs.) Anna Barnhardt, Pomona
Estella Barnum, Simpson
Elmer E. Bates, Perry
Margaret Barrows, Atchison
Matilda Batliner, Colby
Anna M. Beck, St. John
(Mrs.) Fannie Bedker, Sharon Springs
F. H. Beedle, Burdett
H. E. Bell, Wichita
Sherman F. Bell, Perry
Charles E. Bemiss, Selden
E. H. Bennett, Lovewell
Blanche May Berger, Sylvan Grove
Nina Birkett, Holton
Alice Bobek, Caldwell
H. T. Boese, Goessel
Nora M. Boettcher, Winkler
K. C. Boggs, Topeka
J. H. Borrer, Scranton
Mable Botkin, Manhattan
Chas. W. Bower, Perry
Jesse E. Bower, Simpson
Ellinor M. Boyd, Terhune, Wyo.
Bessie E. Bragg, Concordia
Emma Brelsford, Jennings
Walter G. Briggs, Fort Collins, Colo.
Irene Brooks, Parsons
John R. Brooks, Wellington
Lester R. Brooks, Winfield
A. A. Brown, Norton
Clancy R. Brown, Burrton
Hazel Brown, Manhattan
Flossie Brown, Garden City
Helen M. Brown, Holton
Ida Brown, Arrington
Margaret S. Brown, Topeka
W. L. Browning, Sherwin Junction
Genevieve Bruce, Manhattan
Lillian Bucheim, Leonardville
Gerald E. Buck, Bethany, Mo.
A. N. Burdett, Manhattan
Elizabeth Burnham, Kansas City
Cullen I. Burnett, La Cygne
W. H. Burress, Bethany, Mo.
Hattie Bryan, Manhattan
P. M. Bushong, Manhattan
Fannie Butts, Fredonia
Frank S. Campbell, Manhattan
Katherine Campbell, Houston, Tex.
J. A. Cannan, Erie
Reppie Carey, Manhattan
James Carle, Gretna
(Mrs.) Alice Carr Harner, Quincy
(Mrs.) Nettie B. Cartmel, Emporia
Florence Carvin, Wichita
Evangeline Casto, Manhattan
E. R. Chandler, Archer, Wyo.
Bernice Chapman, Emporia
W. K. Charles, Republic
R. C. Chatman, Manhattan
Martha Chitwood, Ozawkie
W. J. Clapp, Camp Funston
D. C. Clark, Manhattan
Florence Clark, Junction City
(Mrs.) Nora R. Clark, Junction City
E. A. Clawson, Manhattan
Merl C. Clift, Lawrence
L. H. Cobb, Kansas City
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Pauline Richards
Stella Strain

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Clayton Smith

Juniors:
Robert Stanton Hargis
William Alfred Nye
Ruth Elizabeth Thomas

Sophomores:
Samuel David Capper
Ina Ruth Findley

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President, Senior Class

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Captain, Baseball Team

Calvin J. Medlin,
President, Sophomore Class

Homer Cross,
President, Y. M. C. A.

Ralph Van Trine,
Captain, Basket Ball Team

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President, Junior Class

Bruce B. Brewer, *Treasurer,*
Editor, Collegian

Bruce Hildreth Meeker,
President, Freshman Class

Lee Williams Randels,
Captain, Football Team

Charles Ranger Enlow,
Captain, Track Team

The Corps of Cadets

(Distinguished College, 1914-'15-'16)

Commandant of Cadets

Captain W. P. J. O'NEILL, U. S. Army,
Professor of Military Science and Tactics

Assistant Commandant

Major W. B. WENDT

Bandmaster

Captain R. H. BROWN

REGIMENTAL STAFF

Captain G. E. Manzer..... Adjutant
Captain W. H. Hilts..... Quartermaster
Captain H. W. McClelland..... Range Officer

NONCOMMISSIONED STAFF

Regimental Sergeant Major ..... H. I. May
Regimental Supply Sergeant ..... G. O. Hoffines
Regimental Supply Sergeant ..... E. N. Berroth
Regimental Color Sergeant ..... F. M. Sisson
Regimental Color Sergeant ..... F. F. Cole
Battalion Sergeant Major..... F. L. Sahlmann
Battalion Sergeant Major..... V. S. Crippen
Chief Bugler ..... T. L. Shuart

FIRST BATTALION

Major J. E. TAYLOR, Commanding
First Lieut. ———, Adjutant

COMPANY A

Captain:
I. O. Mall

First Lieutenant:
F. Griffee

Second Lieutenant:
C. E. Hutto

First Sergeant:
W. C. Janssen

Supply Sergeant:
S. J. Fairchild

Sergeants:
N. J. Anderson
N. E. Dale
N. Bayle
A. C. Ramsey

Corporals:
G. S. Jennings
B. F. Agnew
W. Rodewald
W. D. Fulton
M. J. Lucas

COMPANY B

Captain:
J. E. Williamson

First Lieutenant:
C. C. Key

Second Lieutenant:
W. H. Borland

First Sergeant:
M. P. Schlaegel

Supply Sergeant:
C. A. Frankenhoff

Sergeants:
J. L. McNair
E. T. Williamson
S. D. Capper
L. Zimmerman

Corporals:
S. I. Thackrey
E. H. Siemers
K. D. Thompson
E. S. Bacon
H. Bales
S. L. Hunt

COMPANY C

Captain:
M. W. Converse

First Lieutenant:
B. B. Brewer

Second Lieutenant:
C. E. Freeto

First Sergeant:
W. D. Scully

Supply Sergeant:
W. R. Essick

Sergeants:
J. A. White
R. Ferle
C. O. Works

Corporals:
M. L. Alsop
R. D. Hillard
G. A. Gingrich
F. A. Bell
J. A. Bogue
R. McCall

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Captain:
H. C. Colglazier

First Lieutenant:
R. D. McGregor

Second Lieutenant:
W. D. Denholm

First Sergeant:
H. A. O'Brien

Supply Sergeant:
L. G. Hudson

Sergeants:
P. DuPuy
H. M. Birks
W. B. Carey

Corporals:
H. D. Finch
H. R. Guilbert
H. S. Woodward
L. M. Dike
J. O. Brown

SECOND BATTALION

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First Lieut. ———, Adjutant

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C. M. Barringer

First Lieutenant:
H. Cross

Second Lieutenant:
W. A. Giles

First Sergeant:
W. T. Foreman

Supply Sergeant:
H. W. Snell

Sergeants:
C. C. Chubb
T. Barger
H. W. Bachelor
C. Knisely

Corporals:
R. A. Axtell
C. B. Harris
W. R. Horlacher
D. S. Blanchard
H. G. Gentry

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Captain:
B. F. Barnes

First Lieutenant:
J. F. Eggerman

Second Lieutenant:
G. A. Kauffman

First Sergeant:
J. B. Angle

Supply Sergeant:
I. Rogers

Sergeants:
F. H. Collins
L. G. Van Zile
J. H. Mayer
H. K. Shideler

Corporals:
D. C. Thayer
E. L. Lahr
O. T. Blanke
J. F. Grady
S. T. Harrington

COMPANY G

Captain:
A. M. Harvey

First Lieutenant:
C. W. Hestwood

Second Lieutenant:
J. F. Maas

First Sergeant:
S. E. Kelsey

Supply Sergeant:
R. Kerr

Sergeants:
R. W. May
E. W. Frost
W. E. Robinson
J. H. Coven

Corporals:
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J. W. Andrews
P. L. Fetzer
A. Englund

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J. R. Sparks

First Lieutenant:
J. C. Gulledge

Second Lieutenant:
I. F. Mock

First Sergeant:
A. J. Sahlberg

Supply Sergeant:
R. D. Nichols

Sergeants:
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H. E. Moody
W. R. Shuart
L. B. Bate

Corporals:
I. L. Plank
H. W. Moore
H. D. Garver
F. F. Anderson
C. S. Wood

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ROBERT HENRY BROWN, *Bandmaster*
Principal Musician, Cecil Elder
Drum Major, Roy E. Carr

Flute and Piccalo:
Otto Blanke

Oboe:
P. L. Fetzer

Clarinets:
C. F. Zeigler
E. E. Gottman
W. T. Glenn
S. Fairman
H. Fuqua
D. Blanchard
H. D. Pfeutze
C. L. Shellenbarger
J. M. Myers

Bass Clarinet:
E. V. Floyd

Saxophones:
L. Weigand
E. K. McLain

Baritones:
E. C. Gilbreath
K. S. Day

Basses:
C. H. Brown
O. L. Gibson
R. B. Schnatterly
E. Zollinger

Cornets:
Cecil Elder
R. H. Newkirk
E. C. Abbott
L. F. Gfeller
M. F. Upson
W. W. Trego
L. B. Bates
M. S. Kennedy

Horns:
J. Huff
J. W. Cordts
I. C. Crow
C. P. Brubaker
W. H. Weeks

Trombones:
H. A. Knapp
L. Jones
E. L. St. John
P. Stoker
R. H. Moran
E. A. Waters

Euphonium:
L. Howenstine

Drums:
R. E. Carr
C. H. Cloud
F. Roark
N. S. Spangler

The College Orchestra

ROBERT HENRY BROWN, *Conductor*

First Violins:
Roy E. Carr, *Concert Master*
Helen Carlyle
E. C. Gilbreath
Lloyd Stearman
Inez Backman
C. A. Downing

Second Violins:
Doris M. Bugbey, *Principal*
E. C. Abbott
Jno. Andrews
C. H. Cloud
Claire Higgins

Cellos:
W. M. Dalton
C. Howenstine
C. L. Browning
Vera McClelland

Basses:
Clyde Long
L. Howenstine

Harp:
Cora E. Brown

Tympani:
W. B. Wendt

Flute:
Otto Blanke

Obeo:
P. L. Fetzer

Clarinets:
C. F. Zeigler
E. V. Floyd

Horns:
Cecil Elder
M. R. Hill

Trumpets:
R. H. Newkirk
L. F. Gfeller
M. F. Upson

Trombones:
H. A. Knapp
Genevra Adams
E. L. St. John

Tuba:
C. H. Brown

Piano:
Frances Stall

Drums:
F. Roark

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James Bell Angle
Orville Thomas Bonnett
Walter Bryan Carey
Roy Edward Carr
Charles H. Cloud
George William Corzine
David Everett Davis
Orville Lee Roy Gibson
Elmer Corpeny Gilbreath
Albert Cecil Hancock
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Russell Vernon Knapp
Eugene Sidney Lyons
Paul L. Mann
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Lloyd Rayburn Miller
Samuel M. Mitchell
Howard A. O'Brien
William Chain Robinson
William Robertson Schell
Nathaniel Sheridan Spangler
Claude Allen White
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Florence Leona Brown
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Nina Bess Curry
Frances Louise Cutshaw
Helen Louise Giles
Helen Isabel Gott
Bertha Louise Hill
Gladys Evelyn Hoffman
Flora Pearl Hoots
Ruth Kathrina Huff
June Marie Julian
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Ollie Wilson Klotz
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Ella Eunice Rempel
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Wanda Tetrick
Nellie Agnes Thornburg
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Name Index *

* Names of students may be found by referring to "Students" in the General Index.

General Index

□