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THE GRADUATE SCHOOL
RECORD OF THE SESSION 1936-37

ANNOUNCEMENTS FOR THE SESSION 1937-1938



COLLEGE STATION, TEXAS

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GRADUATE SCHOOL CALENDAR

Summer Session 1937

- JUNE 8, Registration for first term.
JULY 17, First term ends.
JULY 19, Registration for second term.
AUGUST 14, Candidates for degrees in August submit completed theses.
AUGUST 28, Second term ends.

Regular Session 1937-1938

1937

- SEPTEMBER 20, Opening of the first term.
SEPTEMBER 21, Registration of graduate students.
NOVEMBER 11, Observance of Armistice Day.
DECEMBER 18, Christmas recess begins at noon.

1938

- JANUARY 3, Classes resumed at 8 a. m.
FEBRUARY 4, Close of first semester.
FEBRUARY 5 AND 7, Registration for second semester.
FEBRUARY 8, Opening of second semester.
APRIL 21-23, Spring recess.
MAY 14, Candidates for degrees in June submit completed theses.
JUNE 3, Commencement Sermon.
JUNE 3-4, Commencement.

OFFICERS OF ADMINISTRATION

THOMAS OTTO WALTON, LL.D., *President of the College.*

CHARLES PURYEAR, M.A., C.E., LL.D., *Dean Emeritus of the College.*

FRANK C. BOLTON, M.S., LL.D., *Vice President and Dean of the College.*

T. D. BROOKS, Ph.D., *Dean of the Graduate School.*

EUGENE J. HOWELL, M.S., *Registrar.*

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GRADUATE COMMITTEE

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O. M. BALL, Ph.D., *Professor and Head of Department of Biology.*

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A. B. CONNER, M.S., *Director, Texas Agricultural Experiment Station.*

E. P. HUMBERT, Ph.D., *Professor and Head of Department of Genetics.*

J. J. RICHEY, B.S., C.E., *Professor and Head of Department of Civil Engi-
neering.*

R. M. SHERWOOD, M.S., *Chief of Division of Poultry Husbandry, Texas Agri-
cultural Experiment Station.*

O. W. SILVEY, Ph.D., *Professor and Head of Department of Physics.*

GEORGE SUMMEY, JR., Ph.D., *Professor and Head of Department of English.*

B. L. WARWICK, Ph.D., *Animal Husbandman, Texas Agricultural Experiment
Station.*

C. H. WINKLER, Ph.D., *Professor and Head of Department of Psychology.*

MEMBERS OF COLLEGE STAFF PARTICIPATING IN GRADUATE INSTRUCTION

(Figures in parentheses indicate date of first appointment on the College Staff and date of appointment to present position, respectively.)

- Ira Gillespie Adams, *Professor of Economics*. (1927, 1935)
A.B., Evansville College, 1923; A.M., Minnesota, 1927.
- Guy Webb Adriance, *Professor and Head of Department of Horticulture*, (1920, 1935)
B.S., Agricultural and Mechanical College of Texas, 1915; M.S., California, 1917; Ph.D., Michigan State College, 1929.
- Elmer Ross Alexander, *Professor and Head of Department of Agricultural Education*. (1919, 1935)
A.B., Baylor, 1919; B.S., Agricultural and Mechanical College of Texas, 1923; M.S., 1926.
- Fred Hobson Arnold, *Acting Associate Professor of Agricultural Economics*. (1936)
B.S., George Peabody College for Teachers, 1925; M.A., 1928; Ph.D., North Carolina, 1936.
- Charles Laurence Baker, *Professor and Head of Department of Geology*. (1935)
S.B., Chicago, 1908; M.A., California, 1916.
- Oscar Melville Ball, *Professor and Head of Department of Biology*. (1903)
B.A., Virginia, 1898; M.A., Ph.D., Leipsig, 1903.
- Justus Wheeler Barger, *Professor and Head of Department of Agricultural Economics*. (1929, 1935)
B.S., Kansas State College, 1922; M.S., 1923; M.A., Leland Stanford, 1929.
- Sherman Weaver Bilsing, *Professor and Head of Department of Entomology*. (1913, 1918)
A.B., Ohio State, 1912; M.A., 1913; Ph.D., 1924.
- John Henry Binney, *Professor of Mathematics*. (1925, 1937)
B.S., Sam Houston State Teachers College, 1924; M.A., Texas, 1925; Ph.D., Rice, 1933.
- Frank Cleveland Bolton, *Vice-President and Dean of the College, Professor of Electrical Engineering*. (1909, 1932)
B.S., Mississippi State College, 1905; M.S., Ohio State, 1928; LL.D., Austin College, 1932.
- Alexander Van Brewer, *Professor of Mechanical Engineering*. (1922, 1930)
B.S., Purdue, 1913; M.E., 1925; M.S., Agricultural & Mechanical College of Texas, 1937.
- Fred Robert Brison, *Associate Professor of Horticulture*. (1921, 1927)
B.S., Agricultural and Mechanical College of Texas, 1921; M.S., Michigan State College, 1931.
- Thomas Dudley Brooks, *Dean of the Graduate School; Dean of the School of Arts and Sciences*. (1932)
A.B., Baylor, 1903; A.M., Chicago, 1920; Ph.D., 1921.
- Sidney Overton Brown, *Instructor in Biology*. (1936)
B.A., Texas, 1932; Ph.D., 1936.
- Durant Samuel Buchanan, *Professor of Animal Husbandry*. (1920, 1930)
B.S., Agricultural and Mechanical College of Texas, 1917; M.S., Iowa State College, 1926.

- Patton Wright Burns, *Professor and Head of Department of Veterinary Physiology and Pharmacology.* (1926, 1935)
 B.S., Agricultural and Mechanical College of Texas, 1923; D.V.M., 1926.
- William Vaughn Cash, *Associate Professor of Architecture.* (1937)
 M.S., Massachusetts Institute of Technology, 1925; Master of Architecture, 1925.
- Charles Boyle Campbell, *Professor and Head of Department of Modern Languages.* (1903, 1914)
 Ph.B., DePauw, 1900; Ph.D., Chicago, 1912.
- Floyd Brazilia Clark, *Professor and Head of Department of Economics.* (1916)
 A.B., Richmond College, 1907; M.A., 1908; Ph.D., Johns Hopkins, 1914.
- Charles William Crawford, *Professor and Head of Department of Mechanical Engineering.* (1919, 1929)
 B.S., Agricultural and Mechanical College of Texas, 1919; M.S., 1929.
- Frank Iver Dahlberg, *Assistant Professor in Animal Husbandry.* (1936, 1937)
 B. S., Agricultural and Mechanical College of Texas, 1925; M.S., Wisconsin, 1930.
- Albert Laurie Darnell, *Professor of Dairy Husbandry.* (1914, 1925)
 B.S., Mississippi State College, 1913; M.A., Missouri, 1916.
- William B. Davis, *Professor of Wild Game.* (1937)
 A.B., Chico State College, California, 1933; M.A., California, 1936; Ph.D., 1937.
- Harley Clay Dillingham, *Professor of Electrical Engineering.* (1922, 1930)
 B.S., Agricultural and Mechanical College of Texas, 1922; A.M., Columbia, 1933.
- Clifton Childress Doak, *Professor of Biology.* (1926, 1937)
 B.S., North Texas State Teachers College, 1922; M.S., Agricultural and Mechanical College of Texas, 1928; Ph.D., Illinois, 1933.
- Ralph Clark Dunn, *Professor and Head of Department of Veterinary Pathology.* (1911, 1937)
 D.V.M., Ohio State, 1911.
- Nat Edmonson, Jr., *Professor of Mathematics.* (1931, 1937)
 B.A., Austin College, 1924; M.A., 1925; Ph.D., Rice, 1929.
- Titus Carr Evans, *Instructor in Biology.* (1936)
 B.A., Baylor, 1929; M.S., Iowa, 1931; Ph.D., 1934.
- Walter N. Ezekiel, *Plant Pathologist, Agricultural Experiment Station.* (1928)
 B.S., Maryland State College, 1920; M.S., University of Maryland, 1921; Ph.D., 1924.
- Virgil Moring Faires, *Professor of Mechanical Engineering.* (1926, 1930)
 B.S., Colorado, 1922; M.E., 1926; M.S., 1927.
- Clarence Jack Finney, *Professor of Architecture.* (1926, 1934)
 B.S., Agricultural and Mechanical College of Texas, 1932; Ecole des Beaux-Arts, Fontainebleau, 1923.
- Robert Kemble Fletcher, *Entomologist, Agricultural Experiment Station.* (1927)
 B.A., University of Maine, 1917; M.A., Ohio State University, 1919; Ph.D., 1928.
- Walter S. Florey, *Horticulturist, Agricultural Experiment Station.* (1936)
 B.A., Bridgewater College, 1928; M.A., Ph.D., University of Virginia, 1931.
- Leroy Levy Fouraker, *Associate Professor of Electrical Engineering.* (1920, 1927)
 B.S., Agricultural and Mechanical College of Texas, 1914; M.S., 1927.
- George Stronach Fraps, *Chief, Division of Chemistry and State Chemist, Agricultural Experiment Station* (1903, 1905)
 B.S., North Carolina Agricultural College, 1896; Ph.D., Johns Hopkins University, 1899.

- Letcher P. Gabbard, *Chief, Division of Farm and Ranch Economics, Agricultural Experiment Station.* (1922, 1923)
 B.S., University of Tennessee, 1915; M.S., University of Wisconsin, 1921.
- Samuel Rhea Gammon, *Professor and Head of Department of History.* (1925)
 A.B., Washington and Lee, 1911; A.M., 1913; Ph.D., Johns Hopkins, 1921.
- Elder Harris Gibbons, *Assistant Professor of Biology.* (1925, 1927)
 B.S.A., Tennessee, 1925; S.M., Chicago, 1929.
- Frederick Ernest Giesecke, *Professor of Engineering Research; Director Texas Engineering Experiment Station; College Architect.* (1886, 1927)
 M.E., Agricultural and Mechanical College of Texas, 1890; S.B., in Architecture, Massachusetts Institute of Technology, 1904; Ph.D., Illinois, 1924.
- Edgar Wilson Glenn, *Associate Professor of Industrial Education.* (1928, 1930)
 B.S., Illinois, 1924; B.S., Agricultural and Mechanical College of Texas, 1930; M.S., 1931.
- Chauncey Barger Godbey, *Professor of Genetics.* (1926, 1936)
 B.S., Kentucky, 1925; M.S., Agricultural and Mechanical College of Texas, 1926.
- Samuel S. Goldich, *Instructor in Geology.* (1936)
 B.A., Minnesota, 1929; M.A., Syracuse, 1930; Ph.D., Minnesota, 1936.
- Hillel Halperin, *Professor of Mathematics.* (1920, 1925)
 E.E., Liege, 1908; A.M., Columbia, 1915.
- C. Horace Hamilton, *Economist in Rural Life Problems, Agricultural Experiment Station.* (1936)
 A.B., Southern Methodist University, 1923; M.S., Agricultural and Mechanical College of Texas, 1925; Ph.D., University of North Carolina, 1932.
- Thomas Rowan Hamilton, *Professor of Accounting and Statistics.* (1929, 1937)
 A.B., Washington and Lee, 1917; M.S., Columbia, 1924.
- F. Edwin Hanson, *Associate in Dairy Manufacture, Agriculture Experiment Station.* (1936)
 B.S., South Dakota State College, 1930; M.S., University of Wisconsin, 1932; Ph.D., 1937.
- Charles Cleveland Hedges, *Professor and Head of Department of Chemistry and Chemical Engineering.* (1912, 1913)
 B.S., Kentucky, 1906; A.B., Cornell, 1908; Ph.D., 1912.
- Frederick William Hensel, Jr., *Professor and Head of Department of Landscape Art.* (1913, 1925)
 B.S., Agricultural and Mechanical College of Texas, 1907; M.S., Cornell, 1914.
- Sewell Hepburn Hopkins, *Assistant Professor of Biology.* (1935, 1936)
 B.S., College of William and Mary, 1927; M.A., Illinois, 1929; Ph.D., 1933.
- Martin Collins Hughes, *Professor and Head of Department of Electrical Engineering.* (1923, 1932)
 B.S., Illinois, 1917; E.E., 1926.
- William Lycurgus Hughes, *Professor and Head of Department of Education.* (1920, 1924)
 B.A., Howard Payne College, 1920; B.S., Agricultural and Mechanical College of Texas, 1921; M.S., 1922.
- Eugene Peter Humbert, *Professor and Head of Department of Genetics.* (1916, 1923)
 B.S.A., Iowa State College, 1906; M.S., Cornell, 1908; Ph.D., 1910.
- Robert Lee Hunt, *Professor of Agricultural Economics.* (1927, 1935)
 B.S., Agricultural and Mechanical College of Texas, 1924; M.S., North Carolina State College, 1927; Ph.D., Wisconsin, 1934.

- Arne Arthur Jakkula, *Associate Professor of Civil Engineering*. (1937)
 B.S., University of Minnesota, 1926; M.S., 1927; Ph.D., University of Michigan, 1933.
- Frederick William Jensen, *Professor of Chemistry*. (1925, 1930)
 B.S., Nebraska, 1920; M.S., 1923; Ph.D., 1925.
- Horace Greeley Johnston, *Associate Professor of Entomology*. (1927, 1937)
 B.S., Mississippi State College, 1926; Iowa State College, 1928.
- Fred Rufus Jones, *Professor of Agricultural Engineering*. (1921, 1935)
 B.S., Wisconsin, 1915; M.S., Iowa State College, 1931.
- John McKinley Jones, *Chief, Division of Animal Industry, Agricultural Experiment Station*. (1914, 1918)
 B.S., University of Wyoming, 1911; A.M., University of Wisconsin, 1912.
- Luther Goodrich Jones, *Professor of Agronomy*. (1919, 1926)
 B.S., Princeton, 1917; M.S., Agricultural and Mechanical College of Texas, 1921; Ph.D., Cornell, 1927.
- R. E. Karper, *Vice Director and Agronomist, Agricultural Experiment Station*. (1915, 1928)
 B.S., Kansas State Agricultural College.
- D. T. Killough, *Agronomist, Agricultural Experiment Station*. (1914, 1925)
 B.S., Agricultural and Mechanical College of Texas, 1914; M.S., 1925.
- Edwin Jackson Kyle, *Dean of the School of Agriculture, Professor of Horticulture*. (1902, 1911)
 B.S., Agricultural and Mechanical College of Texas, 1899; B.S.A., Cornell, 1901, M.S.A., 1902.
- Ernest Langford, *Professor and Head of Department of Architecture*. (1915, 1929)
 B.S., Agricultural and Mechanical College of Texas, 1913; M.S., Illinois, 1924.
- Thomas Seeter Leith, *Professor and Head of Department of Veterinary Anatomy*. (1937)
 D.V.M., Iowa State College, 1914.
- Thomas William Leland, *Professor and Head of Department of Accounting and Statistics*. (1922, 1926)
 B.A., Wisconsin, 1921; M.A., 1922; C.P.A., 1929.
- August Albert Lenert, *Professor of Veterinary Medicine*. (1919, 1934)
 B.S., Agricultural and Mechanical College of Texas, 1914; D.V.M., Kansas City Veterinary College, 1917.
- Van Allen Little, *Professor of Entomology*. (1923, 1937)
 B.A., Sam Houston State Teachers College, 1922; M.S., Agricultural and Mechanical College of Texas, 1925.
- Willard Homer McCorkle, *Associate Professor of Physics*. (1924, 1935)
 B.A., Iowa, 1924; M.S., 1928; Ph.D., 1935.
- John Thomas Lamar McNew, *Professor of Highway Engineering*. (1920, 1925)
 B.S., Agricultural and Mechanical College of Texas, 1920; M.S., 1926; C.E., Iowa State College, 1925.
- Arthur Kapp Mackey, *Professor of Animal Husbandry*. (1925, 1928)
 B.S., Purdue, 1921; M.S., Illinois, 1923.
- P. C. Mangelsdorf, *Agronomist and Assistant Director, Agricultural Experiment Station*. (1926, 1936)
 B.S., Kansas State Agricultural College, 1921; M.S., Harvard University, 1923; Sc.D., Harvard University, 1925.

- Elias Ward Markle, *Professor of Electrical Engineering*. (1921, 1930)
 B.S., Pennsylvania State College, 1913; M.S., Agricultural and Mechanical College of Texas, 1930.
- Ross Perry Marsteller, *Dean of the School of Veterinary Medicine, Professor and Head of Department of Veterinary Medicine and Surgery*. (1905, 1936)
 D.V.M., Ohio State, 1905.
- Robert LaVern Matlock, *Associate Professor of Agronomy*. (1937)
 B.S., University of Illinois, 1924; M.S., 1938; Ph.D., 1931.
- Joseph Sayers Mogford, *Professor of Agronomy*. (1925)
 B.S., Agricultural and Mechanical College of Texas, 1916; M.S., 1920.
- William Ford Munnerlyn, *Associate Professor of Poultry Husbandry*. (1926, 1934)
 B.S., Agricultural and Mechanical College of Texas, 1926; M.S., 1930.
- Thurmond Armour Munson, *Professor of Hydraulic Engineering*. (1920, 1926)
 B.S., Agricultural and Mechanical College of Texas, 1910; C.E., Iowa State College, 1924; M.S., 1925.
- Leland Shumway Paine, *Associate Professor of Agricultural Economics*. (1927, 1930)
 B.A., Nebraska, 1922; M.A., Wisconsin, 1926.
- Walter Ernest Paulson, *Marketing Research Specialist, Agricultural Experiment Station*. (1920, 1923)
 B.S., Oklahoma A. & M.; M.S., Iowa State College, Ph.D., 1929.
- Walter Lee Porter, *Professor and Head of Department of Mathematics*, (1918, 1932)
 A.B., Howard College, 1911; M.S., Agricultural and Mechanical College of Texas, 1926.
- William McDaniel Potts, *Associate Professor of Chemistry*. (1926, 1937)
 S.B., Chicago, 1921; S.M., 1927.
- John Henry Quisenberry, *Associate Professor of Genetics*. (1936)
 B.S., Agricultural and Mechanical College of Texas, 1931; M.S., Illinois, 1933; Ph.D., 1936.
- Robert Gatlin Reeves, *Professor of Biology*. (1928)
 B.S., Mississippi State College, 1922; M.S., 1923; Ph.D., Iowa State College, 1928.
- Duncan Henry Reid, *Professor and Head of Department of Poultry Husbandry*. (1923)
 B.S., Wisconsin, 1919; M.S., 1922.
- Elver William Renner, *Associate Professor of Dairy Husbandry*. (1930)
 B.S., Iowa State College, 1918; M.S., 1929.
- John Jefferson Richey, *Professor and Head of Department of Civil Engineering*. (1912, 1922)
 B.S., Illinois, 1903; C.E., 1910.
- Norman Frederick Rode, *Professor of Electrical Engineering*. (1922, 1930)
 B.S., Clemson College, 1919; M.S., Agricultural and Mechanical College of Texas, 1929.
- Henry Ross, *Professor of Agricultural Education*. (1935)
 B.S., Agricultural and Mechanical College of Texas, 1923; M.S., 1935.
- Daniel Russell, *Professor and Head of Department of Rural Sociology*. (1926, 1927)
 A.B., Baylor, 1922; A.M., Chicago, 1931.

- Isaac Christopher Sanders, *Associate Professor of Physics*. (1921, 1927)
B.A., Rice, 1917; M.A., Texas, 1925.
- George Wilhelm Schlesselmann, *Associate Professor of Agricultural Economics*. (1934, 1935)
B.A., Iowa State Teachers College, 1927; M.A., Clark, 1928; Ph.D., Nebraska, 1935.
- Hubert Schmidt, *Chief, Division of Veterinary Science, Agricultural Experiment Station*. (1913, 1936)
B.S., Agricultural and Mechanical College of Texas, 1908; D.V.M., Royal Veterinary School, Berlin, Germany, 1912.
- Norman George Schuessler, *Associate Professor of Animal Husbandry*. (1935)
B.S., Agricultural and Mechanical College of Texas, 1931.
- Ross M. Sherwood, *Chief, Division of Poultry Husbandry, Agricultural Experiment Station*. (1919, 1924)
B.S., Iowa State College, 1910; M.S., A. and M. College of Texas, 1924.
- Daniel Scoates, *Professor and Head of Department of Agricultural Engineering*. (1919)
B.S., Iowa State College, 1910; A.E., 1915.
- Charles Noah Shepardson, *Professor and Head of Department of Dairy Husbandry*. (1928)
B.S., Colorado State College, 1917; M.S., Iowa State College, 1924.
- Oscar William Silvey, *Professor and Head of Department of Physics*. (1916)
A.B., Indiana, 1907; A.M., 1910; Ph.D., Chicago, 1915.
- Ernest William Steel, *Professor and Head of Department of Municipal and Sanitary Engineering*. (1925)
C.E., Cornell, 1920.
- Albert B. Stevens, *Professor of Petroleum Engineering*. (1934, 1937)
B.S., California, 1927; M.S., Southern California, 1932.
- George Summey, Jr., *Professor and Head of Department of English*. (1922)
A.B., Southwestern Presbyterian, 1897; M.A., 1898; Ph.D., Columbia, 1919.
- Paul Judson Talley, *Assistant Professor of Biology*. (1934, 1935)
A.B., Baylor, 1928; M.S., Iowa, 1930; Ph.D., Wisconsin, 1932.
- J. J. Taubenhaus, *Chief, Division of Plant Pathology and Physiology, Agricultural Experiment Station*. (1916)
B.S., and M.S., Cornell University, Ph.D., University of Pennsylvania.
- Walter Penn Talyor, *Professor and Head of Department of Wild Game*. (1935, 1937); *Chief, Division of Wildlife Research, Texas Agricultural Experiment Station; Senior Biologist, Biological Survey, United States Department of Agriculture*.
B.S., University of California, 1911; Ph.D., 1914.
- Frank L. Thomas, *Chief, Division of Entomology, State Entomologist, Agricultural Experiment Station*. (1924)
B.S., Massachusetts Agricultural College, 1910; Ph.D., 1917.
- Milam Frank Thurmond, *Associate Professor of Agricultural Engineering*. (1927, 1930)
A.B. Baylor, 1919; B.S., Agricultural and Mechanical College of Texas, 1922; M.S., 1931.
- Ide Peebles Trotter, *Professor and Head of Department of Agronomy*. (1936)
B.A., Mississippi College, 1915; B.S., Mississippi State College, 1918; M.S., 1921; Ph.D., Wisconsin, 1933.

- Francis Earl Turner, *Associate Professor of Geology*. (1934, 1937)
 B.S., California Institute of Technology, 1927; M.S., 1928; Ph.D., California, 1934.
- Harold Vance, *Professor and Head of Department of Petroleum Engineering*. (1934)
 B.S., California, 1923.
- Bruce L. Warwick, *Animal Husbandman, Agricultural Experiment Station*. (1930)
 D.V.M., Iowa State College, 1919; M.S., University of Wisconsin, 1922; Ph.D., 1925.
- George Barton Wilcox, *Professor of Education*. (1920, 1927)
 B.S., Agricultural and Mechanical College of Texas, 1923; A.M., Columbia, 1926.
- David Willard Williams, *Professor and Head of Department of Animal Husbandry*. (1919, 1923)
 B.S., Ohio State, 1915; M.S., Illinois, 1916.
- Edward Lafayette Williams, *Professor and Head of Department of Industrial Education*. (1925)
 B.S., Pittsburg, 1925; M.S., Agricultural and Mechanical College of Texas, 1930.
- Roy Matthew Wingren, *Assistant Professor of Mechanical Engineering*. (1928, 1935)
 B.S., Agricultural and Mechanical College of Texas, 1927; M.S., 1934.
- Telford William Workman, *Veterinarian, Division of Veterinary Science, Agricultural Experiment Station*. (1936)
 D.V.M., Iowa State College, 1932; M.S., 1933; Ph.D., Yale University, 1936.
- Sidney H. Yarnell, *Chief, Division of Horticulture, Agricultural Experiment Station*. (1930)
 B.S., Michigan State College, 1922; M.S., Cornell University, 1926; Sc.D., Bussey Institution, 1930.

THE GRADUATE SCHOOL

General Statement—The Graduate School of the Agricultural and Mechanical College of Texas was established in 1924. Prior to that time graduate work was administered by the general faculty, acting through a committee on graduate studies. The faculty of the Graduate School consists of such members of the teaching staff and the staff of the Agricultural Experiment Station as the general faculty may determine, and has general jurisdiction over all matters relating to graduate work.

Administration.—Matters of general policy are considered by the Graduate Committee consisting of twelve members, which reports its recommendations to the faculty of the school concerned. In cases in which prompt action is desirable the committee is authorized to act, reporting its action to the faculty for ratification.

The Dean of the Graduate School is the representative of the faculty in dealing with individuals, and is charged with the execution of its regulations. Petitions are acted upon by the Dean, or by the Graduate Committee if any matter is involved concerning which a policy has not been definitely established.

All communications relating to graduate work should be addressed to the Dean of the Graduate School.

Character of Graduate Work.—The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; the graduate student is not expected to get from lecture and laboratory courses all of the knowledge and training necessary to meet the requirements for his degree.

Graduate study presupposes a higher standard of excellence than undergraduate study. No graduate credit is granted for work of lower grade than "C", and to receive either the M.S. or Ph.D. degree, the candidate must have earned a grade point ratio of not less than 1.5 on all graduate courses taken.

Degrees.—Approved courses of study in the Graduate School may lead to the degree of Master of Science or Doctor of Philosophy. Professional degrees in Engineering—Agricultural Engineer, Architectural Engineer, Chemical Engineer, Civil Engineer, Electrical Engineer, Mechanical Engineer—are offered on the basis of acceptable professional experience, a thesis, and an examination.

The Master of Science degree with "Municipal Administration" designated as the major field is awarded to eligible students on the completion of programs of courses which in the judgment of the Graduate Committee are appropriate thereto. These programs will be built around courses in Municipal & Sanitary Engineering and will be differentiated for students who have done undergraduate work in engineering and for others.

REQUIREMENTS FOR THE MASTER'S DEGREE

General.—The Master's degree denotes that attainment which a student of good native ability, who has received an appropriate bachelor's degree, may reasonably expect to achieve in one year of entire and successful devotion to advanced studies, with adequate facilities and under competent direction. The courses of study leading to this degree do not make research the chief consideration, but are intended to serve as an introduction to the methods and discipline of research.

Specification as to Courses.—The course of study pursued is specified in the diploma. In his application for admission the student must designate his major courses of study.

Admission.—In order to be admitted to a course of study leading to the master's degree, the candidate must satisfy the following requirements:

1. He must be a graduate of this College or of some other approved institution whose requirements for graduation are substantially equivalent to those of this College.

2. To major in any department, a candidate for the master's degree must meet the requirements of that department for the bachelor's degree at this College. This is especially important as regards basic sciences and fundamental technical subjects.

To minor in any department the candidate must meet such undergraduate requirements as, in the opinion of the head of the department concerned, are prerequisite to the graduate courses selected.

3. His undergraduate record must be of such high order as to satisfy the committee that he is qualified by native ability and by training to pursue graduate studies with profit and with credit. In case it does not fully meet this requirement, the committee may require the completion of additional undergraduate work with a grade of at least "B".

Application.—Application for admission should be made at least one month in advance, and in case the candidate comes from another institution, his application must be accompanied by a complete transcript of his undergraduate record, properly certified.

Admission to Candidacy.—Admission as a graduate student does not imply admission as a candidate for a degree. In order to become a candidate for an advanced degree, the student must make formal application—in the regular session before December 15 and in the summer session one week before the close of the first term. The application will be approved only in case the student has demonstrated his ability to do graduate work in a creditable manner.

Registration.—Graduate students must register at the beginning of each semester at the office of the Registrar and of the Dean.

Amount of Work.—The candidate for the degree of Master of Science must do at least one full year's work. By this is meant that he must register

for, attend and complete at least eight courses of four credit hours each or the equivalent and, in addition, must submit a satisfactory thesis. Full time members of the College staff are not permitted to register in any one semester for more than one fourth of a full semester's work.

Course of Study.—The subjects constituting the student's complete course of study are to be chosen subject to the approval of the Graduate Committee. Of the eight full-semester courses required, at least seven must be done in this College.

In general, the work must be made up of graduate courses. In cases in which it may be deemed advisable, as much as twelve credit hours may consist of courses listed herein "For graduates and advanced undergraduates." Each hour of theory involves two hours of preparation.

Major and Minor Subjects.—For the degree of Master of Science the candidate must choose a major subject and one or two minor subjects. A major or a minor denotes the field of knowledge of a department. With the approval of the executive committee, the major may be taken in two closely-allied departments. In his major subject the student must take at least two full-semester courses each semester, in addition to his thesis. Courses in minor subjects must be chosen by the student after consultation with the head of his major department.

Residence.—The master's degree will not be conferred except after a residence of at least one year at the College. For candidates engaged in teaching or other regular employment, the period of residence will be increased to such extent as the committee may determine.

Work in Summer Session.—The residence requirement may be satisfied by residence during four summer terms of six weeks each. Courses offered in the summer session cover essentially the same ground as that covered by the corresponding courses of the regular session. The maximum amount of work for which a student may register in a summer term is two full-semester courses. In the summer session, each hour of theory involves three hours of preparation.

The candidate who spends only four summer terms in residence may fulfill the requirements for the master's degree, provided that, in the *ad interim* period between summer sessions he does the greater part of the work on his thesis. Authority to do thesis work in this way must be obtained through the Dean, and the student must make such reports of progress as the head of his major department may require.

Extension Class Work.—Work done in extension classes may be allowed graduate credit to the extent of not more than six credit hours, provided:

1. That in each case both the courses and the instructor be approved by the Graduate Committee and by the Faculty of the Agricultural and Mechanical College of Texas.
2. That before taking such a course the applicant be accepted for admission to the Graduate School and admitted to the course by the Graduate Committee.

3. That no such credit be finally allowed as part of the requirements for a degree in this institution until the student has demonstrated, by work done in residence at the Agricultural and Mechanical College of Texas, that he can pursue graduate study with profit.

Students who are in residence during summer sessions only must do the greater part of their thesis work between summer sessions, as stated above.

Short Unit Courses.—For the benefit of teachers of vocational agriculture whose summer vacation is limited to three weeks, provision is made by which they may take the first half of a course one summer and the second half another summer. The letter “M” and “N” written after a course refers, respectively, to the first and second half of the course. Credit is not given until both halves have been completed.

Courses Offered by Experiment Station Staff.—In addition to the courses offered by the several departments of instruction, there are graduate courses offered by members of the Agricultural Experiment Station staff and described under the respective departments of instruction.

Special Opportunity for the Study of Cotton.—The College offers unusual opportunity for the thorough study of cotton in all its phases. The following graduate courses in that field are described under the respective departments: Advanced Cotton Production, Genetic Studies in Cotton, Research in Cotton Breeding, Cotton Insects, Cotton Seed Oil, Cotton Machinery, Cotton Marketing problems. Undergraduate courses in this field include: The Cotton Plant, Fiber Crops, Cotton Insects, Cotton Research Problems, Cotton Machinery, Cotton Marketing. The manufacture of cotton is covered in the courses offered by the Department of Textile Engineering.

Quality of Work.—In order to be allowed to go on with his course, a graduate student must give continued satisfaction in his work.

Initiative.—In carrying on his work in Graduate School, the student is expected to keep himself informed as to the regulations and to assume the initiative in complying with them.

Thesis.—The candidate must submit a thesis, which shall be based upon his work in the department in which he takes his major subject. The thesis project must be submitted to the committee for approval, through the head of the department in which it is to be written, by December 15. In matter and style, the thesis must be acceptable to the head of the department in which it is written and to the committee. It must show that the candidate has the ability to do independent work; and, by correct citation of authorities, must show that he has satisfactory acquaintance with the literature of his field.

The thesis must be typewritten on paper 8½ inches by 11 inches; four weeks before commencement it must be presented to the Dean through the head of the department in completed form, ready for binding. Before the degree is conferred, a bound copy for the College library must be deposited with the Dean.

Examinations.—At the close of the semester, written examinations are held in each graduate course, and it is the duty of the head of the department concerned to file with the Dean a copy of the questions. In addition to the semester examinations, a student must pass a final examination covering his entire course of study and his thesis. The final examination may be oral or written, or both, and is open to the committee and to members of the Faculty.

Reports.—Heads of departments will make reports to the Registrar at the end of each semester on all graduate work done in their respective departments, and such other reports on the progress of their graduate students as the Dean may request.

Special Committee.—The instructors under whom a graduate student takes work constitute a special committee to direct and advise him concerning his work and to represent him before the executive committee. The instructor in charge of the major subject shall be chairman of the special committee in each case.

REGULATIONS GOVERNING THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY

By authorization of the Board of Directors, programs of graduate study and research leading to the degree of Doctor of Philosophy are provided in certain fields related to agriculture, veterinary medicine, and engineering. The programs are administered cooperatively by departments of pure and applied science and divisions of the Texas Agricultural Experiment Station and the Texas Engineering Research Station. Only those candidates will be accepted whose interest can be cared for by this cooperative arrangement.

1. For each student seeking to enter on work leading to the doctorate, there will be appointed a special committee representative of the student's several fields of study and research. This committee shall recommend to the Graduate Committee approval or disapproval of the student's request. In the event of approval the committee will also outline a proposed program of study on the satisfactory completion of which, together with a satisfactory dissertation, the degree will be awarded. The committee will also have full authority to modify, with the approval of the Graduate Committee, this program of courses by addition, reduction, or substitution.

2. The program of study established for a student entering on work for the Ph.D. shall be such as will require a minimum of three years of graduate study and research. The proportion of time allotted to courses and research shall be fixed upon the recommendation of the student's special committee. Acceptable graduate study done in other reputable graduate schools may, in so far as it is consistent with the student's program, be applied to lessen this period of study. In such cases, the student's special committee shall determine the minimum time which he shall be required to spend in resident study, but in no case shall the degree be awarded to a student who has done less than

two consecutive semesters of resident graduate work in the Agricultural and Mechanical College of Texas. For part time students, the residence period shall be fixed equitably at a longer period than for full time students.

While there are certain minimum requirements, pertaining to length of resident study, number of credits, etc., these are not the primary considerations in the granting of the Ph.D. degree. The student must prove his ability to do scholarly work by mastering the previously published work in his major field, by having acquired a broad and sound knowledge of the closely related fields of science, and by research of an original nature with a minimum amount of supervision. This degree does not rest on any computation of time, nor on any enumeration of courses.

3. The student's complete program may include one or two minor fields, if, in the opinion of the student's committee, their relation to his major or his professional purposes justifies such a program. These minors shall in the total occupy not more than half of the time the student will be expected to devote to course work. It will be the responsibility of the special committee to assure adequate undergraduate preparation for both major and minor fields.

4. A student's special committee shall not be restricted to members of the General Faculty, but shall consist of members of the teaching and the research personnel of the College who are members of the graduate faculty, and shall be those who are in charge of the fields of work which compose the student's program of studies. The Dean of the Graduate School shall be *ex officio* member of each such committee. The member of the committee on whom the supervision of the student's research will devolve and who will serve as the student's chief adviser, will be chairman of the Committee.

5. At least one year prior to the receipt of the degree, the student must qualify as a candidate for the Ph.D. degree by passing successfully an examination to be arranged by the Dean of the Graduate School on application of the student, approved by his special committee. The committee will be in charge.

6. No student shall be eligible to such qualifying examination until he has evidenced the ability to read French and German literature in his own field of study, by examinations given by representatives of the Department of Foreign Languages.

7. Publication of the dissertation or an approved abstract thereof, either privately or by a standard scientific publication, shall be required, and one hundred copies or reprints shall be deposited with the library. In the event of publication in abstract, there shall also be deposited with the library one complete bound, typewritten copy of the thesis in such form and style as shall be required by the Graduate Committee.

If publication has not been completed when the degree is sought and the required printed copies cannot be deposited with the library, the candidate must give assurance that the required publication and deposit will be made

either by presenting a written statement of acceptance for publication of the thesis or abstract or by filing with the Fiscal Office of the College cash forfeit or acceptable bond in the amount of \$100, which shall be returned to the candidate within thirty days after the requirement of publication and deposit has been met.

EXPENSES

The necessary expenditures of the graduate student for the regular session of nine months are as follows:

	First Semester	Second Semester
Matriculation Fee.....	\$25.00	\$25.00
Medical Service Fee.....	5.00	5.00

Notes 1. While residence in the college dormitories is not required of graduate students, a great majority of the unmarried men prefer to room in the dormitories, in sections set apart exclusively for their use. Room rent is \$15 per semester.

2. Graduate students who elect to take their meals at the College Mess Hall pay a Maintenance Fee, covering board and laundry, of \$212 for the academic year.
3. Refund of maintenance will be made only in case the student is required to withdraw by Faculty action or in the case of sickness disqualifying him for the discharge of his duties for the rest of the term. When such sickness takes place at the College, it must be attested by the College Physician before the student can receive the refund of the unused portion of his maintenance fee.
4. All students registering for 12 or more credit hours are required to pay the \$25.00 matriculation fee. All students registering for less than 12 credit hours will pay a matriculation fee of \$2.00 per credit hour, but the minimum may not be less than \$7.50.
5. All recipients of advanced degrees are required to pay a diploma fee of \$5.00.

For expenses in the Summer Session, reference should be made to the Summer Session number of the College Bulletin.

Expense of Non-resident students.—The matriculation fee for a non-resident student shall be an amount equivalent to that charged students from Texas by a similar school in the State of which the student shall be a resident and shall not be less than the amount charged resident students. A non-resident student is defined to be a student of less than twenty-one years of age, living away from his family and whose family resides in another State, or whose family has resided within this State for a period of time less than

twelve months prior to the date of registration, or a student of twenty-one years of age or over who resides out of the State, or who has resided within the State for a period of less than twelve months prior to the date of registration.

Expense of Day Students.—Day students pay all specified fees and charges, except maintenance and room rent.

Leaves of Absence or Withdrawal.—Requests for authority to be absent from the College or to withdraw permanently must be presented to the Dean through the Commandant.

Graduation.—Candidates for advanced degrees who expect to complete their work at the end of a given semester must give written notice to the Dean and to the Registrar to that effect at least one month in advance. When a candidate has, to the satisfaction of the executive committee, completed the requirements for an advanced degree, he will be recommended to the faculty for his degree.

PROFESSIONAL DEGREES IN ENGINEERING

The professional degrees in engineering, Agricultural Engineer, Architectural Engineer, Chemical Engineer, Civil Engineer, Electrical Engineer, Mechanical Engineer, are open only to men who have received from this College the degree of Bachelor of Science or Master of Science in an engineering course.

The requirements for any one of these degrees include acceptable professional experience, a thesis and an examination. In detail the requirements are as follows:

The candidate must have been engaged in acceptable professional work for a period of not less than four years after graduation, and must have been in responsible charge of such work for at least one year. The applicant who holds the degree of Master of Science in an engineering course is regarded as having met the time requirement if he has devoted three years to professional practice or to teaching engineering subjects.

In connection with his application for authority to register, the candidate must submit an orderly and detailed statement of his professional experience for the consideration of the executive committee. He must also submit the title and a general outline of the thesis.

At a time to be designated by the Dean he must report at the College for an examination covering his professional experience, his thesis and the research or study which forms its basis.

The thesis must correspond in form to the Master's thesis described above. It must not be simply a descriptive discussion of some ordinary engineering project, nor a digest of engineering literature, but must be of an analytical character, and must constitute a distinct contribution to engineering

science. The thesis in final form must be in the hands of the Dean four weeks before commencement.

The degree is conferred only at commencement, and application for registration must be made not later than November 1, preceding. In case a student does not complete the work for his degree within two years after registration, his registration will be cancelled.

The matriculation fee of \$5.00 is to be paid upon registration.

SCHOLARSHIPS AND FELLOWSHIPS OFFERED BY THE COLLEGE

The College offers annually a limited number of graduate assistantships and fellowships, each carrying a stipend of \$450.00 in the first year of service or \$540 in the second. In either case, payments are made in nine equal installments.

An applicant for an assistantship or a fellowship must meet the requirements for admission to the Graduate School and must express his intention of completing in this College the requirements for a graduate degree. He must also agree, in consideration of the award, to render approximately half time service, to be assigned by the Dean of the Graduate School and the head of the department in which he takes his major work.

Application must be made on forms to be obtained from the Dean of the Graduate School and must be accompanied by a letter of recommendation from the President or other officer of the institution from which the applicant comes.

Nominations to assistantships or fellowships are made on the basis of worthiness of character, scholastic attainments, and promise of success in the principal field of study to which the applicant proposes to devote himself. They are made by the Dean of the Graduate School, subject to the approval of the President.

ADDITIONAL FELLOWSHIPS

For a number of years graduate fellowships for research in industrial problems have been made available to students of the A. & M. College by the Texas Power and Light Company, The Texas Cottonseed Crushers' Association, Anderson Clayton & Co., The National Cottonseed Products Association and The American Soya Products Corporation. Information concerning these will be supplied on request.

COURSES OF INSTRUCTION BY DEPARTMENTS

The courses of instruction are described on the following pages under the departments in which they are given. Courses numbered 301 to 499 are advanced courses accepted for undergraduate credit and for graduate credit under the restriction that not more than twelve credits in these courses may be offered in fulfillment of the requirements of the master's degree. Courses numbered 501 to 599 are for graduate students only. First-semester courses are, as a rule, given odd numbers, second-semester courses even numbers.

The figures in parenthesis, following the name of a course, indicate the number of hours per week, theory and practice, respectively, devoted to the course. The credit value of the course is also indicated. The letter "S" indicates that the course is offered in the summer session only.

ACCOUNTING AND STATISTICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301. Theory and Practice of Accounting. (3-3) Credit 4.

Fundamental process of accounting, special phases of corporation accounting, introduction to actuarial accounting, specific asset and liability accounts, consignments, installment sales, depreciation, analysis of financial conditions and results of operation.

302. Theory and Practice of Accounting. (3-3). Credit 4.

A continuation of course 301. Statement of application of funds, partnership accounting, insurance, accounting for insolvent concerns, branch accounting, parent company and subsidiary accounting, consolidations, foreign exchange, estates and trusts, introduction to budgeting.

303. Statistical Method. (3-3). Credit 4.

Collection, tabulation, presentation, and analysis of data. A study of sampling, graphics, averages, ratios and coefficients, dispersions, skewness, probability and error, index numbers, seasonal and long-time trend, barometers and linear correlation.

401. Cost Accounting. (2-3). Credit 3.

Development of cost accounting principles, cost elements, methods of control, order and process systems, estimated and standard costs, debatable points of theory, uniform methods. Prerequisite: Accounting and Statistics 301.

402. Accounting Systems. (2-2). Credit 3.

A study of special features of accounting for various types of enterprises, an analysis of the accounting systems devised and recommended by government agencies and trade associations. Each student is expected to devise a system for some business organization. Prerequisite: Accounting and Statistics 301.

403. Income Tax. (3-0). Credit 3.

Income tax legislation; the present income tax law, regulations, treasury decisions, court decisions and departmental rulings, income tax problems and returns. Prerequisite: Accounting and Statistics 202.

406. Agricultural and Business Cycles. (3-0). Credit 3.

An empirical and statistical study of agricultural data, production consumption and price indexes; analysis of seasonal and long-time trends, and factors constituting cyclical fluctuation; theory, causes, effects and control of cycles. Prerequisite: Accounting and Statistics 303.

407. Auditing. (3-3). Credit 4.

Theory and practice of auditing; types of audits; audit procedure for individual assets, liabilities, and nominal accounts; working papers and reports; case studies. Prerequisite: Accounting and Statistics 301. (Formerly numbered 304).

408. Advanced Auditing. (3-0). Credit 3.

Case studies in auditing, financial investigations, auditing reports, certificates, statements giving effect to financing. Prerequisite: Accounting and Statistics 407.

409. Accounting for Engineers. (3-0). Credit 3.

Study of the principles of accounting directly related to the problems of the engineer, contractor, and architect; survey of the general accounting system as the source of cost data; development of the fundamental principles of valuation; introduction to cost accounting.

410. Accounting Seminar. (3-0). Credit 3.

Cost accounting literature, research on valuation, income, budgeting, or other accounting problems. Prerequisite: Accounting and Statistics 401, 407.

FOR GRADUATES

501. Statement Analysis. (3-3). Credit 4.

An analytical study of the different kinds of statements for the guidance of executives, investors and creditors; balance sheet and profit and loss ratios. Prerequisite: Accounting and Statistics 304, 401. Professor Leland.

502. Special Accounting. (3-2). Credit 4.

Consideration of the accounting problems and the practices peculiar to specific industries. Class work on municipal, bank, insurance, and public utility accounting. Individual reports on problems in the above fields or in specific lines of manufacturing, wholesaling or retailing. Prerequisite: Accounting and Statistics 201, 202. Professor Leland.

503. Price Analysis. (2-3). Credit 3.

Economic concepts relating to prices, statistical methods of analyzing prices, supply and demand curves, elasticity of demand, price forecasting, study and criticism of works on price analysis. Term paper required on factors affecting the price of an agricultural commodity. Prerequisite: Accounting and Statistics 303, Economics 203, 204. Professor Hamilton.

504. Advanced Statistics. (2-3). Credit 3.

Curve fitting and empirical formulas. The study of measurements of relationship. Multiple correlation, linear and non-linear; part and partial correlation; research studies involving the application of multiple correlation. Sampling and measures of unreliability. Mathematical fitting of normal curves. Prerequisite: Accounting and Statistics 303, Mathematics 101 or 111. Professor Hamilton.

AGRICULTURAL ECONOMICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

410. Transportation. (3-0). Credit 3.

The development of the various agencies of transportation in the United States; history of governmental regulation; survey and analysis of present day transportation trends and problems; special attention to transportation problems. Prerequisite: Economics 203 and 204; or Agricultural Economics 312.

413. Cooperative Marketing of Farm Products. (3-0). Credit 3.

A study of farmers' cooperative organizations in the United States and foreign countries from the standpoints of their history, economic philosophy, factors of success and failure, types of organization, business methods, legal aspects, governmental relationships, and potential development. Prerequisite: Agricultural Economics 314.

420. Market Analysis. (3-0). Credit 3.

Methods of conducting marketing surveys; analysis of data and use of findings considered from the standpoint both of consumers and of concerns handling agricultural or industrial products. Prerequisite: Agricultural Economics 425.

425. Wholesale and Retail Merchandising. (3-0). Credit 3.

A systematic description and a critical analysis of the fundamental operations of wholesale and retail concerns, particularly those handling farm products or operating in agricultural communities. Prerequisite: Economics 203 and 204, or 403.

426. Sales Organization. (3-0). Credit 3.

A consideration of the general principles of successful personal selling, sales organization and sales management; analysis of some carefully selected sales problems of concerns handling industrial and agricultural products: Prerequisite: Economics 203 and 204, or 403.

429. Economic Policy for Agriculture. (2-0). Credit 2.

A critical analysis of the past and present programs of governmental agencies and farmers' organizations for the economic betterment of agriculture. Prerequisite: Economics 203 and 204; or Agricultural Economics 312.

430. Farm Credit. (3-0). Credit 3.

Analysis of the credit requirements of individual farmers and farmers' cooperative organizations; investors and depositors as sources of credit; principles upon which each type of farm credit is extended; the instruments and legal aspects of farm credit; the cost of credit; description of financial institutions which serve agriculture, with major attention to the component units of the Farm Credit Administration. Prerequisite: Economics 311.

432. Advanced Farm and Ranch Management. (2-3). Credit 3.

Detailed problems involved in the organization and management of specific farms and ranches, covering such matters as efficiency analysis, budget preparation, layout and improvement. Survey of research literature in farm and ranch organization and management. Prerequisite: Agricultural Economics 421.

FOR GRADUATES

501, 502. Advanced Marketing Problems. (4-0). Credit 4 each semester.

A thorough study of the problems involved in marketing farm products such as price determining factors; costs affecting distribution; operation of produce exchanges and futures markets; governmental regulation of middlemen and marketing services; and adjustment of supply to demand individually, cooperatively, and by governmental aid. Prerequisite: Agricultural Economics 314. Professor Hunt.

503. Land Problems. (4-0). Credit 4.

An extensive study of problems involved in developing state and national policies for the proper utilization of our land resources. Prerequisite: Agricultural Economics 423. Associate Professor Schlesselman.

511. Farm Management Surveys. (2-4). Credit 3.

Methods of making surveys of regional systems of farming; analysis of survey data; use of findings in formulating farm organization and management programs. Practice work consists of surveying actual farms and ranches. Prerequisite: Agricultural Economics 421. Professor Hunt.

512. Cotton Marketing Problems. (4-0). Credit 4.

Extensive study of potential cotton areas of the world, trends in production, trends of consumption of cotton and substitutes for cotton in the various consuming areas; national and international policies that affect the cotton farmers; price determining factors in the various markets; governmental aid in estimating supply and demand, regulations of standards, and control of futures market; cooperative versus individual sale of cotton. Prerequisite: Agricultural Economics 427. Professor Hunt.

516. Agricultural Geography. (4-0). Credit 4.

A regional survey of the world distribution of major agricultural commodities and associated industries, with particular attention to the causal influences of natural, social and economic factors. Associate Professor Schlesselman.

518. International Trade in Agricultural Products. (4-0). Credit 4.

History of world trade in agricultural products; recent effects on American agriculture of our tariff policies, and of the nationalistic economic policies of foreign countries; the effect on American agriculture of our present governmental policies with respect to trade agreements and restricted domestic production; the future of American agriculture under possible governmental policies in foreign trade. Prerequisite: Economics 409.

571, 572. Research Methods. (2-6). Credit 4 each semester.

Principles of research as applied to the field of agricultural economics. Practice work consists of an analysis of the research projects in agricultural economics conducted by federal agencies, state Agricultural Experiment Stations, and by private research institutions. Special attention to the methods and programs of the Division of Farm and Ranch Economics of the Texas Agricultural Experiment Station. Prerequisite: Agricultural Economics 312 or 429; 314 and 430.

AGRICULTURAL EDUCATION*

FOR GRADUATES AND ADVANCED UNDERGRADUATES

401, 402. Teaching Vocational Agriculture. (2-6). Credit 4 each semester.

Analysis of the agricultural teacher's job; courses of study; annual plan; lesson plans; project outlines and supervision; equipment; reports; observations and directed teaching.

FOR GRADUATES

(Agricultural Education 401, 402 are prerequisites to the following courses.)

501, 502. Advanced Methods in Agricultural Education. (4-0). Credit 4 each semester.

An advanced course in methods of teaching vocational agriculture.

505. Supervised Practice. (4-0). Credit 4.

An advanced study of supervised practice in vocational agriculture. Professor Ross.

507. Future Farmer Activities. (2-0). Credit 2.

Methods of conducting future farmer activities of statewide importance. Professor Alexander.

508. Promotional Activities in Vocational Agriculture. (2-0). Credit 2.

Principles of news writing, plans for collective exhibits, instructional booths, fairs and contests. Open only to teachers of Vocational Agriculture. Professor Alexander.

509. Part Time Classes. (2-0). Credit 2.

Methods of organizing and conducting part-time classes in vocational agriculture. Professor Alexander.

510. Evening Schools. (2-0). Credit 2.

Methods of organizing and conducting evening schools in vocational agriculture on a participation basis. Professor Alexander.

511. Evening School Problems. (2-0). Credit 2.

Supervision of practice work, determining course content, follow-up work, setting up publicity programs, and evaluating improved practices resulting from evening school instruction.

512. Agricultural Outlook Material. (2-0). Credit 2.

Methods of using agricultural outlook material. Open to teachers of agriculture and county agents who have had a course in cooperative marketing.

513. Administration and Supervision of Agricultural Education. (2-0)
Credit 2.

Problems of organization, administration, and supervision of vocational agriculture, experiment station and extension work.

514. Research and Thesis Problems. (2-0). Credit 2.

AGRICULTURAL ENGINEERING

FOR GRADUATES AND ADVANCED UNDERGRADUATES

425, 426. Seminar. (1-0). Credit 1 each semester.

A review and presentation of the results of specially selected lines of research dealing with Agricultural Engineering.

*Teachers of Vocational Agriculture are urged by the Department of Agricultural Education to choose some line of technical agriculture as their major field and to continue Agricultural Education as a minor. If, for sufficient reason, such students are permitted to major in Agricultural Education, the department reserves the right to prescribe the minors to be taken, which may be a composite of courses from as many as three technical fields of Agriculture.

FOR GRADUATES

501, 502. Advanced Drainage and Irrigation. (3-3). Credit 4 each semester.

Advanced study of farm drainage and irrigation with special emphasis on recent developments. Prerequisite: Agricultural Engineering 305. Professor Scoates.

503, 504. Advanced Farm Machinery. (3-3). Credit 4 each semester.

Advanced study of farm machinery with special emphasis on recent development. Prerequisite: Agricultural Engineering 201. Professor Jones.

505, 506. Advanced Farm Buildings. (2-6). Credit 4 each semester.

Advanced study of farm buildings and farm home utilities. Prerequisite: Agricultural Engineering 418. Professor Scoates.

507. Cotton Machinery. (1-3). Credit 2.

An advanced course in cotton machinery used for preparation of seed bed, seeding, cultivating, harvesting and ginning, with special emphasis on recent developments. Professor Jones.

509, 510. Advanced Farm Power. (2-6). Credit 4 each semester.

Advanced study of farm power with special emphasis on recent developments. Prerequisites: Agricultural Engineering 203 and 216. Professor Jones.

511. Advanced Farm Shop. (3-3). Credit 4.

Advanced study of farm shop with special emphasis on problems relative to teaching the course; i. e., equipment, methods, supplies and projects. Prerequisite: Agricultural Engineering 321, 322. Associate Professor Thurman.

513, 514. Advanced Soil Erosion Engineering. (3-3). Credit 4 each semester.

The advanced study of design, construction, and layout of terraces and other obstructions used for the control of soil erosion, as well as the outlet structures for same, with special emphasis on late developments. Professor Scoates.

515, 516. Technical Research. Credit 2 to 6 each semester.

Projects subject to the approval of the head of the department.

AGRONOMY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

413. Soil and Crop Problems. (3-0). Credit 3.

Special problems dealing with the management and utilization of distinctive types of soils and soil conditions and a detailed consideration of crop management problems under varying soil and climatic conditions. Prerequisite: Agronomy 301.

418. Soil Conservation. (2-3). Credit 3.

A course dealing with the importance of soil conservation from the standpoint of different soil types in the agricultural regions of Texas and the United States. Conservation methods are presented according to climatic regions, cropping systems, topographic locations, and other influencing factors. Field practice in soil mapping is included in the laboratory periods. Prerequisite: Agronomy 301.

FOR GRADUATES

501, 502. Advanced Farm Crops. (3-4). Credit 4 each semester.

An advanced study of field crop production and breeding, including a review of the more recent and noteworthy investigations in this field.

505, 506. Advanced Soils. (3-4). Credit 4 each semester.

A review of our present knowledge of the soil as a medium for plant growth; study of the more recent and noteworthy investigations pertaining to soils and fertility.

507, 508. Advanced Cotton Production. (3-4). Credit 4 each semester.

An advanced study of cotton from the standpoint of species, varieties, breeding, fertilization, tillage practice, and harvesting. In the course extended use is made of recent cotton literature in scientific journals, experiment station bulletins, and such reference books on cotton as are available.

509, 510. Research Problems. Credit 1 to 4 each semester.

Technical research problems subject to approval of head of department.

ANIMAL HUSBANDRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

303. Animal Nutrition. (3-2). Credit 4.

Chemical composition of feeding stuffs, composition of farm animals; digestion; metabolism; functions of nutrients; vitamins; coefficients of digestibility, energy in feeds and its uses; feed requirements of animals; maintenance, growth; fattening; milk production; wool production; work; computation of rations; manurial values of feeds; nature and uses of feed stuffs including cereal by-products, legumes and legume seeds, oil bearing seeds and by-products, packing house by-products, hays, fodders, straws, pastures, forage, silage, and miscellaneous feeds. Prerequisite: Chemistry 212, 214.

406. Beef Cattle Production. (3-2). Credit 4.

The world beef cattle situation; historical development; systems of production and determination of the place of each; distribution and value in comparison with other meat animals; location of beef enterprise; establishment of the herd; improvement methods; mating and reproduction; calving; feed and care of calf; development of stock

for the breeding herd; wintering; summer management; cattle feeding; selection of feeds; value of feeds; financial aspect of beef production; equipment; parasites and diseases; fitting and showing; marketing. Prerequisite: Animal Husbandry 303 or 409.

410. Sheep and Angora Goat Production. (3-2). Credit 4.

Present status; history in United States; methods and type of sheep raising; pure bred business; breeding; management and feeding of the breeding flock; growing young lambs; fattening sheep and lambs; marketing sheep and lambs; fitting and showing; parasites and diseases. Prerequisite: Animal Husbandry 303 and 409.

412. Swine Production. (3-2). Credit 4.

Historical; feeding and handling the breeding herd during various seasons; culling; records; the sow and the litter; growing and fattening pigs; forage crops; feeding on forage; dry lot feeding; choice and value of feeds; garbage disposal plants; prevention of diseases; slaughtering and curing; the pure bred herd; fitting and showing. Prerequisite: Animal Husbandry 303 or 409.

413. Horse and Mule Production. (3-2). Credit 4.

Review of situation; historical development; mechanical vs. horsepower; anatomy; unsoundness; ailments and diseases; feeding the brood mare; stallions; growing and developing colts; feeding and handling horses at work; stables and equipment; harness; shoeing; fitting and showing; polo and saddle horse breeding and training; horse markets; jacks and jennets; mule production. Prerequisite: Animal Husbandry 303 or 409.

418. Wool and Mohair. (2-3). Credit 3.

Microscopic structure; chemical composition; production; preparation for market; market reports; marketing; comparison with other textile materials; measurement; grading; sorting; scouring; pullaries; process of manufacture of fabrics.

419. Meat Preservation Problems. (1-3). Credit 2.

A detailed study of problems in methods of curing and storing under various conditions; methods of canning. Prerequisite: Animal Husbandry 307. During the summer session, students who have not had Animal Husbandry 307 or its equivalent will be required to do extra laboratory work in order to become familiar with the material covered in that course.

420. Quality in Meats. (2-0). Credit 2.

The effects of feeding, breeding, and management of the animal on the quality of pork, beef, and mutton; a study of cutting tests in relation to type and finish.

421. Advanced Studies of Breeds of Livestock. (2-0). Credit 2.

Methods used in the development of outstanding animals; popular lines of breeding; breed improvement; characteristics and breeding of show winners. Students will be given a choice of one breed of each class of livestock for intensive study. Prerequisite: Animal Husbandry 202.

423. Seminar. (2-0). Credit 2.

Research methods in animal experimentation; sources of error in experiment work; review of research literature with oral and written presentation. Prerequisite: Animal Husbandry 303, Genetics 301.

424. Range Live Stock Production. (3-0). Credit 3.

Review of historical development; types of ranges; types and breeds of livestock used; range livestock improvement; handling cattle, sheep and goats during various seasons of the years; culling of herds and flocks; range livestock losses including parasites, deficiency, diseases, droughts; stocking of the range under various conditions; carrying capacity determination; over and under grazing; water development; salting; feeding both regular and under emergency conditions; finishing on the range; equipment; labor; cost of production; marketing. Prerequisite: Animal Husbandry 303 or 409.

FOR GRADUATES

501, 502. Advanced Animal Nutrition. (3-3). Credit 4 each semester.

A continuation of material covered in course 303; review of more recent investigations; methods of investigations; sources of error. Professor Buchanan.

505a, 506a. Advanced Beef Cattle Production. (3-3). Credit 4 each semester.

A continuation of course 406. Associate Professor Schuessler.

505b, 506b. Advanced Sheep Production. (3-3). Credit 4 each semester.

A continuation of course 410. Professor Mackey.

505c, 506c. Advanced Swine Production. (3-3). Credit 4 each semester.

A continuation of course 412. Professor Buchanan.

505d, 506d. Advanced Horse Production. (3-3). Credit 4 each semester.

A continuation of course 413. Professor Williams.

571, 572. Wool and Mohair Research. (3-4). Credit 4 each semester.

Offered only by individual agreement, to graduate students qualified by previous training to do thesis work on some portion of an organized wool or mohair research project. Studies under way include a determination of the grades and shrinkage of wool and mohair from registered and unregistered flocks. The wool and mohair grading and scouring laboratory is at the disposal of graduate students taking this course. Mr. Jones.

573, 574. Research in Animal Breeding. (3-4). Credit 4 each semester.

A thesis course designed to furnish students majoring in genetics, animal husbandry, or dairy husbandry, the opportunity to work out a breeding problem of sufficient importance to be organized as a regular research project of the Experiment Station. Portions of projects already organized are available as thesis subjects and include problems of inheritance in beef cattle, dairy cattle, sheep and goats. Most of the problems available involve principles both of genetics and either animal husbandry or dairy husbandry, and students electing this course must first be familiar with the fundamentals of those fields. Dr. Warwick.

575, 576. Research in Animal Nutrition. (3-4). Credit 4 each semester.

Research problems on a selected topic related to animal nutrition. The student must show that he is well grounded in chemistry and animal nutrition before being admitted. Offered only by consent where cooperative arrangement is necessary with Texas Experiment Station.

ARCHITECTURE

FOR GRADUATES AND ADVANCED UNDERGRADUATES

415, 416. The Fine Arts. (2-0). Credit 2 each semester.

History of the fine arts in their relationship to architecture; the historic styles of decoration; the development of furniture and furnishings; a study of the history of sculpture and painting. Prerequisite: Senior classification.

417, 418. Concrete Structures. (3-0, 2-3). Credit 3 each semester.

Theory of reinforced concrete design and its application in the design of slabs, beams, girders, columns, and footings; concrete buildings. Prerequisite: Architecture 313, or Civil Engineering 305.

421, 422. Structural Design. (2-6). Credit 4 each semester.

Advanced problems in building construction; wooden and steel trusses; plate girders; critical study of steel frame work for high buildings. Prerequisite: Architecture 314, Civil Engineering 305.

FOR GRADUATES

501, 502. Architectural Design. Credit 2 to 8 each semester.

Design of buildings and groups of buildings. Practice, criticisms; consultations; research. Professor Finney and Associate Professor Cash.

503, 504. Architectural Construction. (2-8). Credit 5 each semester.

Theory and practice in advanced constructive design; foundations; walls; frames. Professor Langford and Associate Professor Cash.

505, 606. Architectural Practice. (1-4). Credit 2 each semester.

Contracts, specifications, superintendence; office methods. Professor Langford and Associate Professor Cash.

507, 508. Architectural Presentation. (0-6). Credit 2 each semester.

Sketching, rendering, color harmony and effects. Professor Finney.

509, 510. Mechanical Equipment of Buildings. (1-4). Credit 2 each semester.

Theory, practice, and research relating to building sanitation. Professor Langford and Associate Professor Cash.

BIOLOGY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

341, 342. General Physiology. (3-4). Credit 4 each semester.

The structure of the human body; the physiology of the cell; nutrition, chemistry of food, digestion, metabolism; physiology of the muscular, nervous and circulation systems, and of the special senses. Prerequisite: Biology 203, 204 or 211, 212.

FOR GRADUATES

501, 502. Plant Morphology. (2-6). Credit 4 each semester.

Comparative plant morphology with emphasis on seed plants; morphological technique; taxonomic applications. Professor Doak.

503, 504. Advanced Vertebrate Zoology. (2-6). Credit 4 each semester.

Comparative anatomy of vertebrate types. Origin and development of organs and organ systems. Dr. Evans.

505, 506. Advanced Bacteriology. (2-6). Credit 4 each semester.

Advanced methods of bacteriological analysis. Assistant Professor Gibbons and Dr. Brown.

509, 510. Advanced Plant Physiology. (2-6). Credit 4 each semester.

Responses of the plant to various external and internal stimuli; physiology of growth, nutrition and reproduction. Assistant Professor Talley.

511. Plant Microchemical Technique. (2-4). Credit 4.

Standard microchemical methods. Prerequisite: Organic or agricultural chemistry. Dr. Brown.

512. Microchemistry of Plant Products. (2-4). Credit 4.

The application of microchemical technique to plants of economic importance. The plants considered will depend upon the demands of the group served. Prerequisite: Organic or agricultural chemistry. Dr. Brown.

513, 514. Advanced Plant Pathology. (2-6). Credit 4 each semester.
Morphology and physiology of pathogenic fungi.

515, 516. Cytology. (2-6). Credit 4 each semester.

An intensive study of the organization and activities of the cell; cytological technique. Emphasis is placed upon topics related to heredity. Professor Reeves.

517, 518. Advanced Invertebrate Zoology and Parasitology. (2-6)
Credit 4 each semester.

Morphology, taxonomy, biology and phylogeny of invertebrate animals; second semester devoted to parasites and laboratory methods in parasitology. Assistant Professor Hopkins.

519, 520. Advanced Systematic Botany. (2-6). Credit 4 each semester.

Classification and identification of Spermatophytes with emphasis on the difficult families. Independent credit will be allowed for the terms, which may be taken in reverse order. Prerequisite: Approval of instructor. Professor Reeves.

573, 574. Research in Plant Pathology. Credit 2 to 6.

Research in plant pathology on problems and under conditions characteristic of the Experiment Station. The student will be held responsible for mastery of the literature relating to his problem and for an acceptable report of his investigation. Offered only by individual agreement. Dr. Taubenhause, Dr. Ezekiel.

CHEMISTRY AND CHEMICAL ENGINEERING

Chemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301, 302. Organic Chemistry. (3-4). Credit 4 each semester.

An introduction to the chemistry of the compounds of carbon. A study of general principles, and their application to various industrial processes. The laboratory work serves as the basis of the course. The student here familiarizes himself with the reactions, properties and relations of typical organic compounds. Prerequisite: Chemistry 201.

323. Physical Chemistry. (3-4). Credit 4.

Explanation and mathematical development of the theories and principles of chemistry. Topics discussed are atomic structure, gas laws, thermodynamics, thermochemistry, liquids, solutions, osmotic pressure, colloids. Experiments in the laboratory substantiate the theories and the principles developed in the classroom. Prerequisite: Chemistry 302 and Chemical Engineering 202. Mathematics 204.

324. Physical Chemistry. (3-4). Credit 4.

Intensive study of homogenous and heterogenous equilibria, the phase rule, chemical kinetics, catalysis, hydrogen-ion concentration, electrolytic and galvanic cells and electrochemistry, photochemistry, and radio activity. Prerequisite: Chemistry 323.

342. Physical Chemistry. (3-4). Credit 4.

Explanation of basic chemical theories and principles with reference to their relationship to transformations in living matter. Special development is made of such topics as atomic structure, diffusion and osmotic pressure, colloids, chemical equilibrium, catalysis, reaction velocity, hydrogen-ion concentration and its importance in biological process. Prerequisite: Chemistry 296, 207 or Chemical Engineering 202.

FOR GRADUATES

501, 502. Advanced Agricultural Chemistry. (2-6). Credit 4 each semester.

Similar to course 212, 214, with more advanced work. Professor Hedges.

507, 508. Advanced Organic Chemistry. (2-6). Credit 4 each semester.

Analysis and preparation of organic compounds. Prerequisite: Chemistry 302. Associate Professor Potts.

511, 512. Advanced Physical Chemistry. (3-3). Credit 4 each semester.

An intensive study of physical and electro chemistry. Prerequisite: Chemical Engineering 418. Professor Jensen.

513, 514. Research. Credit 1 to 4 each semester.

571, 572. Special Topics in the Chemistry of Animal Nutrition. (2-6).
Credit 4 each semester.

Vitamins, amino acids, mineral contents of feeds, productive protein, and productive energy as related to animal nutrition. The laboratory work is under Agricultural Experiment Station conditions and includes analysis of feeds, experiments, and a thesis on the chemistry of animal nutrition.

573, 574. Special Topics in the Chemistry of Animal Nutrition. (2-6).
Credit 4 each semester.

A continuation of course 571, 572.

575, 576. Special Topics in the Chemistry of Soils. (2-6). Credit 4 each semester.

The study of soil acidity, phosphoric acid, potash, and nitrogen related to crops, and similar topics by means of books, bulletins, original articles and the preparation of reports. The laboratory work accompanying the course will depend upon the experiences of the student.

577, 578. Special Topics in the Chemistry of Soils. (2-6). Credit 4 each semester.

A continuation of course 575, 576.

Chemical Engineering

FOR GRADUATES AND ADVANCED UNDERGRADUATES

409. Gas and Oil Technology. (3-6). Credit 5.

Application of chemistry and engineering to gas, natural gasoline, petroleum, and cotton seed oil. The laboratory work comprises the refining of petroleum and the production and refining of cotton seed oil. Prerequisite: Chemistry 302.

414. Sanitary Chemistry. (3-4). Credit 4.

Sanitary examination of food, milk, and milk products, and the sanitary analysis of water, including water treatment methods. Methods of purification of water, as the use of sand filters, coagulants, and algicides; sources of pollution of water and milk supplies and their relation to public health; problems common to the sanitary chemist and the engineer. Prerequisite: Chemistry 206 or 302.

416. Chemical Technology. (3-4). Credit 4.

The application of chemical theories and laws to industrial processes, organic chemical processes being emphasized, especially those dealing with the refining of petroleum, cotton seed oil, and sugar. Prerequisite: Chemical Engineering 409.

419. Petroleum Refining. (3-0). Credit 3.

The application of chemical theories and laws to the refining of petroleum.

422. Animal and Vegetable Oils. (3-4). Credit 4.

Chemical examination of animal and vegetable oils with special reference to the detection of adulterants. Prerequisite: Chemistry 302.

FOR GRADUATES

503, 504. Advanced Industrial Chemistry. (2-6). Credit 4 each semester.

A study of industrial processes. Prerequisite: Chemistry 302. Associate Professor Bishop.

509, 510. Cotton Seed Oil. (2-6). Credit 4 each semester.

A study of cotton seed oil production and refining. Prerequisite: Chemistry 302. Associate Professor Bishop.

CIVIL ENGINEERING

FOR GRADUATES AND ADVANCED UNDERGRADUATES

311. Hydraulics. (3-0). Credit 3.

The laws governing the action of water at rest and in motion, as related to engineering problems; the flow of water in pressure mains, sewers, aqueducts, open channels, and in rivers; measurement of the flow of water by nozzles, orifices, weirs and meters; elements of the theory of pumps and water wheels. Prerequisite: Mechanical Engineering 212, or equivalent.

336. Hydraulics Laboratory. (0-2). Credit 1.

Calibration of nozzles, orifices, water meters, weirs, pressure gauges; measurement of pipe friction; measurement of pipe flow with Pitot instrument and Venturi meter; efficiency tests on impulse motor, hydraulic ram, and centrifugal pump; solution of assigned problems. Prerequisite: Civil Engineering 311, or registration therein.

340. Elementary Structural Analysis. (3-0). Credit 3.

Loads and reactions for simple structures; review of moment and shear in beams; influence lines for beams and trusses; algebraic and graphical methods for determining stresses in trusses. Prerequisite: Civil Engineering 305.

342. Structural Design Problems. (0-4). Credit 1.

Application of graphical methods in solving reactions and stresses in simple structures; designing and detailing of structural members. Prerequisite: Civil Engineering 340 or registration in that course.

344. Mechanics of Reinforced Concrete. (2-0). Credit 2.

Theory of stress distribution in plain and reinforced concrete beams; derivation of working formulas for rectangular reinforced beams and T-beams; stress determination and elementary design of beams; theory, investigation, and design of reinforced columns. Prerequisite: Civil Engineering 305.

407. Roads and Pavements. (3-0). Credit 3.

A brief study of country roads and city pavements. Highway location, design, construction and maintenance; road laws, finances, organization and supervision briefly considered. The text is supplemented by lectures, the use of bulletins, models and samples of materials. Prerequisite: Civil Engineering 201, Mechanical Engineering 212.

414. Reinforced Concrete Design. (2-3). Credit 3.

A study of the design of various types of reinforced concrete structures, such as buildings, bridges, retaining walls, culverts. Practice in the making of simple designs and working drawings. Prerequisite: Civil Engineering 344.

417. Bituminous Materials. (2-3). Credit 3.

Origin, production, specification, and tests of bituminous materials and mixtures used in the construction and maintenance of roads and pavements. Prerequisite: Senior classification in engineering.

423. Structures. (2-4). Credit 3.

Types of highway bridges; calculation of stresses; design of bridge floors; beam bridges; plate girders, high and low truss bridges; bridge details, deflections. The practice consists chiefly in making design computations and general drawings for a low riveted truss bridge in accordance with a given set of specifications. Prerequisite: Civil Engineering 340, 342.

443. Materials of Construction. (0-4). Credit 1.

A laboratory study of the suitability of various materials of engineering including brick, stone, sand, gravel, cement, mortars, concrete. Prerequisite: Civil Engineering 407.

448. Engineering Economy. (3-0). Credit 3.

Comparison of engineering plants or projects on basis of first cost, ultimate economy comparisons involving depreciation, operating expense, etc.; accounting records and cost records; estimating costs. Prerequisite: Senior classification in engineering.

452. Structural Engineering. (2-3). Credit 3.

An introduction to the design of continuous structures of reinforced concrete and steel, such as rigid frame bridges and building frames. Laboratory checking of computed stresses by the use of celluloid models and deformation gauges; laboratory study

of the variation of stress in hooks of reinforcing bars, in plates at a welded joint, and in similar structural details, by the aid of the photo-electricity polariscope and the strain gage. Prerequisite: Civil Engineering 423 or 455.

455. Steel Buildings. (2-3). Credit 3.

Structural features of mill buildings, office buildings, warehouses. Design of one of the foregoing types of buildings. Prerequisite: Civil Engineering 340, 342.

456. Highway Administration and Design. (2-3). Credit 3.

Study of highway laws, the administration of street and highway improvements, and the procedure followed in planning and executing municipal street improvements. Problems in pavement design. Prerequisite: Civil Engineering 407.

458. Hydraulic Engineering. (3-0). Credit 3.

An elementary study of the control and utilization of water resources for irrigation, power, and flood protection; correlation of rainfall and stream flow by means of isohyets and hydrographs; channel improvement, levee design, detention basin operation; design of pumping plants and other hydraulic structures. Prerequisite: Civil Engineering 311.

461. Masonry Construction. (2-2). Credit 3.

Brick and stone masonry; cement and aggregates; theory of proportioning concrete; methods of mixing, placing, and curing for concrete; foundations; plain concrete structures, including dams, retaining walls, abutments, piers, culverts; forms and falsework. Problems in design and investigation of masonry structures. Prerequisite: Civil Engineering 305.

463. Hydrology. (3-0). Credit 3.

A study of the occurrences and measurement of precipitation and stream flow; relations between precipitation and run-off; estimating seepage, evaporation, run off, storage, and flood discharges for drainage basins. Prerequisite: Civil Engineering 311.

FOR GRADUATES

525, 526. Highway Construction and Materials. (3-3). Credit 4 each semester.

Highway design and construction, including location, drainage, foundations, types, costs. Laboratory and field investigations of highway materials and pavement mixtures. Professor McNew.

527, 528. Hydraulic Engineering. (3-3). Credit 4 each semester.

Advanced hydrology, water power development, flood control, irrigation. Professor Munson.

531, 532. Advanced Structural Analysis and Design. (3-3). Credit 4 each semester.

Analysis of stress in rigid frames; secondary stresses; analysis of cantilever, suspension, and continuous bridge trusses. Design of reinforced concrete arch and building frame. Associate Professor Jakkula.

533, 534. Advanced Mechanics of Materials. (4-0). Credit 4 each semester.

Deflection of structures; internal stresses in members and details determined by mathematical analysis, mechanical methods, and study of test data. Professor Richey and Associate Professor Jakkula.

Civil Engineering 535, 536. City Street Paving. Credit 2 each semester.

Financing municipal street improvements, methods of assessment, Texas paving laws. Pavement types, costs, designs and traffic characteristics. Street grades, widths, intersections and appurtenances. Special Problems.

Civil Engineering 537, 538. (1-3). Credit 2 each semester.

Sub-grade soil studies and laboratory investigations of engineering materials. Special problems.

541, 542. Research. Credit 2 to 6.

Technical research; project subject to approval of head of department.

DAIRY HUSBANDRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301. Market Milk. (3-2). Credit 4.

Nutritional value of milk; milk and public health; organization of city milk supplies; processing and distribution and inspection of market milk supplies; processing and distribution and inspection of market milk. Prerequisite: Dairy Husbandry 202, must have had or be taking Dairy Husbandry 320 or its equivalent.

306. Butter Making and Factory Management. (3-2). Credit 4.

Types of creameries; raw products; grading, pasturization; use of commercial starters; ripening; churning; salting and working butter; explanation of various physical phenomena in making, packing, and storing butter. Creamery location and plans; business accounting as applied to management in various types of creameries. Prerequisite: Dairy Husbandry 202.

311. Technical Control of Dairy Products. (2-3). Credit 3.

Methods of analysis of milk and milk products, and their use in controlling the composition and purity of dairy products and in the detection of adulterations. Prerequisites: Dairy Husbandry 202, Chemistry 212, 214.

320. Bacteriology of Dairy Products. (3-4). Credit 4.

Relation of micro-organisms to quality in milk products; a study of the actions of micro-organisms in the ripening of cheese, butter and fermented milk. Prerequisite: Biology 206.

322. Advanced Dairy Bacteriology. (2-3). Credit 3.

A study of bacteriological problems in connection with dairy products. Prerequisite: Dairy Husbandry 320.

(Offered in alternate years. Not offered in 1936-37.)

407. Ice Cream Making and Refrigeration. (3-2). Credit 4.

Mixing and freezing ice cream, sherbets and other frozen products and the physical principles involved; types of freezers; flavoring materials; fillers, binders, ice cream standards; the theory and practice of artificial refrigeration and its use in the ice cream plant. Prerequisite: Dairy Husbandry 202.

408. Cheese Making and Advanced Testing. (2-3). Credit 3.

A study of the manufacture, ripening and marketing of the various types of cheese; analysis of dairy products. Prerequisite: Dairy Husbandry 202.

(Offered in alternate years. Offered in 1936-37.)

409. Selection and Breeding of Dairy Cattle. (2-3). Credit 3.

Consideration of the selection of breeds, individual cows and herd sires; studies of prominent families and individuals in the major dairy breeds; dairy cattle breeding and other problems of the breeder. Prerequisite: Dairy Husbandry 417.

415. Condensed Milk and Milk Powder. (3-0). Credit 3.

The food value, manufacture and distribution of condensed and evaporated milk, milk powder, milk sugar, casein and other milk products; a study of milk substitutes. Prerequisite: Dairy Husbandry 301.

417. History and Development of Dairy Cattle. (3-2). Credit 4.

A general history of dairy farming and its place in a permanent system of agriculture; history, origin and classification of dairy cattle and dairy cattle breeds. Prerequisite: Dairy Husbandry 202, Genetics 301.

418. Feeding and Management of Dairy Cattle. (3-2). Credit 4.

The care, feeding and management of the dairy herd; calf raising, developing the dairy heifer, herd records and record keeping. Prerequisite: Animal Husbandry 303, Dairy Husbandry 202.

FOR GRADUATES

501, 502. Advanced Dairy Production. (2-6). Credit 4 each semester.

An advanced study of general production problems. Prerequisite: Dairy Husbandry 409 417, and 418. Professor Darnell.

503, 504. Advanced Dairy Manufactures. (2-6). Credit 4 each semester.

An advanced study of general manufacturing problems. Prerequisite: Dairy Husbandry 301, 306, 407 and 415. Associate Professor Renner.

505, 506. Research in Dairy Production. (2-6). Credit 4 each semester.

A study of research methods and a review of scientific literature dealing with special dairy production problems. Students will select individual problems, subject to the approval of the head of the department. Prerequisite: Dairy Husbandry 409, 417, and 418. Professor Darnell.

507, 508. Research in Dairy Manufacture. (2-6). Credit 4 each semester.

A study of research and a review of scientific literature dealing with special dairy manufacturing problems. Students will select individual problems subject to the approval of the head of the department. Prerequisite: Dairy Husbandry 301, 306, 407, and 415. Associate Professor Renner.

ECONOMICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

311. Money and Banking. (3-0). Credit 3.

The evolution of money, the various forms of credit, the history of banking institutions, banking in other countries, the Federal Reserve System, and current monetary and banking problems. Prerequisite: Economics 203, 204, or 403.

318. Labor Problems. (3-0). Credit 3.

Theories of wages, development of trade unions and labor unions, proposals for solution of labor problems, labor legislation, and other problems growing out of modern industrial development. Prerequisite: Economics 203, 204, or 403.

408. Corporation Finance. (3-0). Credit 3.

The common forms of business organizations with special attention to corporations. Advantages of incorporation, formation and organization of corporations, capital stock and bonds, legal status of corporations, bankruptcy and reorganization.

409. Foreign Trade and Exchange. (3-0). Credit 3.

The principles of international commerce, methods of conducting foreign trade, and the theory and practice of foreign exchange.

412. Public Finance and Taxation. (3-0). Credit 3.

The purpose of the course is to give a working knowledge of public financial institutions and practices. Among the topics considered are: The amount and growth of public expenditures; the sources of revenue; budgetary methods; principles which should govern appropriations; public industries and price making; the principles of taxation; the important kinds of taxes; the principles of borrowing; the management of public debts.

413, 414. Advanced Economy Theory. (3-0). Credit 3 each semester.

This course is based on two assumptions, namely, (1) the nature of economic theory is such that maturity of judgment is essential to its comprehension, and (2) contact with practical economic problems is highly valuable in grasping economic concepts. The advanced course in economic theory, therefore, covers the same ground as that covered in other courses in economic principles but covers it more exhaustively. The course is open only to students who have had Economics 203, 204, or its equivalent, and in addition at least one course in applied economics.

416. Public Utility Economics. (3-0). Credit 3.

A general survey course examining: historical development; legal and economic principles; evolution in methods and types of regulation; financial policies; labor policies; taxation and rate making, public ownership.

422. Credit Institutions. (3-0). Credit 3.

A critical study of the principal credit institutions of the United States and other nations. The major emphasis is placed on commercial credit. Some attention, however, is given to other credit institutions. Prerequisite: Economics 311 or its equivalent.

423. Advertising. (3-0). Credit 3.

Place of advertising in business; advertising media, such as the newspaper, trade paper, magazine, direct mail, poster, and the radio; description of the various methods of advertising; development of copy and layout of advertisements; consumer habits and psychology; methods of investigation for advertising campaigns; cost of advertising; legal and technical problems involved in advertising; consideration of advertising from the standpoint of consumers. Prerequisite: Economics 203 and 204, or 403.

424. Modern Transportation. (3-0). Credit 3.

A comprehensive survey of rail, motor, water, air and pipe line transportation, including the special operating, administrative, rate, financial, and regulatory problems of each and the problems and the technique of coordination. Prerequisite: Economics 403 or its equivalent.

FOR GRADUATES

501, 502. History of Economic Doctrines. (4-0). Credit 4 each, semester.

The purpose of this course is to study in detail, beginning with the Physiocrats, the growth of the science of economics. A careful study is made of the various schools of economists and an analysis is made of such fundamental concepts as production, value, capital, interest and profits as they have appeared from time to time in the writings of the leading economists. Gide and Rist's History of Economic Doctrines serves as a guide to these authorities. Professors Clark and Adams.

505. Public Finance. (4-0). Credit 4.

An account of the evolution of financial systems; a chronological review of the discussion of the theories and principles of finance; a study of current theory and practice in public borrowing and levying, financial administration and expenditure of public revenues in the United States and the principal European countries. Professor Clark.

506. Labor Problems. (4-0). Credit 4.

A historical survey of the evolution of labor movements and programs, with a critical examination of their underlying philosophies. The economic principles involved in the leading problems of labor and wages. Professor Clark.

507. Comparative Economic Theory. (4-0). Credit 4.

This is a comparative study of the doctrines as they appear in modern economic literature. The purpose is, so far as possible, to associate the modern economists with any of the older schools to which they may logically belong or to give them distinctive positions to which their writings may entitle them. Professor Clark.

EDUCATION

FOR GRADUATES AND ADVANCED UNDERGRADUATES

321. Secondary School Methods. (3-0). Credit 3.

Methods of teaching high school subjects; for students who expect to teach in city high schools.

322. Secondary School Administration. (3-0). Credit 3.

The administrative problems of the high school; for teachers who expect to administer school systems.

422. History of Education. (3-0). Credit 3.

The history of modern education, with special attention to the history of education in the United States.

426. Tests and Measurements. (3-0). Credit 3.

A study of the use of intelligence and achievement tests in administration and supervision of public schools. Prerequisite: Junior or Senior standing.

428. Junior High School Methods. (3-0). Credit 3.

This course will introduce the student to the modern practices of teaching in the Junior High School. Prerequisite: Rural Education 323.

430. Curriculum Construction. (3-0). Credit 3.

Problems and lectures in revising and adjusting the public school curriculum to meet the needs of modern society. Prerequisite: Junior or Senior standing.

FOR GRADUATES

501. Problems in Rural Education. (4-0). Credit 4.

The rural school problem in the United States, including problems in related fields. Professor Hughes.

502. Problems in Rural School Administration. (3-0). Credit 3.

Organization, supervision, and administration of rural schools. Professor Hughes.

504. Development of Education in Texas. (2-0). Credit 2.

The origin and development of public school education in Texas. Professor Hughes.

507. Programs and Procedures in Supervision. (2-0). Credit 2.

Types of supervision and the organization of supervisory programs. Professor Wilcox.

508. Administration of Local School Finance. (2-0). Credit 2.

A study of school funds on the local school level; sources, budgeting, systems of accounting as related to school efficiency. Professor Wilcox.

510. Administration of Pupil-Personnel. (2-0). Credit 2.

A study of devices to record and improve census taking and attendance; classification and promotional schemes; school record systems; school reports and pupil appraisal studies, marking systems. Professor Wilcox.

511. The Newer Techniques in Teaching. (4-0). Credit 4.

A critical evaluation of such techniques as supervised study, the project, the problem, the Dalton Plan, the Winnetka Plan, the Activity Movement, the appreciation lesson, the Morrison Plan, and the use of work books. Professor Wilcox.

512. Interpreting the Schools to the Public. (2-0). Credit 2.

A study of types of programs designed to give to the public comprehensive information of the local school; devices and media used in presenting information. Professor Wilcox.

513. The School Plant. (2-0). Credit 2.

A study of plans for determining the extent and character of present and future building and equipment needs of a school unit; efficiency of present plant; operation and maintenance; planning the building program. Professor Wilcox.

514. State School Finance. (2-0). Credit 2.

A study of taxation for school support; apportionment of state school funds; endowments and subsidies; equalizing educational opportunities and tax burdens. Professor Hughes.

515. State School Administration. (2-0). Credit 2.

A study of state school administrative organizations; origin and development of local units; proper relationships of the State to local units; state boards of education and their functioning; training and certification of teachers. Professor Hughes.

516. Administration of Teacher-Personnel. (2-0). Credit 2.

A study of selection, tenure and promotion of teachers, including in-service training; efficiency records and ratings. Professor Hughes.

ELECTRICAL ENGINEERING

FOR GRADUATES AND ADVANCED UNDERGRADUATES

315. Alternating Currents. (3-6). Credit 5.

Principles of alternating currents. The steady-state relations of voltage and current in simple circuits containing resistance, self inductance, mutual inductance and capacitance. Power and power factor, polyphase circuits. The practice consists of laboratory studies of the topics mentioned above. Prerequisite: Electrical Engineering 201 and Mathematics 204.

405. Electrical Transmission. (3-0). Credit 3.

Lectures and recitations on the transmission of electricity by wires. The subject is treated by the use of hyperbolic functions and covers the fundamental principles of electric transmission which are applicable to either telephone or power transmission. Prerequisite: Mathematics 305, Electrical Engineering 302.

406. Electrical Distribution and Transmission. (2-2). Credit 3.

Lectures and recitations on the transmission and distribution of power by electrical methods, including the design and cost estimate of several transmission and distribution systems. Prerequisite: Electrical Engineering 406.

409. Advanced Communication Engineering. (2-3). Credit 3.

An introduction to radio engineering, including a basic study of radiation and radiation devices of thermionic tubes and their application in radio receiving and transmitting circuits.

410. Electron Tubes. (2-2). Credit 3.

An introduction to the theory and industrial application of electron tubes and devices, including thermionic, gaseous, light sensitive, and cathode ray tubes. The laboratory shall consist primarily of experimental studies of the performance characteristics of electron tubes.

416. Motor Applications. (3-0). Credit 3.

The determination of the proper sizes and types of motors to be applied in various industrial loads. Special emphasis is laid on the preliminary study of duty cycle and numerical calculation of starting duty and motor ratings. The study of industrial controllers. Prerequisite: Electrical Engineering 401 or 308.

426. Illumination Engineering. (3-3). Credit 4.

The principles of illumination; the design of lighting systems for buildings of various types. Tests of lighting units and of complete systems both for interior and exterior use. Prerequisite: Electrical Engineering 316 or 308 or 305.

428. Communication Circuits. (3-3). Credit 4.

A study of the engineering principles used in telephone communication, including transmission theory, inductive interference, networks, and filters, loading, repeater and carrier systems. Laboratory investigations include transmission measurements on artificial lines and repeaters involving the use of vacuum tube measuring devices and impedance bridges. Prerequisite: Electrical Engineering 405.

431. Engineering Administration. (2-0). Credit 2.

A brief study of problems of engineering administration, including the law of contracts, records to be kept in engineering construction and operation, systems of organizations required. Prerequisite: Senior classification.

432. Public Utility Problems. (3-0). Credit 3.

The problems of operation of public utilities with particular attention to methods of organization, the fixing of rates, the economic features of new lines and extensions. Prerequisite: Electrical Engineering 01, 431.

FOR GRADUATES

501, 502. Advanced Alternating Currents. (2-6). Credit 4 each semester.

The theory of transient phenomena; polyphase circuits; the study of transients with the oscillograph. Professor Rode.

503. Electrical Machine Design. (1-3). Credit 2.

The design of electrical machines and the predetermination of their characteristics. Professor Hughes.

504. Electrical Plant Design. (1-3). Credit 2.

The design of power plants with special emphasis on the electrical machinery. Professor Hughes.

507, 508. Advanced Alternating Current Machinery. (2-6). Credit 4 each semester.

A study of the complicated alternating current machines. Professors Hughes and Rode.

509. Advanced Communication Engineering—Telephone. (3-3). Credit 4.

A study of the design and operation of telephone repeater and carrier systems, filters, networks, transmission measuring devices, telephoto and printer telegraph systems; laboratory investigation including transient and frequency characteristics of telephone lines, and transmission measurements on typical networks and lines. Professor Dillingham.

510. Advanced Communication Engineering—Radio. (3-3). Credit 4.

A detailed study of the design and operation of audio amplification and radio frequency transmission systems with particular reference to radiating devices. Oscillographic studies and field strength measurements are the major laboratory investigations. Professor Dillingham.

512. Applications of Electrical Machinery to Industrial Operations. (3-0). Credit 3.

A study of characteristics of electrical motors with special emphasis on their application to different types of loading, electrical control and the development of electrically operated drives, study of rate charge for service. Professors Hughes and Markle.

513, 514. Public Utility Administration. (4-0). Credit 4 each semester.

A study of the development of public service regulation by commission, status of public service corporation in the courts, the fixing of rate basis and analyses of methods used in determining cost of service, and other problems pertaining to Public Utility Administration. Dean Bolton.

516. Acoustic Devices in Sound Reproduction Systems. (3-3). Credit 4.

A detailed study of microphones and loud speakers with an introduction to the basic theory of vibrating systems, and a brief study of architectural and physiological acoustics incident to the proper application of sound reproducing systems. Laboratory work includes measurements of speakers and microphones and noise surveys and acoustic treatment of small auditoria. Professor Dillingham.

517, 518. Research in Electrical Engineering.—Credit 2 to 6 each semester.

Technical research projects approved by the head of the department.

520. Advanced Illuminating Engineering. (3-3). Credit 4.

A study of fundamentals of illuminating engineering concepts; advanced design of various types of lighting installations; problems of a research character, Associate Professor Fouraker.

ENGINEERING RESEARCH

FOR GRADUATES

501, 502. Research. Credit 2 to 6.

Project subject to the approval of the head of the department.

503, 504. Research. (1-4). Credit 2 each semester.

Project relating to the heating of buildings.

ENGLISH

FOR GRADUATES AND ADVANCED UNDERGRADUATES

307. Technical Writing. (2-0). Credit 2.

The composition of reports, recommendations, and scientific articles suitable for publication, with some opportunity for oral presentation. Prerequisite: English 203 or 210.

309. The English Language. (3-0). Credit 3.

A study of the history, vocabulary, syntax, and sounds of the English language. Prerequisite: English 281, 282, or 203, 210.

310. Phonetics and Pronunciation. (3-0). Credit 3.

A study of the formation of English sounds and usage in pronunciation. Prerequisite: English 231, 232, or 203, 210.

312. Shakespeare. (3-0). Credit 3.

The life, environment, and major dramatic works of Shakespeare. Prerequisite: English 231, 232, or 203, 210.

328. American Literature Since 1870. (2-0). Credit 2.

A study of recent American writing, chiefly prose, with attention to the intellectual and social movements reflected in the literature. Limited to students who have made an average grade of C in the prerequisite courses. Prerequisite: English 203 or 231.

413, 414. Contemporary Literature. (2-0). Credit 2 each semester.

A study of the most significant British and American novelists, poets, and dramatists from about 1890 to the present, with lectures on the social, political, economic, and intellectual backgrounds. Among the authors studied are Bernard Shaw, Samuel Butler, John Galsworthy, Rudyard Kipling, H. G. Wells, Sinclair Lewis, Joseph Conrad, Eugene O'Neill, and Edna St. Vincent Millay. Prerequisite: English 231, 232, or 203, 210.

415. Contemporary Continental Drama. (2-0). Credit 2.

A study of representative plays (in translation) by Ibsen, Strindberg, Hauptmann, Sudemann, Schnitzler, Maeterlinck, Rostand, Hervieu, Brieux, Benevente, and Pirandello. Prerequisite: English 231, 232, or 203, 210. (Not offered in 1936-37).

416. Contemporary English Drama. (2-0). Credit 2.

A study of representative plays by Pinero, Jones, Wilde, Galsworthy, Shaw, Barrie, Synge, Yeats, Lady Gregory, Dunsany, and O'Neill. Prerequisite: English 231, 232, or 203, 210. (Not offered in 1936-1937).

431. The Novel. (3-0). Credit 3.

Its origin and development and its reflection of life and personality. A study of English prose fiction from the romances of the sixteenth century through the great novels of the eighteenth and nineteenth centuries. Prerequisite: English 231, 232.

ENTOMOLOGY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301, 302. Systematic Entomology. (2-4). Credit 3 each semester.

A systematic study of the various orders of insects. The student has free access to the entomological library, which contains bound volumes of standard publications on entomology; and to a considerable insect collection for identification purposes.

305, 306. Morphology. (1-4). Credit 2 each semester.

The external and internal anatomy of insects; the exoskeleton, endoskeleton, mouth parts, wing venation, and other morphological characteristics of taxonomic value. The second term is devoted to the study of internal insect anatomy.

401, 402. Advanced Economic Entomology. (2-4). Credit 3 each semester.

For students who desire a knowledge of insect life histories, the physical and chemical properties of insecticides and their effects on insects, and methods of entomological research. Prerequisite: Entomology 201 and 301.

412. Entomological Literature. (3-0). Credit 3.

A summary of the most important works on the classification of insects; a survey of the entomological publications of the United States Department of Agriculture, and state experiment stations.

417, 418. Special Problems. (3-2). Credit 4 each semester.

The taxonomy, ecology, and biology of a specific family of insects; or the life history, anatomy or biology of some one insect. Prerequisite: Entomology 301, 302.

FOR GRADUATES

501, 502. Systematic Entomology. (3-3). Credit 4 each semester.

A taxonomic study is made of the orders, families and sub-groups of the class Hexapoda. The student is required to make a special study of some particular group. Professor Bilsing.

503, 504. Cotton Insects. (3-3). Credit 4 each semester.

A detailed study of the life history of the most important insects affecting cotton; survey of the literature on this subject. The use of cultural methods, dusting and sterilizing machinery and insecticides is considered. Professor Little.

505, 506. Advanced Apiculture. (3-3). Credit 4 each semester.

A problem in apary management or in the study of one or more of the diseases affecting bees; grading and marketing honey, foul brood laws, and methods of eradicating bee diseases. Professor Little.

507, 508. Economic Entomology. (3-3). Credit 4 each semester.

A detailed study of the most important economic pests. A comparison is made of the structure of insects belonging to the same group which attack our more important crops. Cultural methods, trap crops, insecticides, and fumigation. Professor Bilsing.

509, 510. Microtechnique. (3-3). Credit 4 each semester.

A study of insect tissue; methods of making microscopic slides, making section and staining tissues. Associate Professor Johnston.

511, 512. Research Entomology. (3-3). Credit 4 each semester.

A study of the distribution of insects and the ecological relationship to their environment. Prerequisite: Taxonomic work.

513, 514. Morphology. (3-3). Credit 4 each semester.

Study of the morphological characteristics which are of taxonomic value, including wing venation, genitalia and other external characteristics. Professor Bilsing.

GENETICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301. Genetics. (3-2). Credit 4.

Fundamental principles of genetics; heredity; variation; Mendelism; the expression and interaction of genes; the physical basis of inheritance; the chromosome theory of inheritance; linkage; sex and its inheritance; and introduction to biometrical methods; laboratory work with *Drosophila*. Prerequisite: Biology 101, 102.

FOR GRADUATES

501, 502. Advanced Plant Genetics. (3-4). Credit 4 each semester.

Specialized study of plant genetics. Opportunity to specialize in some commercial crop. Standard text books and current scientific literature used. Professor Humbert.

503, 504. Advanced Animal Genetics. (3-4). Credit 4 each semester.

Specialized study of animal genetics. Opportunity to specialize on some breed of farm animals, guinea pigs, pigeons or *Drosophila*. Standard text books and current scientific literature used. Associate Professor Quisenberry.

505, 506. Advanced Biometry. (3-4). Credit 4 each semester.

The application of certain biometric principles to the interpretation of genetic data. Professor Godbey.

507, 508. Genetic Studies in Cotton. (3-4). Credit 4 each semester.

A detailed study of cotton genetics and breeding for students especially interested in cotton. Professor Humbert.

509, 510. Research Problems. Credit 1 to 4 each semester.

Technical research problems subject to approval of head of department.

571, 572. Research in Cotton Breeding. Thesis.

A thesis course for students who are majoring in genetics or agronomy and who desire to become familiar with the methods of commercial cotton breeding. The problem given to the student will cover, in its completion, in relation to cotton breeding the biometrical methods; progeny analysis; germination, seedling and maturity tests procedure; stapling; ginning. Students electing this course must first be familiar with the fundamentals of genetics and agronomy. Mr. Killough.

GEOLOGY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

303, 304. Petrology. (3-4). Credit 4 each semester.

Rocks, their textures, mineral composition, chemical characters, classification, occurrence and origin. The laboratory work includes a study of hand specimens and microscopic study of thin sections of rocks and minerals. Prerequisite: Geology 202 and approval of head of department.

305, 306. Paleontology. (3-3). Credit 4 each semester.

An introductory study of the chief characteristics, successions and environmental conditions of the animal and plant life recorded in the rocks. The laboratory work includes field trips and the preparation and study of specimens. Prerequisite: Geology 202, Biology 204, or equivalent, and approval of head of the department.

312 Structural Geology. (3-2). Credit 4.

The interpretation of rock structures caused by earth movements. The relation of rock structures to stratigraphic, physiographic and economic problems. Prerequisite: Approval of head of department.

FOR GRADUATES

505, 506. Special Geology. Credit 2 to 6 each semester.

Advanced work along specialized lines for properly qualified students. May include independent investigation of problems in various phases of geology. Primarily a thesis course. Prerequisite: Approval of head of department.

509, 510. Advanced Field Geology. Credit 2 to 6 each semester.

Systematic geologic surveying of selected areas. The course is designed as a field basis for thesis for advanced degrees and will be varied to meet the needs of individual students.

511. Economic Mineral Deposits. (5-0). Credit 5.

A study of the origin, classification, and exploitation of economic mineral deposits other than stone, clay, and fuels. Open to properly qualified seniors. Prerequisite: Geology 405.

513. Earth Sculpture and Depositional Agencies. (5-5). Credit 7.

Advanced work in interpretation and origin of land forms (geomorphology and geomorphogeny). Laboratory work in the interpretation of modern topographic and other maps. Prerequisite: Approval of head of department.

514. Advanced Stratigraphic and Historical Geology. (5-2). Credit 6.

Prerequisite: Geology 513.

516. Micropaleontology. (1-6). Credit 3.

Study of microscopic fossils and their uses in correlation. Laboratory work in the examination of well samples. Prerequisite: Approval of head of department.

518. Sedimentation. (2-6). Credit 4.

Investigation of processes of sedimentation with analytical laboratory work on sedimentary rocks. Seminar. Prerequisite: Approval of head of department.

HORTICULTURE

FOR GRADUATES AND ADVANCED UNDERGRADUATES

310. Commercial Vegetable Production. (2-2). Credit 3.

The production of vegetables for market. Climate, soil, equipment and storage as affecting production and marketing in Texas and other states. Practice: The production, harvesting and marketing of vegetable crops. Prerequisite: Horticulture 202.

311. Fruits and Vegetable Products. (1-3). Credit 2.

Methods of preservation of fruits and vegetables, including dehydration, canning, pickling, and freezing. Special attention will be given to the preparation of fruit and vegetable juices and to the processing of pecans.

317, 318. Principles of Fruit Production. (2-3). Credit 3 each semester.

Orchard management, including problems of location, soils, planning, cultivating, protection from insects and diseases, pruning, harvesting and marketing. Practice: Practical orchard work from planting to marketing. Prerequisite: Horticulture 201.

401. Systematic Pomology. (3-2). Credit 4.

Fruits, their identification, classification, distribution, importance and history; a detailed study of the more important species and varieties. Practice is given with such fruits as can be obtained during the season. Prerequisite: Horticulture 317, 318.

404. Systematic Vegetable Crops. (2-2). Credit 3.

The history, anatomy, taxonomy, breeding, seed production, and plant improvement of vegetable crops. The practice deals with a study of the actual plants as to type, variety, technique of breeding, selection of seed, taxonomy and anatomy of the various plants. Prerequisite: Horticulture 202, 310.

418. Nut Culture. (1-3). Credit 2.

Early history; distribution of native nuts; development of native groves to improved varieties. Practice: Budding and grafting pecans in the nursery row; top-working native pecans to improve varieties by means of budding and grafting; systematic study of the standard varieties of nuts; study of graft and bud unions. Prerequisite: Horticulture 201.

422. Subtropical Fruits. (3-2). Credit 4.

A study of subtropical fruits, with attention to citrus fruits, figs, olives, and dates. Practice: Study of varieties of subtropical fruits and their products; propagation and care of the various subtropical fruits. Prerequisite: Horticulture 317, 318.

423. Geography of Horticultural Industries. (2-0). Credit 2.

A study of horticultural sections of the United States; with emphasis on producing centers in Texas; various fruits and vegetables considered with regard to point of origin and time of movement to market. Study of competition between domestic shipping centers as well as the influence of importations. Certain horticultural commodities considered with respect to the commercial varieties of different producing sections.

425. History and Literature of Horticulture. (2-0). Credit 2.

The development of the art and science of horticulture with emphasis on American horticulture. The men who have made outstanding contributions to the development of the various horticultural enterprises receive special attention. Books and periodicals are also considered critically. A brief summary of the development of European horticulture will be followed by a careful study of the different eras in its development in America.

426. Commercial Propagation. (2-3). Credit 3.

Fundamental problems in propagation of horticultural plants, principally fruit trees and ornamentals. Physiological responses in rooting of stem and leaf cuttings, including artificial treatments to stimulate rooting; morphology and physiology of graft unions; congeniality between stocks and scions; and adaptation of stocks to their environment. Commercial nursery practice, including methods of budding and grafting, and care of nursery stock after propagation. Commercial production of bulbs for planting will also be considered. Practice in laboratory and greenhouse, and in the College orchards.

FOR GRADUATES

501, 502. Advanced Fruit Growing. (3-3). Credit 4 each semester.

Problems of cultivation, fertilization, pruning, thinning of fruit and protection from frost and insect pests and diseases; the improvement of fruit by means of bud selection and breeding. Prerequisite: Horticulture 317, 318, or equivalent work. Professor Adriance.

503, 504. Advanced Vegetable Gardening. (3-3). Credit 4 each semester.

Recent developments in the production of vegetables for market and truck gardening purposes; irrigation; forcing plants for early market, and the development of plants by breeding and selection. Prerequisite: Horticulture 310, 404, 420, or equivalent work. Associate Professor Brison.

507, 508. Horticultural Problems. (2-6). Credit 4 each semester.

Various problems concerning recent developments in horticulture are considered, both in theory and in laboratory. Recent work at other stations is reviewed. Professor Adriance.

INDUSTRIAL EDUCATION

FOR GRADUATES AND ADVANCED UNDERGRADUATES

406. Vocational Guidance. (2-0). Credit 2.

A survey of the recent development of educational and vocational guidance within and outside of the schools.

409. Methods of Introducing Industrial Organization and Management into Industrial Schools. (2-0). Credit 2.

A study of the history and development of industrial organization and management up to the present; most efficient methods; how these systems can best be adapted in industrial schools to make them more practical.

422. Social, Economic and Educational Influences Affecting the Junior Worker. (2-0). Credit 2.

A study of the supply and demand of workers in various occupations; pay and opportunities for advancement and their relation to society as a whole.

FOR GRADUATES

500. A Practical Study of the Relation of Industry to Education. (5-0). Credit 5.

This course is to be conducted during the summer only and as a tour of inspection and research. Advance arrangements will be made in the various cities with the directors of industrial education. The group will visit industrial schools, industries, and teacher-training institutions. Lectures will be given by men in each phase of work. Seminars will be held whenever possible en route. A final report will be required.

505. Philosophy of Industrial Education. (4-0). Credit 4.

The social, economic, and political necessities back of the movement for industrial education; the relation of industrial education to general education; types of courses to meet the demands of the community; the relations of industrial education to capital, labor, Americanization, and world competition in industry.

Industrial Education 507A. Organization of Industrial Arts Departments. (2-0). Credit 2.

Problems in making surveys, planning for public schools and setting up the proper organization.

Industrial Education 507B. Organization of Industrial Schools and Classes. (2-0). Credit 2.

Problems in making surveys, planning needed departments and classes for public schools and setting up the proper organization.

508. Administration and Supervision in Industrial Education. (4-0). Credit 4.

Problems of the local director or supervisor of industrial education departments.

509, 510. Methods of Teaching High School Drawing. (2-4). Credit 3 each semester.

A survey of the field of drawing. The designing and organizing of problems and teaching devices. The first semester is devoted to general mechanical drawing as taught in the first two years of high school; the second semester to machine drawing. Either semester may be taken separately.

511. Industrial Education Problems. (4-0). Credit 4.

A study of current problems in Industrial Education. Research and organization of material to assist in the solving of individual problems.

512. Methods of Training Employees in Commerce and Industry. (3-0). Credit 3.

A study of the various methods used by commercial and industrial concerns to train workers for their respective needs. The aim of this course is to help teachers and supervisors analyze the training needs of local businesses and organize courses for the preparation and improvement of their employees.

514. Guidance Seminar. (2-0). Credit 2.

The organization of occupational information; educational and vocational guidance; counseling case problems. Prerequisite: I. E. 406 or a similar course.

516. Industrial Education. Methods of Teaching Industrial Arts in Secondary Schools. (2-0). Credit 2.

Selecting and organizing instructional material for problems in a particular arts activity. This course must be taken with one of the following courses: Industrial Education 520a, 520b, 520c, 520d.

518. Tests and Measurements in Industrial Education. (2-0). Credit 2.

A study of testing and measuring devices and their application to industrial education subjects.

519. Related Subjects in Part-Time Cooperative Programs. (2-0). Credit 2.

The organization and presentation of content material necessary in Part-time Cooperative Programs, and the direction of the study of the students engaged in such programs.

520a. Auto Mechanics. (1-4). Credit 2.

520b. Electricity. (1-4). Credit 2.

520c. Cabinet Making. (0-5). Credit 2.

520d. Machine Shop. Credit 2.

The designing, building, and testing of laboratory problems in one of the above fields of public school industrial arts. Prerequisite: Industrial Education 516 or registration in that course.

LANDSCAPE ART

FOR GRADUATES AND ADVANCED UNDERGRADUATES

401, 402. Advanced Landscape Art. (3-8). Credit 6 each semester.

The development of large areas, private estates, parks, subdivisions, cemeteries, and other private and semi-private, and public properties. Major problems; landscape construction; detailed plans; professional practice. Prerequisite: Landscape Art 301, 304.

FOR GRADUATES

505, 506. Landscape Design. (2-12). Credit 6 each semester.

Advanced landscape problems; research consultations; criticism. Professor Hensel.

MATHEMATICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

405. Vector Analysis. (4-0). Credit 4.

409, 410. Advanced Calculus. (4-0). Credit 4 each semester.

FOR GRADUATES

504. Solid Analytic Geometry. (4-0). Credit 4.

Professor Porter.

506. Theory of Probability. (4-0). Credit 4.

Professor Porter.

- 507, 508. Theory of Functions of a Real Variable. (4-0). Credit 4 each semester.
Professor Binney.
511. Ordinary Differential Equations. (4-0). Credit 4.
Professor Edmonson.
512. Partial Differential Equations. (4-0). Credit 4.
Professor Edmonson.
- 513, 514. Differential Geometry. (4-0). Credit 4 each semester.
Professor Halperin.
- 515, 516. Advanced Algebra. (4-0). Credit 4 each semester.
Professor Edmonson.
- 517, 518. Theory of Functions of a Complex Variable. (4-0). Credit 4 each semester.
Professor Porter.
519. Elliptical Integrals. (3-0). Credit 3.
Professor Halperin.
520. Fourier's Series and Allied Topics. (4-0). Credit 4.
Professor Edmonson.

MECHANICAL ENGINEERING

FOR GRADUATES AND ADVANCED UNDERGRADUATES

329. Advanced Cabinet Making. (1-6). Credit 3.
Advanced cabinet making, design, finishing, estimating, detailing, rod making, and one research problem on one of the above subjects, or any subject that deals with cabinet making and design as applied to a school shop. Prerequisite: Teaching experience in Cabinet Making, and courses equivalent to M. E. 105 and 106.
407. Mechanical Refrigeration. (3-0). Credit 3.
The application of the principles of thermodynamics to mechanical refrigeration. Kinds of equipment and methods of practical production or refrigeration, ice making and cold storage. Prerequisite: Mechanical Engineering 320 or 323.
- 419, 420. Industrial Engineering. (3-0). Credit 3 each semester.
Principles of management as applied in modern industry: location and layout of factories, control of production, systems of wage payment, cost keeping, human relations. Prerequisite: Senior classification.
428. Aerodynamics. (3-0). Credit 3.
The fundamental principles of airplane design and construction. Recent articles on current practice; research problems. Prerequisite: Mechanical Engineering 313.
430. Production Engineering. (2-2). Credit 3.
A study of the management and shop methods used in plants and factories whose output is largely the product of machine tools and similar equipment. Prerequisite: Mechanical Engineering 419; to be accompanied by Mechanical Engineering 420.
431. Industrial Engineering Problems. (0-2). Credit 1.
Sketches and drawings of plant layouts for selected problems; reports, materials and production scheduling. Must be preceded or accompanied by Mechanical Engineering 419.

FOR GRADUATES

501. Advanced Machine Design. (2-6). Credit 4.
A detailed study of special problems in design, such as the theory and practice of lubrication, the fatigue of metals, the deflections of machine elements, the balancing of moving parts. Professor Faïres.

502. Design of Machinery. (2-6). Credit 4.

A further study of special problems in design, or the design of some complete machine (which may be a machine of the student's own choice), or the work may consist of a combination of special problems and actual design. The nature of the work can to some extent be governed by the inclination of the student. Professor Faires.

503, 504. Power Plants. (2-6). Credit 4 each semester.

The design of central and isolated power plants with special attention to over-all economic operation. Professor Brewer.

507, 508. Experimental Engineering Research. (1-8). Credit 4 each semester.

Methods and practice in mechanical engineering research, taking up extended problems specially chosen to meet the needs of the individual student.

513. Dynamics and Kinetics of Machinery. (4-0). Credit 4.

A study of the balancing of rotating masses, critical speeds, gyroscopic effects, and governors; also an advanced treatment of flexible cables subjected to a change in temperature. Prerequisite: Mechanical Engineering 313, Civil Engineering 305. Professor Faires.

515. Advanced Engineering Thermodynamics. (4-0). Credit 4.

An extended study of the theories of thermodynamics and their application to the more involved problems in engineering practice. Prerequisite: Mechanical Engineering 320. Professor Faires.

516. Heat Transmission. (4-0). Credit 4.

A study of the fundamental laws relating to heat flow, emphasis being laid on the application of these laws to engineering materials used in various industrial processes. Also a study of up-to-date developments by reference to current literature. Assistant Professor Wingren.

517. Mechanical Vibrations. (4-0). Credit 4.

The subject of vibration as applied to mechanical engineering. Besides giving the general theory in a readily understandable form, the course covers in some detail the principal applications to water wheels, steam turbines, automobiles, airplanes, Diesel engines and electrical machinery. Prerequisite: Mechanical Engineering 313, Mathematics 204. Assistant Professor Wingren.

MUNICIPAL AND SANITARY ENGINEERING

FOR GRADUATES AND ADVANCED UNDERGRADUATES

401. Sewage and Sewage Disposal. (3-0). Credit 3.

Determination of the quantity of storm water and domestic sewage; design and construction of sewer systems; principles of sewage treatment; methods of treatment; operation of sewage disposal plants. Prerequisite: Civil Engineering 311.

402. Water Supply and Purification. (3-0). Credit 3.

Development of ground and surface water supplies; principles and methods of water purification; design, construction and operation of water-works systems for municipalities. Prerequisite: Civil Engineering 311, or registration in that course.

403. Sanitary Design. (1-5). Credit 3.

Practical problems in the design of sewer systems and appurtenances; sewage treatment plants; water collection and distribution systems; water purification plants. Prerequisite: Municipal and Sanitary Engineering 401 or 402 or registration in either of these courses.

406. Sanitation and Public Health. (3-0). Credit 3.

Relation of sanitation to public health; municipal sanitary work, including garbage and refuse disposal; plumbing; control of food supplies; mosquito, fly and rodent control; sanitation of swimming pools and tourist camps; organization of health departments. Prerequisite: Junior classification.

408. Municipal Administration. (3-0). Credit 3.

City government, including the city manager plan; relation of city to state; administration of city departments; public utilities; city planning. Prerequisite: Junior classification.

412. Sanitary Laboratory. (1-5). Credit 3.

Field and laboratory work in control and operation of sewage and water treatment plants and investigation of stream pollution. Prerequisite: Municipal and Sanitary Engineering 401 or 402.

FOR GRADUATES

501, 502. City Management. (4-0). Credit 4 each semester.

Development of European and American cities, form of city government, functions of the city manager; administration of municipal affairs; organization of city departments; city finances; public utilities; fire prevention and protection, police administration; parks and playgrounds; public health and welfare; housing, city planning. Professor Steele.

503, 504. Sanitary Engineering. (4-0). Credit 4 each semester.

Principles and methods of sewage treatment; principles and methods of water purification; recent developments in the treatment of water and sewage; garbage and refuse collection and disposal; mosquito control; sanitation and public health. Professor Steele.

505, 506. Research. Credit 2 to 6.

Research; projects in sanitary engineering and municipal affairs subject to the approval of the head of the department.

PETROLEUM ENGINEERING

401. Oil Measurements and Transportation. (2-3). Credit 3.

The measurement, sampling and testing of crude oil, tank strapping and preparation of tank tables, oil storage, the prevention of loss by evaporation, fire and lightning protection. A study of the principles of pipe line design and construction. Prerequisite: Petroleum Engineering 303, 304.

402. Oil Field Management. (3-0). Credit 3.

The management of oil field properties, taxes and insurance, organization, regulation and valuation of oil and gas properties. Prerequisites: Petroleum Engineering 303, 304, 401, and 405.

406. Natural Gas and Gasoline. (2-3). Credit 3.

Theory and practice of gas measurement, orifice meters, positive displacement meters, Pitot tubes, orifice well testers, etc. The transportation of gas and the manufacture of natural gasoline. Prerequisite: Petroleum Engineering 303, 304.

FOR GRADUATES

501, 502. Petroleum Engineering Problems. (3-3). Credit 4 each semester.

An advanced course in Petroleum Engineering problems with special reference to the application and design of equipment.

PHYSICS

FOR GRADUATES AND ADVANCED UNDERGRADUATES

301. Heat. (3-3). Credit 4.

Heat transfer, kinetic theory, critical points, isothermal and adiabatic changes and the thermodynamics of the changes of state and radiation. Prerequisite: Physics 202, 204, or 208, and Mathematics 204.

(Offered in 1937-38 and alternate years thereafter.)

302. Properties of Matter. (3-3). Credit 4.

Universal gravitation, elasticity, surface tension, diffusion, viscosity and the mechanics of fluids. Prerequisite: Physics 202, 204 or 208, and Mathematics 204. (Offered in 1937-1938 and alternate years thereafter.)

305. Light. (2-0). Credit 2.

The wave theory of light, optical instruments, dispersion, spectroscopy, aberrations, refractions, interference, diffraction, polarization, double refraction and theories of refraction and reflection. The treatment is non-mathematical. Prerequisite: Physics 202, 204, or 208.

401. Optics. (3-3). Credit 4.

Periodic motion, wave motion, the nature and propagation of light, interference, polarization and the theory of optical instruments. Prerequisite: Physics 202, 204, or 208, and Mathematics 204.

(Offered in alternate years. Offered in 1936-1937.)

402. Electricity and Magnetism. (3-3). Credit 4.

Electric fields, potential, capacitance, current, resistance, electrolysis, primary and secondary cells, thermoelectric phenomena, magnetism, electromagnetic induction, electronics and Roentgen rays. Prerequisite: Physics 202, 204, or 208, and Mathematics 204.

(Offered in alternate years. Offered in 1936-37.)

407. Geophysics and Geophysical Methods. (3-0). Credit 3.

A study of the earth's gravitational, magnetic, electrical, elastic and thermal properties and the various methods of geophysical prospecting. The effects of various types of deposits upon each method are shown with the object of determining, from an analysis of structural and lithologic conditions, the type of geophysical method most suitable in any particular area. Prerequisite: Physics 202, or 204, and Mathematics 203, 204; or senior standing in Geology or Petroleum Engineering.

409. Theoretical Acoustics. (3-0). Credit 3.

A study of the fundamental theory of acoustic sound waves; theory of horns, including relations between acoustic and electrical impedance; acoustic transmission; acoustic measurements and instruments; atmospheric acoustics. Prerequisite: Mathematics: 203, 204, 305.

FOR GRADUATES

501, 502. Analytical Mechanics. (4-0). Credit 4 each semester.

A study of rectilinear motion, plane and solid motion of a point, plane and solid rotational motion, mechanisms, strains, kinetics of a particle, kinetics of a rigid body, statics, attraction and potential plane and solid of a rigid body, hydro-static and hydro-kinetics. Associate Professor Vezey.

503, 504. Advanced Electricity and Magnetism. (4-0). Credit 4 each semester.

A study of the underlying principles of alternating electric currents, the development of graphical methods of analysis as a basis for the solution of practical problems. The development of the equations for the propagation of an electromagnetic disturbance through a dielectric. A study of electrostatic and electromagnetic fields, the electromagnetic theory of light, thermal and electrical conduction in magnetic fields. Associate Professor McCorkle.

505, 506. Theory of Thermodynamics and Thermal Radiation. (4-0).

Credit 4 each semester.

An advanced course in thermodynamics and thermal radiation including Planck's thermodynamical basis of the quantum theory, the quantum theory of specific heats, Gibb's phase rule, Nernst's heat theorem, radiation, spectra, chemical equilibrium and affinity, modern theories of osmotic pressure, properties of solutions and voltaic cells. Associate Professor Sanders.

507. Kinetic Theory. (4-0). Credit 4.

A study of gas pressure, speed of gaseous molecules. Boyle's law, the law of Gay-Lussac, Graham's Law, mean free path, coefficients of diffusion and viscosity, Maxwell's distribution law, Vander Waal's equation and Brownian movements. Open to undergraduate students who have a grade of A or B in Physics 301, 302. Professor Silvey.

508. Electron Theory. (3-0). Credit 3.

A study of the conductivity of electricity through gases, mobility and diffusion of gaseous ions, measurement of the elementary electric charge, ratio of charge to mass of ions, positive ions and photo-electric action. Open to undergraduate students who have a grade of A or B in Physics 301, 302. Professor Silvey.

510. Electron Theory. (0-3). Credit 1.

This course may be taken by students who are enrolled in Physics 508 and those who have credit in this course or its equivalent. Assistant Professor McCorkle.

511, 512. Advanced Optics. (4-0). Credit 4 each semester.

The electromagnetic theory of light, spherical and chromatic aberrations, interference, diffraction, crystal optics, optical properties of metals, emission, absorption, dispersion and dispersion formulae, resonance; line and band spectra and their use in the study of the nature of atoms and molecules. Associate Professor McCorkle.

POULTRY HUSBANDRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

302. Feeding and Brooding. (3-2). Credit 4.

Common grain mill feeds for poultry, chemical composition, vitamin content and values as poultry feeds, embryology of chick and introduction to brooding from a commercial standpoint. The practice includes methods of balancing poultry rations, different methods of determining the value of feeds, identifying and mixing poultry feeds, anatomy of the common fowl, identification of digestive and egg production organs. Prerequisite: Poultry Husbandry 201.

401. Culling and Management. (3-2). Credit 4.

The underlying principles of poultry culling, study of the literature, management of large poultry flocks on commercial poultry farms, selecting the breeding stock qualities of a good breeding male. The practice includes a study of the relationship between physiological characteristics and egg production of the domestic fowl, the standard type, weight and qualities of standard domestic fowls. Prerequisite: Poultry Husbandry 201.

402. Poultry Farming. (3-2). Credit 4.

The laying out of poultry farms, cost and management in raising a flock of one thousand or more, types of houses, incubators and brooders, raising of special types of poultry, battery brooding methods, teaching and demonstrating plans. The practice consists of problems in organizing, financing and establishing a commercial poultry business. Prerequisite: Poultry Husbandry 201.

FOR GRADUATES

501, 502. Research Problems. (3-4). Credit 4 each semester.

A study of recent investigations in poultry breeding and nutrition. Research methods are given attention. Experiment station literature, scientific journals and newer publications are to be read and reported by the student. Associate Professor Munnerlyn and Professor Reid.

503, 504. Advanced Incubation and Brooding. (3-4). Credit 4 each semester.

Factors underlying the successful hatching of eggs. A study of the effects of various chemicals and disinfectants on the hatching of hen's eggs. Peculiar requirements of hatching eggs from different species of domestic fowl,—chickens, ducks, geese, turkeys and guinea fowl. Nutritive requirements of the young of the different species of domestic fowl. Optimum percentage of proteins and other nutrients in the ration. The vitamins necessary for growth; vitamins necessary to avoid malformation and to secure good growth; minerals essential to good growth. Results of vitamins deficiency in rations. Professor Reid.

(These two courses are carried on in cooperation with the Department of Chemistry.)

505. Embryology of the Chick. (2-6). Credit 4.

A microscopic study of the changes which take place in the egg during the period of incubation; methods of changing the rate of development of the embryo. Associate Professor Munnerlyn.

571. Cooperative Study of Poultry Nutrition. Credit 2 to 6.

The history of the scientific study of poultry nutrition, including life, animal heat, nutrients, vitamins, etc., and the contributions of the important research workers in the field. A series of written reports, a three-hour weekly conference with the instructor and the carrying out of an Experiment Station project in animal nutrition will be required.

RURAL SOCIOLOGY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

311. Social Psychology. (3-0). Credit 3.

The factors affecting group behavior together with methods of social control; the forces and influences which determine the mental attitude of country people; the connection between a good understanding of the social mind and successful organization effort; methods of dealing with the problems involved; the many questions related to public opinion.

312. General Sociology. (3-0). Credit 3.

The position of sociology among the social sciences. The subject matter of sociology is outlined under the following heads: population, physical environment, human motivation, social organization and social pathology. Emphasis is placed upon methods of investigation and quantitative measurement of the data of sociology.

404. Rural Organization. (3-0). Credit 3.

A study of community life in the rural districts with its natural organizing and disorganizing tendencies; a survey and evaluation of attempts at community organization, as the survey, community club plan, community council plan, the school community center, the community church, the Y. M. C. A., the Red Cross in rural districts.

407. Rural Sociology. (2-2). Credit 3.

An analysis of the conditions, forces and agencies influencing the life of the country dweller and the country community; a detailed study of a number of special problems related to the social side of country life, such as population questions, city-ward drift; town and country relationships; rural health problems, reaction, rural leadership; community organizations and community planning. Attention is also given to the social problems connected with the home, the school, the church, the press and other social institutions.

FOR GRADUATES

501, 502. Advanced Rural Sociology. (4-0). Credit 4 each semester.

An intensive study of some important aspects of the field of rural sociology. The first term is connected mainly with the evolution of rural society; the second term with an analysis of some of the principles of rural social problems of today and proposed solutions. Professor Russell.

511. History of Modern Social Thought. (4-0). Credit 4.

A study of the history, basis, and foundation of modern systems of thinking, as to authors who advance the theories, and as to different theories themselves. Special emphasis is placed on the study of the mental attitudes of the farmers on social, political, and economic questions. Professor Russell.

512. The Rural Community. (4-0). Credit 4.

A study of the rural community as to its geographic background, population, social institutions, and occupational attitudes. Different efforts at organizing the rural community, as the county public welfare project, school and church community center projects, recreational and health projects, local, state and national agencies for rural community co-operation are studied. Professor Russell.

TEXTILE ENGINEERING

FOR GRADUATES

413, 414. Cotton Classing. (1-3, 0-3). Credit 2, 1.

Recitations and lectures on classification and stapling of cotton, buying spot cotton, papers used in the cotton trade and cotton exchanges.

VETERINARY ANATOMY

FOR GRADUATES

511, 512. Veterinary Anatomy. (2-4). Credit 3 each semester.
Professor Leith.

VETERINARY MEDICINE AND SURGERY

FOR GRADUATES

501, 502. Special Surgery. (2-4). Credit 3 each semester.

Problems of surgical conditions, surgical pathology, surgical technique and sterility of animals. Professor Lenert.

VETERINARY PATHOLOGY

FOR GRADUATES

541, 542. Advanced Special Pathology. (3-4). Credit 4 each semester.

Etiology, pathogenesis, lesions and results of diseases of organs and systems or organs; pathology of infectious diseases. Prerequisite: Veterinary Pathology 242, or equivalent. Professor Dunn.

543, 544. Advanced Special Bacteriology. (3-4). Credit 4 each semester.

A study of pathogenic micro-organisms; their cultural and biological characteristics and pathogenicity. Prerequisite: Biology 206. Professor Dunn.

VETERINARY PHYSIOLOGY AND PHARMACOLOGY

FOR GRADUATES

501, 502. Advanced Practical Physiology. (3-4). Credit 4 each semester.

Recent phases of physiology; modern experimental methods. The work is arranged to suit the needs of the student and in harmony with his previous training. Professor Burns.

503, 504. Advanced Physiology of Nutrition. (3-4). Credit 4 each semester.

A detailed study of the modern theories of nutrition with special reference to vitamins. Professor Burns.

505, 506. Advanced Poisonous Plants. (3-4). Credit 4 each semester.

Original investigations and detailed studies of the poisonous plants affecting domestic animals. Professor Burns.

507, 508. Advanced Experimental Pharmacology. (3-4). Credit 3 each semester.

Modern methods of research in pharmacology and pharmaceutical processes. Original research in studying the actions and uses of drugs. Professor Burns.

WILD GAME

FOR GRADUATES AND ADVANCED UNDERGRADUATES

302. Ecology of Animals and Plants. (2-3) Credit 3.

Animal-plant interrelationships. The web of life. The importance of taking full account of animal, plant and environment. The place of action and reaction, zonation, succession, numbers, limiting factors, biological control, the balance of nature in wildlife management. A basic course. Required of all prospective graduates in wildlife management.

401. General Mammalogy. (2-6) Credit 4.

An introduction to the study of mammals. The structure, classification and economic relations of mammals with special reference to deer, antelope, elk, squirrel, rodents, flesh-eaters, furbearers, and others of economic importance. Methods of collection and preparation of study skins of mammals. Foundation for wildlife management or museum work. Prerequisites: Biology 203, 204.

402. General Ornithology. (2-6) Credit 4.

Introduction to the study of birds, their structure, classification, geographic distribution, ecologic relations and economic status. Special attention will be given to game species. Methods of collection and preparation of study skins. Foundation for wildlife management on the farm, in the forest, and on the range; also for museum work. Prerequisites: Biology 203, 204.

FOR GRADUATES

501, 502. Advanced Wildlife Studies. (2-6) Credit 4 each semester.

The classification of selected groups of vertebrates; methods of practice in vertebrate life-history studies; survey of literature in the field of wildlife management; special problems and reports.

573, 574. Research on Wildlife Problems. Credit 2 to 6.

Field and laboratory problems in wildlife research, including game or non-game species, with special regard for the interrelationships between organisms and their environment, and interdependence of plants and animals. Written progress reports, weekly conference with instructor, and the carrying out of a specific project in wildlife will be required.

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