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The University of Minnesota

GENERAL INFORMATION

1915-1916

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The Bulletin of the University of Minnesota is issued as often as twice a month during the University year.

The Bulletin comprises—

Original Series. Containing the reports of the President and of the Board of Regents, the Register, the Bulletin of General Information, the annual announcements of the individual colleges of the University, etc.

General Series. Containing announcements of departments of instruction, reports of University officers, etc.

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The REGISTRAR,
The University of Minnesota,
Minneapolis, Minnesota.

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School of Mines Experiment Station Series. Containing results of investigations conducted by the Station.

Current Topic Series. Containing papers of general interest in various lines of work.

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The University of Minnesota,
Minneapolis, Minnesota.

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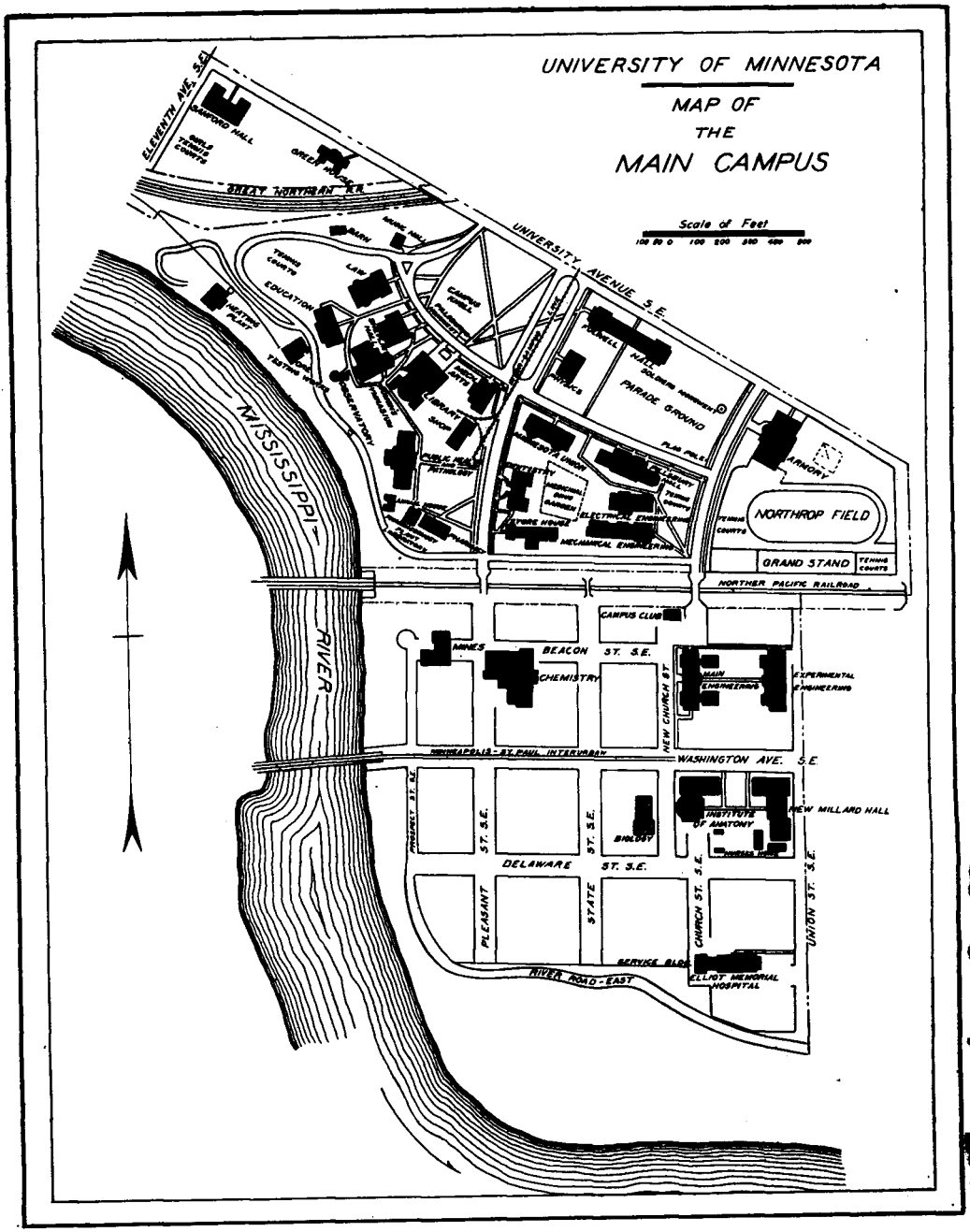
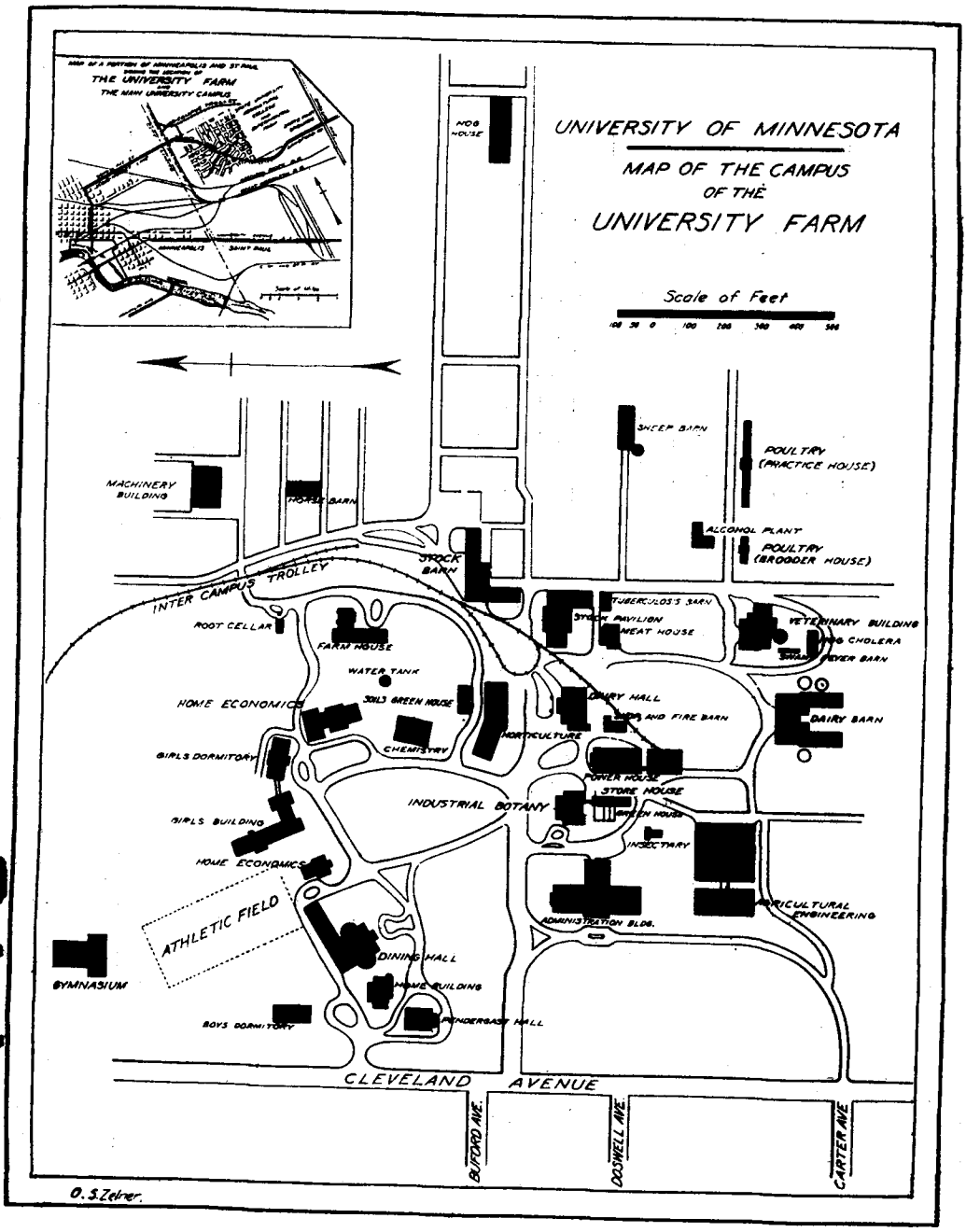


Area of Main Campus, 108.5 acres



Area of University Farm, 422.56 acres

1915

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UNIVERSITY CALENDAR

1915-1916

The university year covers a period of thirty-eight weeks, beginning on the Tuesday before the second Thursday in September. Commencement Day is always the second Thursday in June.

1915			
August	31	Tuesday	Registration closes except for new students
September	1-8	Week	Fees payable except for new students
September	7-14	Week	Examinations for the removal of conditions (except Colleges of Agriculture and Forestry), entrance examinations, registration of new students, and payment of fees
September	15	Wednesday	First semester begins
September	27	Monday	Agricultural College, farm experience examination
October	4	Monday	School of Agriculture, first term begins
October	7	Thursday	Senate meeting, 4:00 p.m.
November	8	Monday	Dairy School opens
November	24	Wednesday	Thanksgiving recess begins 9:00 p.m.
November	29	Monday	Thanksgiving recess ends 8:00 a.m.
Nov. 29 to Dec. 4		Week	Second semester condition examinations, Colleges of Agriculture and Forestry
December	2	Thursday	Senate meeting, 4:00 p.m.
December	6-11	Week	Short course for ice-cream makers
December	11	Saturday	Dairy School closes
December	17	Friday	Christmas vacation begins 9:00 p.m.
December	17	Friday	School of Agriculture, first term closes
1916			
January	3-8	Week	Farmers' Short Course
January	4	Tuesday	Christmas vacation ends 8:00 a.m.
January	18	Tuesday	Registration for second semester closes
January	21	Tuesday	School of Agriculture, second term begins
January	24	Monday	Final examinations begin
January	25	Tuesday	Payment of fees for second semester closes
February	2	Wednesday	Second semester begins
February	3	Thursday	Senate meeting, 4:00 p.m.
February	12	Saturday	Lincoln's Birthday: a holiday
February	22	Tuesday	Washington's Birthday: a holiday
March	30	Wednesday	School of Agriculture closes

April	3-8	Week	Junior Short Course
April	19	Wednesday	Easter recess begins 9:00 p.m.
April	27	Thursday	Easter recess ends 8:00 a.m.
May	1-6	Week	Condition examinations in certain colleges
May	2	Tuesday	Traction Engineering Course begins
May	4	Thursday	Senate meeting, 4:00 p.m.
May	26	Friday	Final examinations begin
May	30	Tuesday	Memorial Day: a holiday
June	1-8	Week	Military Encampment, Fort Snelling
June	3	Saturday	Second semester closes
June	4	Sunday	Baccalaureate service
June	5	Monday	Senior class day exercises
June	7	Wednesday	Alumni Day
June	8	Thursday	Forty-fourth Annual Commencement.
June	9	Friday	Summer vacation begins
June	12	Monday	Summer Session begins

The university year for 1916-17 will begin Tuesday, September 12.

Program of Entrance Examinations 1915-1916

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 112, Library Building, unless otherwise specified.

Any student finding a conflict in his program should report to the Registrar for adjustment.

Tuesday,	Sept. 7	9 a.m.	Business Subjects, Elementary Algebra, Plane Geometry
		2 p.m.	Manual Subjects, Domestic Art and Science, Agriculture, Higher Algebra, Solid Geometry
Wednesday,	Sept. 8	9 a.m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology, Physics, Physiology
		2 p.m.	American Government, History, Economics, Commercial Geography, History of Commerce, Economic History of England, Economic History of the United States
Thursday	Sept. 9	9 a.m.	English
		2 p.m.	German, Greek, French, Latin, Scandinavian, Spanish

A representative of each department will be at the office of the head of the department each forenoon of entrance examination week from 9 to 12 to give information and advice.

Condition Examinations

Regular examinations for the removal of conditions are given at no other times than (1) the week following the Easter recess, (2) the registration week in September, and (3) the week following the Thanksgiving recess, for students in the Colleges of Agriculture and Forestry.

The examinations in second-semester courses are given in the September period and those in first-semester courses are given after the Easter recess or in September, or at both times, as each school or college may determine. No student may take more than one examination to remove a condition.

Examination schedules for the respective schools and colleges may be secured at the Registrar's office.

ORGANIZATION OF THE UNIVERSITY

The University is organized in Schools, Colleges, and Divisions as follows:

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

THE DEPARTMENT OF AGRICULTURE, including—

- THE COLLEGE OF AGRICULTURE
- THE COLLEGE OF FORESTRY, including—
  - FOREST EXPERIMENT STATIONS AT ITASCA AND CLOQUET
- THE CENTRAL SCHOOL OF AGRICULTURE, UNIVERSITY FARM
- THE NORTHWEST SCHOOL OF AGRICULTURE, CROOKSTON
- THE WEST CENTRAL SCHOOL OF AGRICULTURE, MORRIS
- THE EXPERIMENT STATIONS, including—
  - THE MAIN STATION, ST. ANTHONY PARK
  - THE NORTHWEST EXPERIMENT STATION, CROOKSTON
  - THE NORTH CENTRAL EXPERIMENT STATION, GRAND RAPIDS
  - THE WEST CENTRAL EXPERIMENT STATION, MORRIS
  - THE NORTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION, DULUTH
  - THE SOUTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION, WASECA
  - THE FRUIT-BREEDING FARM, ZUMBRA HEIGHTS

THE LAW SCHOOL

THE MEDICAL SCHOOL, including—

- THE SCHOOL FOR NURSES

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES, including—

- MINNESOTA SCHOOL OF MINES EXPERIMENT STATION

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

THE UNIVERSITY EXTENSION SERVICE, including—

- GENERAL EXTENSION DIVISION
- AGRICULTURAL EXTENSION DIVISION

THE BOARD OF REGENTS

The Hon. Fred B. Snyder, Minneapolis, President of the Board - - 1916
George Edgar Vincent, Minneapolis - - - - - - *Ex officio*
The President of the University
The Hon. Winfield Scott Hammond, St. James - - - *Ex officio*
The Governor of the State
The Hon. C. G. Schulz, St. Paul - - - - - - *Ex officio*
The Superintendent of Education
The Hon. Pierce Butler, St. Paul - - - - - - - 1916
The Hon. B. F. Nelson, Minneapolis - - - - - - - 1916
The Hon. W. J. Mayo, Rochester - - - - - - - - 1916
The Hon. Milton M. Williams, Little Falls - - - - 1916
The Hon. John G. Williams, Duluth - - - - - - 1920
The Hon. George H. Partridge, Minneapolis - - - - 1920
The Hon. A. E. Rice, Willmar - - - - - - - - 1921
The Hon. Charles L. Sommers, St. Paul - - - - - 1921

EXECUTIVE OFFICERS

George Edgar Vincent, Ph.D., LL.D., President
Ernest B. Pierce, B.A., Registrar
George H. Hayes, University Comptroller and Secretary of the Board of Regents
James T. Gerould, B.A., Librarian
John B. Johnston, Ph.D., Dean of the College of Science, Literature, and the Arts
Edward E. Nicholson, M.A., Assistant Dean of the College of Science, Literature, and the Arts
Francis C. Shenehon, C.E., Dean of the College of Engineering and the Mechanic Arts
Albert T. Woods, M.A., D.Agr., Dean and Director of the Department of Agriculture
Edward M. Freeman, Ph.D., Assistant Dean of the Department of Agriculture
William R. Vance, Ph.D., LL.B., Dean of the Law School
Elias Potter Lyon, Ph.D., M.D., Dean of the Medical School
Richard O. Beard, M.D., Assistant Dean and Secretary of the Medical School
Alfred Owre, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
Frederick J. Wulling, Phm.D., LL.M., Dean of the College of Pharmacy
William R. Appleby, M.A., Dean of the School of Mines
George B. Frankforter, Ph.D., Dean of the School of Chemistry
Lotus D. Coffman, Ph.D., Dean of the College of Education
Guy Stanton Ford, Ph.D., Dean of the Graduate School
Richard R. Price, M.A., Director of University Extension
Margaret Sweeney, Ph.D., Dean of Women

THE UNIVERSITY OF MINNESOTA

DESCRIPTION OF DEPARTMENTS

The College of Science, Literature, and the Arts offers a four-year course of study leading to the degree of Bachelor of Arts. The work is elective within certain limitations intended to secure a proper balance between breadth of foundation and liberal culture on the one hand and specialized training on the other.

In this college are given also the first two or three years of the combined courses leading to the degrees of Bachelor of Science or Bachelor of Arts and Doctor of Medicine; the two years of college work required for entrance to the Law School; and various non-professional subjects required in other schools and colleges of the University.

The College of Engineering and the Mechanic Arts offers courses of study of five years each, in Civil, Mechanical, Electrical, and Architectural Engineering, and Architecture, leading to the degrees of Civil, Mechanical, Electrical, and Architectural Engineer and Architect. The degrees of Bachelor of Science in Engineering and Bachelor of Science in Architecture are conferred at the end of the fourth year. This college also offers work in the Graduate School leading to the degree of Master of Science.

In the course in Civil Engineering, a period of five weeks is spent in camp. This summer survey work is required of all students in this course in the vacation following the junior year.

Excellent facilities exist in the college for practicing engineers to carry on graduate work in engineering and architecture.

The College of Agriculture offers four-year courses in Agriculture and Home Economics leading to the degree of Bachelor of Science. The work in Agriculture includes general courses in Agricultural Education, Agronomy and Farm Management, Dairy and Animal Husbandry and Horticulture. Special Agricultural Science Courses are also offered in Agricultural Chemistry, Entomology, Plant Pathology and Soils. The courses in Home Economics include a general course, a teachers' course in the general field of Home Economics and a special teachers' course in Textiles and Clothing.

The College offers to all students in Agriculture and Home Economics the courses necessary for the University Teachers' Certificate in preparation for teaching in secondary schools.

Graduate work is offered in all special lines of Agriculture. The special problems are for the most part correlated with work in the Experiment Station.

The Summer Session of the College of Agriculture begins about the middle of June and continues for six weeks. Courses are offered in

Agriculture and Home Economics adapted to the needs of teachers and others not in attendance during the regular college session and also to regular students. The State Teachers' Training School is held at the same time and place.

The College of Forestry offers a four-year course leading to the degree of Bachelor of Science. In addition to the work given at the University Farm, six months' work, two freshman and four junior, is given at Itasca State Park where a well equipped demonstration forest is available as a laboratory. The college also controls a Forest Experiment Station at Cloquet, which offers a good field for graduate students and original research. Provision is made for graduate work in all the various lines of sylviculture and utilization.

The Schools of Agriculture offer three-year courses of study adapted especially to the needs and opportunities of farm boys and girls. They offer courses of special training for practical farm life and for practical home economics. The Central School is located at Saint Anthony Park; the Northwest School, at Crookston; and the West Central School, at Morris.

The Dairy School offers a five-weeks' course of practical instruction in dairying, especially designed for those who are actually engaged in the manufacture of butter and cheese. (November and December.)

The Farmers' and Home-Makers' Week is held early in January. Instruction in Agriculture and Home Economics is offered in regular classes, important conferences are held and many agricultural organizations of the State hold their sessions at this time.

A Short Course for Veterinarians, one week in length, is held in February. Lectures are given by members of the State Live Stock Sanitary Board and by members of the staffs of the Division of Veterinary Medicine and other divisions of the College and clinical work is conducted by veterinarians of national reputation.

The School of Traction Engineering is a five-weeks' course of practical instruction in the operation and handling of traction engines and other farm machinery. Engineers' licenses of different grades are given according to previous experience. (May.)

The Experiment Station conducts experiments along the various lines of agriculture which are of interest to farmers. It is closely correlated with the College of Agriculture. Its object is the solution of agricultural problems of importance in Minnesota. It offers secondarily educational and research advantages to undergraduate and graduate students of the College of Agriculture. The main station is located at St. Anthony Park; substations are located at Crookston, Grand Rapids, and Morris. Demonstration experimental farms are also located at Waseca and Duluth.

The Extension Work of the Department of Agriculture is correlated with the Farmers' Institute work and aims to bring to the farmers of the State information leading to the improvement of the farm and home. It reaches farmers by institutes, lectures, demonstrations, and demonstration farms, industrial and agricultural contests, a press bureau, and by correspondence and personal visits.

The Law School offers a course covering a period of three academic years, leading to the degree of Bachelor of Laws. Candidates for admission to the Law School must have completed at least two years of work in the College of Science, Literature, and the Arts of the University of Minnesota, or some other college or university of equal grade. A special pre-legal course of two years, covering those subjects which are particularly desirable as a preliminary to the study of law, is offered by the College of Science, Literature, and the Arts. Seniors in that college are permitted to take the work of the first-year class in law and count the same as the equivalent of one year's work towards their Academic degree. This provision enables students to obtain the degrees of Bachelor of Arts and Bachelor of Laws in six years. The so-called "case system" method of teaching law, approved by the leading law schools of the country, is employed.

The Medical School is the only collegiate institution giving medical instruction in the State of Minnesota.

Two years of college work equivalent to that of the College of Science, Literature, and the Arts, of this University, including certain specified subjects, are required for admission. See page 22.

The course in medicine includes four years of thirty-six weeks of laboratory, didactic, and clinical work and a fifth year spent in clinical work in an approved hospital or in advanced laboratory studies in this school.

All students are required to secure the B.S. or B.A. degree before receiving the M.D. degree.

The school offers the following courses of study:

1. Course leading to the degrees of Bachelor of Science and Doctor ot Medicine. Two years of properly selected work in the College of Science, Literature, and the Arts or its equivalent, five years in the Medical School, viz., four years of graded study and one year in a hospital interneship or in advanced laboratory studies or research.

2. Course leading to the degrees of Bachelor of Arts and Doctor of Medicine. Students presenting three years of work properly selected in the College of Science, Literature, and the Arts, including the required subjects mentioned, may elect the first year in medicine in their senior academic year, receiving the B.A. degree at its close, and the M.D. degree upon the successful completion of the remaining four years in medicine.

3. The University School for Nurses, organized in connection with the University Hospital service, is under the control of the Faculty of the Medical School. (See School Bulletin.)

4. Course for Embalmers (see special circular). This is a six-weeks' course, the successful completion of which is accepted by the State Board of Health in lieu of examination for embalmers' license.

5. Graduate and research work is offered to qualified students.

The College of Dentistry offers a three-year course of study, of nine months each, leading to the degree of Doctor of Dental Surgery.

One year of Academic work, including the following subjects, is

recommended as a prerequisite to the Dental Course: Animal Biology, Technical Drawing, Physics, Economics.

The University now offers an optional six-year course of study. The first three years of the course are given in the College of Science, Literature, and the Arts. The last three years are given in the College of Dentistry. It leads to the degrees of Bachelor of Arts and Doctor of Dental Surgery at the end of the six-year course.

The College of Pharmacy offers a regular course extending over two years leading to the degree Graduate in Pharmacy, and two postgraduate courses, the first requiring at least one additional year of resident work leading to the degree Pharmaceutical Chemist, and the second requiring two additional years of work leading to the degree of Bachelor of Science in Pharmacy.

The School of Mines offers three regular courses, namely, Mining Engineering, Mining Engineering (specializing in Geology), and Metallurgy, leading to the degrees of Engineer of Mines (E.M.), Engineer of Mines (in Geology) [E.M. (Geology)], and Metallurgical Engineer (Met.E.), respectively.

Students with satisfactory preparation in Elementary and Higher Algebra and Plane and Solid Geometry may graduate in four years. Students presenting high-school credentials to the extent indicated on page 24, may graduate in five years.

Courses in the school are designed for the purpose of preparing men to enter their profession with a thoro grounding in mathematics, in the sciences, and in the fundamental principles of mining engineering and metallurgy. A system of apprenticeship during summer vacations has been inaugurated. This work has become part of the curriculum and is required of all students who are candidates for degrees.

The School of Analytical and Applied Chemistry offers three courses. Two of these, the Analytical and the five-year course in Arts and Chemistry, are designed for those who wish to become teachers of chemistry, analysts, and investigators. The four-year Analytical Course leads to the degree of Bachelor of Science in Chemistry, while the Arts and Chemistry Course leads to the degree of Bachelor of Arts after four years and Bachelor of Science in Chemistry at the end of the fifth.

The third or Applied Course extends over five years, leading to the degree of Bachelor of Science at the end of four years and Chemical Engineer at the end of the fifth. These courses aim to give the student a broad foundation in chemistry and some of the allied sciences.

The College of Education offers a practical and a theoretical training for prospective high-school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

Students are admitted to the college only after the completion of at least two full years of college work, during which time they should have pursued at least one course in general psychology, and prospective high-school teachers should have given especial attention to one or more of the subjects which they expect to teach. The two-years' course of study,

beginning with the junior year, leads to the degree of Bachelor of Arts in Education. A third year leads to the degree of Master of Arts, including advanced studies in education and philosophy, and in one or more of the subjects of the secondary curriculum, at the option of the candidate.

The Graduate School gathers into a single organization and unites for the purpose of administration all the activities of the University in all its schools and colleges in so far as they relate to advanced instruction offered for the second or higher degrees, viz., Master of Arts and Doctor of Philosophy, Master of Science and Doctor of Science. The privileges of this school are in general open to all who have received Bachelors' degrees from reputable colleges and universities, based on courses substantially equivalent to those at this University.

The University Summer Session is organized for six weeks in June and July under the authority of the Board of Regents as a regular part of the University. Courses carrying university credit, including all the subjects of the state professional certificate, are offered for college students, experienced teachers, and others who desire the opportunity for advanced study. Students may secure not more than six credits at one session.

Courses in Agriculture and Home Economics, for which university credit is given, are offered by the College of Agriculture.

Summer courses are offered also by the College of Engineering, the Medical School and the College of Dentistry.

Special Courses.—In practically all of the colleges, students of mature age and adequate preparation are permitted to pursue, under the direction of the Faculty, one or two distinct lines of study.

University Extension.—All extension work of the University of Minnesota has been established as an organic unit of the University under the title of Extension Service. The Extension Service of the University functions in two main lines and these two branches have been called the General Extension Division and the Agricultural Extension Division.

Bulletins of evening classes, correspondence, and lecture courses may be had upon request.

ADMISSION

GENERAL REQUIREMENTS

Admission to the colleges or schools of the University which accept students direct from the high school is either by certificate or examination, or both. The candidate must offer fifteen units of high-school work so chosen as to include those subjects required by the college or school which he desires to enter. No candidate will be admitted with less than fifteen units. The Registrar may, however, authorize substitutions in the list of required subjects to the extent of one unit in case the candidate did not have an opportunity to take all the required subjects, provided that no substitutions shall be made for the mathematics requirement in the four-year course in the School of Mines.

No new student will be admitted to the work of the second semester unless he brings from another college a certificate of advanced standing showing his qualification to continue the second semester's work.

Under List of Entrance Subjects is shown the minimum and maximum number of units of any one subject that will be accepted by any college of the University. For a statement of the specific units required in any subject or group, see Requirements of Individual Colleges, pages 20-25.

ADMISSION BY EXAMINATION

Entrance examinations are offered at the University during the opening week, September 7 to 14. Candidates entering by this method must pass examinations in fifteen units so chosen as to satisfy the specific requirements of the college to which entrance is desired. (See Requirements of Individual Colleges.) Certificates from the College Entrance Examination Board and from the High School Board are accepted in lieu of examinations in the subjects they represent. Those desiring to take examinations should notify the Registrar in writing not later than September 1. See schedule of examinations, page 8.

ADMISSION BY CERTIFICATE

Graduates of the following courses, provided their preparation satisfies the specific requirements of the college they desire to enter, may be admitted to the freshman class.

1. Any four-year course of a Minnesota state high school or other accredited school in the state.

2. A four-year course of schools in any other state accredited to the state university of that state.

3. The Advanced Latin and Advanced English courses of the Minnesota state normal schools.

REGISTRATION

The applicant for admission should request the principal or superintendent to forward to the Registrar of the University a complete transcript of his high-school or preparatory-school record showing the number of weeks and hours per week spent upon each study, with the grades entered as *passed, passed with credit,* or *passed with honor.* Credential blanks prepared by the University must be used; these blanks may be secured upon application at the Registrar's office. Upon receipt of the credentials at the University the Registrar will notify the applicant with regard to his admission, and will send directions for registration.

LIST OF ENTRANCE SUBJECTS

The term *unit* means not less than five recitations of forty minutes each per week for a school year of at least thirty-six weeks. In manual subjects and kindred courses, it means the equivalent of ten recitation periods per week for thirty-six weeks.

Group A: English

English, four or three units.*

(a) Principles of rhetoric
(b) Practice in written expression in each of the years of the course, on an average of not less than one hour a week.
(c) Classics

Group B: Languages

Latin—
- Grammar, one unit
- Cæsar, four books, one unit
- Cicero, six orations, one unit
- Virgil, six books, one unit

Greek—
- Grammar, one unit
- Anabasis, four books, one unit

German—
- Grammar, one unit
- Literature. one, two, or three units

French—
- Grammar, one unit
- Literature, one, two, or three units

Spanish—
- Grammar, one unit
- Literature, one, two, or three units

Scandinavian Languages—
- Grammar, one unit
- Literature, one, two, or three units

*Three units will satisfy the English requirement in the Colleges of Engineering and Dentistry and the School of Mines, and when the applicant presents four units in one foreign language or two units in each of two foreign languages.

GROUP C: HISTORY AND SOCIAL SCIENCES

History—
- Ancient, to Charlemagne, one unit
- Modern, from Charlemagne, one unit
- English, one-half unit
- Senior American, one-half unit

American Government, one-half or one unit

Elementary Economics, one-half unit

Commercial Geography, one-half or one unit

History of Commerce, one-half or one unit

Economic History of England, one-half unit

Economic History of the United State, one-half unit

GROUP D: MATHEMATICS

Elementary Algebra, one unit
Plane Geometry, one unit
Higher Algebra, one-half unit
Solid Geometry, one-half unit
Trigonometry, one-half unit

GROUP E: NATURAL SCIENCES

Physics, one unit
Chemistry, one unit
Botany, one-half or one unit
Zoology, one-half or one unit
Physiology, one-half unit
Astronomy, one-half unit
Geology, one-half unit
Physiography, one-half unit

GROUP F: VOCATIONAL SUBJECTS

Not to exceed four units may be offered from the following list of vocational subjects:

Business Subjects—
- Business Law, one-half unit
- Business Arithmetic, one-half unit
- Elementary Bookkeeping, one unit
- Advanced Bookkeeping, one unit
- Stenography and Typewriting, two units

Manual Subjects—
- Freehand Drawing, two units
- Mechanical Drawing, two units
- Domestic Art and Science, four units
- Shop Work, two units
- Modeling and Wood Carving, one unit

Normal Training Subjects—

One to three units from schools giving normal courses approved by the State High School Board, provided the applicant has had one year of subsequent teaching experience.

Agriculture—

One to four units from schools receiving special state aid for Agriculture and also from other schools in which such course in Agriculture is

approved by the State High School Board, as fast as the said schools are prepared to offer work in Agriculture.

REQUIREMENTS OF THE INDIVIDUAL COLLEGES

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

1. *Regular Bachelor of Arts Course*

(1) English, four units; or three units of English accompanied by four units of one foreign language, or two units in each of two foreign languages.

(2) Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit.

(3) Enough additional work to make in all fifteen units of which not more than four may be in Group F.

2. *Academic-Medical Course*

Same as 1 above except that two units of Latin are required.

3. *Academic-Law Course*

Same as 1 above.

4. *Arts and Music Course*

Same as 1 above, also certificate from the Department of Music showing that the applicant is qualified to pursue the courses offered.

5. *Graduates of Minnesota State Normal Schools*

Graduates of the Advanced Graduate course of a Minnesota state normal school are admitted with advanced standing equivalent to one year's credit, and receive the degree of Bachelor of Arts upon completing in this college ninety credits provided they comply with the usual requirements for graduation. Such students will not be permitted to elect the following courses for credit: Education 1, 2, 3, or 105, Rhetoric 1-2, History 1-2, or Psychology 1-2 or 5.

Individual graduates of the Advanced Latin course (five years) or of the Advanced English course (five years) of a Minnesota state normal school, who, on the basis of maturity and ability, present from the president of the normal school certificates of special fitness, will be admitted with advanced standing under the same regulations and proviso.

This does not include those students of any of the above classes who substitute for the more advanced work of certain courses specialized work in preparation for elementary teaching.

6. *Unclassed Students*

Unclassed students are: (1) persons of mature years engaged in teaching or other occupation, but registered in this college without having satisfied the entrance requirements in full; (2) all others who have been permitted to register for less than eleven hours of work. Only by permission of the Administrative Board and upon the presentation of satisfactory reasons for not taking the regular course will an applicant be admitted as an unclassed student. Unless he takes the same examinations or presents the same credentials as are required of those who enter the freshman class he can be admitted only upon vote of the

Faculty. A new application must be made each semester. No student will be admitted as unclassed after the third week.

7. *Special Music Students*

Same as 4 above.

COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

Including Courses in Civil, Electrical, Mechanical and Architectural Engineering, and Architecture

1. English, three units.

2. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit; Higher Algebra, one-half unit, and Solid Geometry, one-half unit.

3. Chemistry, one unit.

4. Enough additional work to make in all fifteen units of which not more than three may be in Group F.

Students looking forward to the study of architecture will find it greatly to their advantage to take as much freehand drawing as possible in high school, to elect French as their language, and to cover the field of general history as far as possible.

Applicants who are allowed to substitute for Mathematics must take Mathematics 69 and those who substitute for Chemistry must take General Chemistry with the provision that the resulting deficiency be made up in the Summer Session following.

COLLEGES OF AGRICULTURE AND FORESTRY

Including Courses in Agriculture, Home Economics, and Forestry

Students entering these colleges should submit their credentials to the enrollment committee, University Farm, St. Paul.

1. English, four units; or three units accompanied by four units of one foreign language, or two units in each of two foreign languages.

2. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit.

3. Enough additional work to make in all fifteen units, of which not more than four may be in Group F.

Prospective students in Agriculture and Forestry are urged to present both Higher Algebra and Physics for entrance. This will permit the selection of vocational electives during the college course in place of Mathematics and Physics otherwise required.

Every prospective student in Agriculture is also urged to obtain before entering college at least six months' practical experience on a farm. Those whose farm experience credentials are not satisfactory, will be examined as to their familiarity with farm practices, and farm experience will be required during the college course in accordance with the results of these examinations.

Prospective students in Home Economics are urged to elect biology, physiology, chemistry, and physics, as a part of their high-school course.

Schools of Agriculture

These schools are not of collegiate grade. For further information, see special bulletins. Graduates of these schools may be admitted to the College of Agriculture on the certification of the completion of the following additional work in an accredited high school:

1. English, two units.
2. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit.
3. History, one unit.
4. Electives, three units, none of which may be from Group F.

LAW SCHOOL

Regular Students

Students desiring to enter the Law School must first complete two full years (not less than fifty-eight credits) of collegiate work in science, literature, and arts at this or some other university or college of equal rank. See admission to the College of Science, Literature, and the Arts, page 20. Such candidates may be admitted upon presenting their credentials to the Registrar.

A special pre-legal course is offered by the College of Science, Literature, and the Arts covering those subjects which are particularly desirable as a preliminary for the study of law.

The Law Faculty recommends that prospective law students devote the major part of their time while in high school to the study of the following subjects: English, Latin, History, Mathematics, French, or German, and Science.

Special Students

Applicants who are twenty-one years of age and have preliminary education sufficient at least to entitle them to admission to the College of Science, Literature, and the Arts, may, upon furnishing satisfactory evidence of their ability to pursue the law course with profit to themselves and without hindrance to the regular students, in the discretion of the Faculty, be admitted to the Law School as special students. Such special students are not candidates for a degree.

Special students entering with fifty-two academic credits may become regular students by complying with the requirements for admission before the beginning of their second year in the Law School, *provided* they have passed all the subjects required of the first-year law class.

MEDICAL SCHOOL

Prospective Medical students must complete two years (not less than sixty credits) of collegiate work in science, literature and arts at this or some other university or college of equal rank. The high-school preparation of such students must satisfy the requirements for admission to the College of Science, Literature, and the Arts and should include two units of Latin, two of German, and one of Chemistry. The

sixty college credits required must include six credits each in Rhetoric, *General Chemistry, *Qualitative Analysis, Zoology, Social Science; eight credits in Physics, and enough German to enable the student to read scientific publications in that language with facility. This will usually require one or two years of collegiate work in this subject.

The degree of Doctor of Medicine is conferred only upon those who have received the Bachelor's degree in Arts or Science from this or some other recognized university or college. Combined courses are offered by the College of Science, Literature, and the Arts and by the Medical School, which lead to either of the Bachelors' degrees and, subsequently, to the degree in medicine.

Those who at the time of entrance have a Bachelor's degree from an approved institution other than the University of Minnesota may be allowed reasonable deviation from the exact credits mentioned above. But thoro college courses in Physics, Chemistry, and Biology and a reading knowledge of modern languages (particularly German) are indispensable as preparation for medical study.

School for Nurses

Graduation from an approved high school or other preparatory school on the accredited list is a prerequisite for admission. Preference, however, will be given to women of superior preliminary training. Applicants must not be less than twenty, nor more than thirty-five, years of age. They must submit to the committee satisfactory evidence of physical and mental fitness and of good character and will undergo a general physical examination by the school physician.

Upon receipt of credentials at the Registrar's office, applicants will be notified with regard to the details of registration.

All applicants matriculated will be required to take the preliminary course of instruction and must pass the examinations at its close successfully. This period will be one, not only of preliminary training, but of probation. The Faculty reserves the right to pass upon the general fitness of the student to enter the hospital service at the close of that time.

COLLEGE OF DENTISTRY

1. English, three units.
2. Chemistry, one unit.
3. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit.
4. Enough additional work to make in all fifteen units of which not more than four may be in Group F.

Because of the limited capacity of the College of Dentistry, the number of freshmen admitted will be limited to ninety. The student who

*Those who have had good training in preparatory Chemistry will take a combined course of six credits in General Chemistry and Qualitative Analysis, and six credits of Organic Chemistry.

desires to enter this college in September, 1915, should fill out and send to the University a special application blank, which will be sent him as soon as his regular credential blank has been received by the Registrar. Both blanks should be in the Registrar's hands not later than July 1.

Selection of candidates will be based on the following principles:

1. In all cases of equal preparation residents of Minnesota will be given preference.

2. Those having one year of collegiate training will be guaranteed admission on receipt of satisfactory credentials if filed on or before July 1.

3. High school graduates who on the basis of their scholastic records, and evidence of mechanical proficiency, show the most promise, will be accepted until ninety students have been admitted.

The student's entire scholastic and industrial record will be taken into consideration in determining admission, and applicants will be notified promptly after the date set concerning the possibility of their matriculation.

COLLEGE OF PHARMACY

Beginning with the school-year 1915-1916, a high-school or equivalent training will be required as a prerequisite to entrance upon the regular courses of pharmacy. Applicants are advised to secure preparation in two units of Latin and one unit of physics, chemistry, botany and physiology.

SCHOOL OF MINES

It is recommended that students who come poorly prepared in mathematics enter the five-year courses.

Five-Year Courses

1. English, three units.

2. Mathematics: Elementary Algebra, one unit, and Plane Geometry, one unit.

3. Enough additional work to make in all fifteen units, of which not more than four may be in Group F.

Four-Year Courses

1. English, three units.

2. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit; Higher Algebra, one-half unit; Solid Geometry, one-half unit.

3. Enough additional work to make in all fifteen units, of which not more than four may be in Group F.

It is recommended that students who enter the four-year courses review their mathematics, especially Higher Algebra and Solid Geometry. Those who are unable to carry satisfactorily freshman mathematics will be compelled to drop back into the five-year course.

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

Arts and Chemistry Course (five years)

1. English, four units; or three units accompanied by four units of one foreign language, or two units in each of two foreign languages.

2. Mathematics: Elementary Algebra, one unit; Plane Geometry, one unit.

3. Enough additional work to make in all fifteen units, of which not more than four may be in Group F.

Analytical Course (four years) and *Applied Course* (five years)

The requirements are the same as in Arts and Chemistry above, except that in addition to the mathematics indicated one-half unit of Higher Algebra must be presented.

COLLEGE OF EDUCATION

Applicants for admission to this college must present credentials showing:

1. The completion of a regular four-year high-school course.

2. The completion of two full years of collegiate work (not less than sixty credits) in science, literature and arts at this or some other college or university of equal rank.

Graduation from Advanced Graduate normal courses (two years beyond the high school) is considered equivalent to (1) and (2) above.

Graduates of a five-year normal course, if individually recommended by the normal school president, are allowed forty-two credits and are admitted to the College as unclassed students pending the completion of eighteen additional credits.

ADMISSION AS UNCLASSED STUDENTS

Only by permission of the proper officers and upon the presentation of satisfactory reasons for not taking the regular course will an applicant be admitted as an unclassed student. He must take the same examinations or present the same credentials as are required of those who enter as regular students. Exceptions can be made only upon vote of the appropriate faculty. A new application must be made each semester to the committee in charge. No student will be admitted as unclassed after the third week. No unclassed student shall be admitted to the School of Mines.

ADMISSION TO ADVANCED STANDING

1. *From Other Colleges*

This University accepts credits from all reputable colleges and universities toward advanced standing. Such credits are accepted as far as they represent courses equivalent to the work done in this institution. In bringing or sending records from other institutions, the certificate must

be upon the official blank of the institution granting the certificate and should show:

(a) The subject studied; if a language, the books read, etc.

(b) The number of weeks and hours a week spent upon each subject.

(c) Ground covered in laboratory work in case of laboratory subjects.

(d) The result. The exact grades should be stated, accompanied by an explanation of the marking system employed.

Upon receipt of the student's credentials the Registrar will notify the applicant concerning his classification and will send directions for registration.

Candidates wishing to gain advanced standing by examination are allowed examinations without charge, providing such be taken within six weeks after matriculation.

2. *From Minnesota Normal Schools*

Graduates of the Advanced Graduate course of a Minnesota State Normal School are admitted to the College of Science, Literature, and the Arts with one year (30 credits) of advanced standing. Graduates of such advanced courses are admitted to the College of Education with an allowance of sixty credits toward graduation.

Individual graduates of the Advanced Latin course (five-year) or of the Advanced English course (five-year) of a Minnesota State Normal School who, on the basis of maturity and ability, present certificates of special fitness from the President of the Normal School, will be admitted with thirty credits of advanced standing. Graduates of such courses are admitted to the College of Education with an allowance of forty-two credits toward graduation.

3. *Miscellaneous*

Credit in Shop Work and Drawing will be given in the College of Engineering for work in manual training, or for practical experience, provided the applicant gives evidence of proficiency in such work, and is qualified to pursue advanced work. The student must register for the regular work and at the same time make application to the department concerned for advanced credit.

LIST OF ACCREDITED SCHOOLS

Graduates of the following Minnesota state high schools will be admitted to the University of Minnesota without conditions, provided their credentials satisfy the specific requirements of the college to which entrance is desired.

Ada	Albert Lea	Annandale
Adrian	Alden	Anoka
Aitkin	Alexandria	Appleton
Akeley	Amboy	Argyle

a
tin
agleville
ne Plaine
Bemidji
Benson
Bird Island
Biwabik
Blackduck
Blooming Prairie
Blue Earth
Brainerd
Breckenridge
Brown Valley
Buffalo
Buhl
Caledonia
Cambridge
Canby
Cannon Falls
Cass Lake
Chaska
Chatfield
Chisholm
Clarkfield
Cloquet
Cokato
Coleraine
  Greenway
  Olcott
Cottonwood
Crookston
Dassel
Dawson
Deer River
Delano
Detroit
Dodge Center
Duluth
  Central
  Industrial
Eagle Bend
East Grand Forks
Elbow Lake
Elk River
Elmore
Ely
Eveleth
Excelsior
Fairfax
Fairmont
Faribault
Farmington
Fergus Falls
Fertile
Fosston
Frazee
Fulda
Gaylord
Gilbert
Glencoe
Glenwood
Graceville
Grand Meadow
Grand Rapids
Granite Falls
Hallock
Halstad
Harmony
Hastings
Hawley
Hector
Henderson
Herman
Heron Lake
Hibbing
Hinckley
Hopkins
Houston
Howard Lake
Hutchinson
International Falls
Jackson
Janesville
Jordan
Kasota
Kasson
Kenyon
Kerkhoven
Lake Benton
Lake City
Lake Crystal
Lake Park
Lakefield
Lamberton
Lanesboro
Le Roy
Le Sueur
Le Sueur Center
Litchfield
Little Falls
Long Prairie
Luverne
Lyle
McIntosh
Mabel
Madelia
Madison
Mankato
Mantorville
Maple Lake
Mapleton
Marshall
Milaca
Minneapolis
  Central
  East
  North
  South
  West
Minneota
Montevideo
Montgomery
Monticello
Moorhead
Mora
Morris
Morton
Mountain Lake
New Prague
New Richland
New Ulm
Northfield
North St. Paul
Norwood—Young America
Olivia
Ortonville
Osakis
Owatonna
Park Rapids
Paynesville
Pelican Rapids
Perham

Pine City
Pine Island
Pipestone
Plainview
Preston
Princeton
Red Lake Falls
Red Wing
Redwood Falls
Renville
Rochester
Royalton
Rush City
Rushford
St. Charles
St. Cloud
St. James
St. Louis Park
St. Paul
  Central
  Humboldt
  John A. Johnson
  Mechanic Arts
St. Peter
Sandstone
Sauk Center
Sauk Rapids
Shakopee
Sherburn
Slayton
Sleepy Eye
South St. Paul
Springfield
Spring Grove
Spring Valley
Staples
Stephen
Stewartville
Stillwater
Thief River Falls
Tracy
Two Harbors
Tyler
Virginia
Wabasha
Wadena
Walker
Warren
Waseca
Waterville
Wayzata
Welcome
Wells
West Concord
Wheaton
White Bear
Willmar
Windom
Winnebago
Winona
Winthrop
Worthington
Zumbrota

Graduates of the following private schools will be admitted to the freshman class under the regulations governing admission of high-school graduates.

Albert Lea
  Albert Lea College, Preparatory Department
Collegeville
  St. John's College
Duluth
  Cathedral High School for Boys
  Cathedral High School for Girls
  Villa Sancta Scholastica
Faribault
  Bethlehem Academy
  St. Mary's Hall
  Shattuck Military Academy
Fergus Falls
  Park Region Luther College
Frontenac
  Villa Maria
Minneapolis
  Blake School for Boys
  Graham Hall
  Minnesota College
  St. Margaret's Academy
  Stanley Hall
Montevideo
  Windom Institute
Moorhead
  Concordia College
Owatonna
  Pillsbury Academy
Red Wing
  Academy of the Red Wing Seminary
  Lutheran Ladies' Seminary
St. Joseph
  Convent of St. Benedict
St. Paul
  Bethel Academy
  St. Joseph Academy
  St. Paul Academy
  St. Thomas College
  The Backus Schools for Girls
  The College of St. Catherine
  The Loomis School
  Visitation Convent
St. Paul Park
  St. Paul's College
Winona
  St. Claire Seminary

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission. The number of units in parentheses following each subject indicates the maximum credit accepted by any one college of the University and does not mean tha[illegible]ges will a[illegible] the maximum stated. See pages 20 to 25 for statements of the req[illegible]s of the individual colleges.

ENGLISH

Three or four units*

In order to secure a definite plan of study and unity of method on the part of [illegible]reparatory schools, the entrance requirement in English is outlined below some[illegible] in detail. To satisfy this requirement a course of not less than four hours [illegible]k must be pursued during the time specified above. The headings under [illegible]truction will naturally fall are:

[illegible] Principles of Rhetoric
[illegible]e in Written Expression
[illegible] Classics

[illegible] in the principles of rhetoric should include the principles and [illegible]rdinary texts upon the subject, whether acquired by the direct [illegible] mainly by the study of selected English masterpieces. It [illegible]at this is not an end in itself, but simply a means of teach[illegible] use of English.

[illegible] a week in each of the four years of the course [illegible] composition, which should be criticized both orally [illegible] subjects should be chosen as will best make [illegible] and interests of the students, who should [illegible]lly, and write correctly and forcefully. [illegible] of all freshmen at the University, it [illegible] intending to enter the University, this [illegible] of the high-school

XIV, XV, XVII, XXI; Virgil's *Aeneid*. The *Odyssey*, *Iliad*, and *Aeneid* should be read in English translations of recognized literary excellence.

For any unit of this group a unit from any other group may be substituted.

Group II. *Shakespeare.*—*Midsummer Night's Dream; Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Romeo and Juliet; King John; Richard II; Richard III; Henry V; Coriolanus; Julius Caesar*; Macbeth*; Hamlet*.*

Group III. *Prose Fiction.*—Malory's *Morte d' Arthur* (about 100 pages); Bunyan's *Pilgrim's Progress*, Part I; Swift's *Gulliver's Travels* (voyages to Lilliput and to Brobdingnag); De Foe's *Robinson Crusoe*, Part I; Goldsmith's *Vicar of Wakefield*; Frances Burney's *Evelina*; Scott's Novels (any one); Jane Austen's Novels (any one); Maria Edgeworth's *Castle Rackrent*, or *The Absentee*; Dickens' Novels (any one); Thackeray's Novels (any one); George Eliot's Novels (any one); Mrs. Gaskell's *Cranford*; Kingsley's *Westward Ho!* or *Hereward, the Wake*; Reade's *The Cloister and the Hearth*; Blackmore's *Lorna Doone*; Hughes's *Tom Brown's School-days*; Stevenson's *Treasure Island*, or *Kidnapped*, or *Master of Ballantree*; Cooper's Novels (any one); Poe's Selected *Tales*; Hawthorne's *The House of the Seven G*
or *Twice-Told Tales*, or *Mosses from an Old Manse*; a collection of *Short S*
various standard writers.

Group IV. *Essays, Biography, etc.*—Addison and Steele's *The S*
Coverley Papers, or Selections from the *Tatler* and *Spectator* (abou
Boswell's Selections from the *Life of Johnson* (about 200 pages); F
biography; Irving's *Sketch Book* (about 200 pages), or *Life of G*
Life of Nelson; Lamb's *Essays of Elia* (about 100 pages); Lo
(about 200 pages); Thackeray's Lectures on Swift, Addison
Humorists; Macaulay's *Lord Clive, Warren Hastings,*
smith, Frederick the Great, Madame d' Arblay (any one)
lay (about 200 pages); Ruskin's *Sesame and Lilies*, o
Dana's *Two Years before the Mast*; Selections fro
two *Inaugurals*, the *Speeches in Independence*
Address, and the *Letter to Horace Gre*
mate; Parkman's *The Oregon Trail*;
(about 150 pages); Holmes's *The At*
Inland Voyage, and *Travels with a*
from *Lay Sermons*, including th

Arlington
Atwater
Aurora
Austin
Bagley
Barnesville
Belle Plaine
Bemidji
Benson
Bird Island
Biwabik
Blackduck
Blooming Prairie
Blue Earth
Brainerd
Breckenridge
Brown Valley
Buffalo
Buhl
Caledonia
Cambridge
Canby
Cannon Falls
Cass Lake
Chaska
Chatfield
Chisholm
Clarkfield
Cloquet
Cokato
Coleraine
  Greenway
  Olcott
Cottonwood
Crookston
Dassel
Dawson
Deer River
Delano
Detroit
Dodge Center
Duluth
  Central
  Industrial
Eagle Bend
East Grand Forks
Elbow Lake
Elk River
Elmore
Ely
Eveleth
Excelsior
Fairfax
Fairmont
Faribault
Farmington
Fergus Falls
Fertile
Fosston
Frazee
Fulda
Gaylord
Gilbert
Glencoe
Glenwood
Graceville
Grand Meadow
Grand Rapids
Granite Falls
Hallock
Halstad
Harmony
Hastings
Hawley
Hector
Henderson
Herman
Heron Lake
Hibbing
Hinckley
Hopkins
Houston
Howard Lake
Hutchinson
International Falls
Jackson
Janesville
Jordan
Kasota
Kasson
Kenyon
Kerkhoven
Lake Benton
Lake City
Lake Crystal
Lake Park
Lakefield
Lamberton
Lanesboro
Le Roy
Le Sueur
Le Sueur Center
Litchfield
Little Falls
Long Prairie
Luverne
Lyle
McIntosh
Mabel
Madelia
Madison
Mankato
Mantorville
Maple Lake
Mapleton
Marshall
Milaca
Minneapolis
  Central
  East
  North
  South
  West
Minneota
Montevideo
Montgomery
Monticello
Moorhead
Mora
Morris
Morton
Mountain Lake
New Prague
New Richland
New Ulm
Northfield
North St. Paul
Norwood—Young America
Olivia
Ortonville
Osakis
Owatonna
Park Rapids
Paynesville
Pelican Rapids
Perham

Pine City
Pine Island
Pipestone
Plainview
Preston
Princeton
Red Lake Falls
Red Wing
Redwood Falls
Renville
Rochester
Royalton
Rush City
Rushford
St. Charles
St. Cloud
St. James
St. Louis Park
St. Paul
  Central
  Humboldt
  John A. Johnson
  Mechanic Arts
St. Peter
Sandstone
Sauk Center
Sauk Rapids
Shakopee
Sherburn
Slayton
Sleepy Eye
South St. Paul
Springfield
Spring Grove
Spring Valley
Staples
Stephen
Stewartville
Stillwater
Thief River Falls
Tracy
Two Harbors
Tyler
Virginia
Wabasha
Wadena
Walker
Warren
Waseca
Waterville
Wayzata
Welcome
Wells
West Concord
Wheaton
White Bear
Willmar
Windom
Winnebago
Winona
Winthrop
Worthington
Zumbrota

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  Albert Lea College, Preparatory Department
Collegeville
  St. John's College
Duluth
  Cathedral High School for Boys
  Cathedral High School for Girls
  Villa Sancta Scholastica
Faribault
  Bethlehem Academy
  St. Mary's Hall
  Shattuck Military Academy
Fergus Falls
  Park Region Luther College
Frontenac
  Villa Maria
Minneapolis
  Blake School for Boys
  Graham Hall
  Minnesota College
  St. Margaret's Academy
  Stanley Hall
Montevideo
  Windom Institute
Moorhead
  Concordia College
Owatonna
  Pillsbury Academy
Red Wing
  Academy of the Red Wing Seminary
  Lutheran Ladies' Seminary
St. Joseph
  Convent of St. Benedict
St. Paul
  Bethel Academy
  St. Joseph Academy
  St. Paul Academy
  St. Thomas College
  The Backus Schools for Girls
  The College of St. Catherine
  The Loomis School
  Visitation Convent
St. Paul Park
  St. Paul's College
Winona
  St. Claire Seminary

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission. The number of units in parentheses following each subject indicates the maximum credit accepted by any one college of the University and does not mean that all colleges will accept the maximum stated. See pages 20 to 25 for statements of the requirements of the individual colleges.

ENGLISH

Three or four units*

In order to secure a definite plan of study and unity of method on the part of preparatory schools, the entrance requirement in English is outlined below somewhat in detail. To satisfy this requirement a course of not less than four hours per week must be pursued during the time specified above. The headings under which instruction will naturally fall are:

1. The Principles of Rhetoric
2. Practice in Written Expression
3. English Classics

1. The work in the principles of rhetoric should include the principles and technical terms of ordinary texts upon the subject, whether acquired by the direct study of such text or mainly by the study of selected English masterpieces. It should not be forgotten that this is not an end in itself, but simply a means of teaching the student the correct use of English.

2. Not less than an hour a week in each of the four years of the course should be devoted to work in composition, which should be criticized both orally and in writing by the teacher. Such subjects should be chosen as will best make this written work an expression of the lives and interests of the students, who should be taught to observe accurately, think logically, and write correctly and forcefully. In view of the fact that Rhetoric is required of all freshmen at the University, it is important that in the case of those students intending to enter the University, this written work be continued during the junior and senior years of the high-school course.

3. The preparation in English Literature should consist in the study of a limited number of English classics and in the reading of a larger number. The following lists of books, headed respectively *reading* and *study*, are quoted from the report of the National Conference on Uniform Entrance Requirements in English. They will be found suggestive to those preparing students for the University. In connection with both lists, the student should be trained in reading aloud and be encouraged to commit to memory some of the more notable passages both in verse and in prose. As an aid to literary application, he is further advised to acquaint himself with the most important facts in the lives of the authors whose works he reads and with their place in literary history.

a. Reading.—The aim of this course is to foster in the student the habit of intelligent reading and to develop a taste for good literature, by giving him a first-hand knowledge of some of its best specimens. He should read the books carefully, but his attention should not be so fixed upon details that he fails to appreciate the main purpose and charm of what he reads.

With a view to large freedom of choice, the books provided for reading are arranged in the following groups, from which at least ten units are to be selected, two from each group:

Group I. The *Old Testament,* comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings, and Daniel, together with the books of Ruth and Esther; the *Odyssey,* with the omission, if desired, of Books I, II, III, IV, V, XV, XVI, XVII; the *Iliad,* with the omission, if desired, of Books XI, XIII,

*See note on page 18.

XIV, XV, XVII, XXI; Virgil's *Aeneid*. The *Odyssey*, *Iliad*, and *Aeneid* should be read in English translations of recognized literary excellence.

For any unit of this group a unit from any other group may be substituted.

Group II. *Shakespeare.*—*Midsummer Night's Dream; Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Romeo and Juliet; King John; Richard II; Richard III; Henry V; Coriolanus; Julius Caesar*; Macbeth*; Hamlet*.*

Group III. *Prose Fiction.*—Malory's *Morte d' Arthur* (about 100 pages); Bunyan's *Pilgrim's Progress*, Part I; Swift's *Gulliver's Travels* (voyages to Lilliput and to Brobdingnag); De Foe's *Robinson Crusoe*, Part I; Goldsmith's *Vicar of Wakefield;* Frances Burney's *Evelina;* Scott's Novels (any one); Jane Austen's Novels (any one); Maria Edgeworth's *Castle Rackrent*, or *The Absentee;* Dickens' Novels (any one); Thackeray's Novels (any one); George Eliot's Novels (any one); Mrs. Gaskell's *Cranford;* Kingsley's *Westward Ho!* or *Hereward, the Wake;* Reade's *The Cloister and the Hearth;* Blackmore's *Lorna Doone;* Hughes's *Tom Brown's School-days;* Stevenson's *Treasure Island*, or *Kidnapped*, or *Master of Ballantree;* Cooper's Novels (any one); Poe's Selected *Tales;* Hawthorne's *The House of the Seven Gables*, or *Twice-Told Tales*, or *Mosses from an Old Manse;* a collection of *Short Stories* by various standard writers.

Group IV. *Essays, Biography, etc.*—Addison and Steele's *The Sir Roger de Coverley Papers*, or Selections from the *Tatler* and *Spectator* (about 200 pages); Boswell's Selections from the *Life of Johnson* (about 200 pages); Franklin's *Autobiography;* Irving's *Sketch Book* (about 200 pages), or *Life of Goldsmith;* Southey's *Life of Nelson;* Lamb's *Essays of Elia* (about 100 pages); Lockhart's *Life of Scott* (about 200 pages); Thackeray's Lectures on Swift, Addison and Steele in the *English Humorists;* Macaulay's *Lord Clive, Warren Hastings, Milton, Addison, Goldsmith, Frederick the Great, Madame d' Arblay* (any one); Trevelyan's *Life of Macaulay* (about 200 pages); Ruskin's *Sesame and Lilies*, or *Selections* (about 150 pages); Dana's *Two Years before the Mast;* Selections from Lincoln, including at least the two *Inaugurals*, the *Speeches in Independence Hall* and at *Gettysburg*, the *Last Public Address*, and the *Letter to Horace Greeley*, together with a brief memoir or estimate; Parkman's *The Oregon Trail;* Thoreau's *Walden*, Lowell's *Selected Essays* (about 150 pages); Holmes's *The Autocrat of the Breakfast Table;* Stevenson's *An Inland Voyage*, and *Travels with a Donkey;* Huxley's *Autobiography*, and selections from *Lay Sermons*, including the addresses on *Improving Natural Knowledge, A Liberal Education*, and *A Piece of Chalk;* a collection of Essays by Bacon, Lamb, De Quincey, Hazlitt, Emerson, and later writers, a collection of *Letters* by various standard writers.

Group V. *Poetry.*—Palgrave's *Golden Treasury* (*First Series*), Books II and III with special attention to Dryden, Collins, Gray, Cowper, and Burns; Palgrave's *Golden Treasury* (*First Series*) Book IV, with special attention to Wordsworth, Keats, and Shelley (if not chosen for study under *b*); Goldsmith's *The Traveler*, and *The Deserted Village;* Pope's *The Rape of the Lock;* a collection of English and Scottish *Ballads*, as, for example, some *Robin Hood* ballads. *The Battle of Otterburn, King Estmere, Young Beichan, Bewick and Grahame, Sir Patrick Spens*, and a selection from later ballads; Coleridge's *The Ancient Mariner, Christabel*, and *Kubla Khan;* Byron's *Childe Harold*, Canto III or IV, and *The Prisoner of Chillon;* Scott's *The Lady of the Lake*, or *Marmion;* Macaulay's *The Lays of Ancient Rome, The Battle of Naseby, The Armada, Ivry;* Tennyson's *The Princess*, or *Gareth and Lynette; Lancelot and Elaine*, and *The Passing of Arthur;* Browning's *Cavalier Tunes, The Lost Leader, How They Brought the Good News from Ghent to Aix, Home Thoughts from Abroad, Home Thoughts from the Sea, Incident of the French Camp, Hervé Riel, Pheidippides, My Last Duchess, Up at a Villa—Down in the City, The Italian in England, The Patriot, The Pied Piper, "De Gustibus"—, Instans Tyrannus;* Arnold's *Sohrab and Rustum*, and *The Forsaken Merman;* Selections from *American Poetry*, with special attention to Poe, Lowell, Longfellow, and Whittier.

b. Study.—This part of the requirement is designed to insure a natural and logical continuation of the student's earlier reading, with greater stress laid upon

*If not chosen for study under (*b*).

form and style, the exact meaning of words and phrases, and the understanding of allusions. The books provided for study are arranged in four groups, from each of which one selection is to be made.

(1) Shakespeare's *Julius Caesar, Macbeth, Hamlet.*

(2) Milton's *L'Allegro, Il Penseroso,* and either *Comus* or *Lycidas; Tennyson's The Coming of Arthur, The Holy Grail,* and *The Passing of Arthur;* the selections from Wordsworth, Shelley, and Keats, in Book IV of Palgrave's *Golden Treasury (First Series).*

(3) Burke's *Speech on Conciliation with America;* Macaulay's *Two Speeches on Copyright* and Lincoln's *Speech at Cooper Union;* Washington's *Farewell Address* and Webster's *First Bunker Hill Oration.*

(4) Carlyle's *Essay on Burns,* with a selection from Burns's *Poems;* Macaulay's *Life of Johnson;* Emerson's *Essays on Manners.*

MATHEMATICS

Elementary Algebra (one unit).—Positive and negative numbers; addition; subtraction; multiplication; division; factoring; highest common divisor and lowest common multiple by factoring; fractions; equations of the first degree in one, two, and three unknowns, with numerous problems involving such equations; involution (omitting the binominal theorem); evolution (omitting cube root); elementary manipulation of surds; irrational equations that lead to equations of the first degree; pure quadratic equations; affected quadratic equations by the method of completing the square and by factoring, with problems involving such equations.

Higher Algebra (one-half unit).—A review of elementary algebra with more difficult problems and with some demonstrational work; the factor theorem; the binominal theorem for positive integral exponents; cube root; fractional, negative, and zero exponents; surds, radicals, and imaginaries; the solution of affected quadratic equations by formula; equations in the quadratic form; simultaneous quadratic equations; arithmetic and geometric progressions. The course in higher algebra should be taken by students in their third or fourth high-school year.

Plane Geometry (one unit).—Any of the standard texts on this subject will furnish the necessary preparation. Isoperimetry, symmetry, and maxima and minima of figures are not required. The exercises requiring solutions and demonstrations should not be omitted.

Solid Geometry (one-half unit).—Any of the standard texts on this subject will furnish the necessary preparation. The exercises requiring solutions and demonstrations should not be omitted.

LANGUAGES

Latin

In place of the work specified below the University also accepts the work recommended in the report of the Cleveland Commission on College Entrance Requirements in Latin.

Latin Grammar (one unit).—This will include the subjects of orthography, etymology, and syntax. Proficiency is particularly desired in the following subjects: the analysis of the verb forms, the rules of syntax, and the principal parts of the irregular verbs.

Caesar (one unit).—First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. The student is expected to be familiar with the life of Caesar and an account of his wars.

Cicero (one unit).—Any six orations from the following list: *Against Catiline, Poet Archias, Ligarius, Marcellus, Manilian Law* (to count as two orations), the fourteenth *Philippic.* The student should also be familiar with the life of Cicero.

Virgil (one unit).—Six books of the *Aeneid,* or five of the *Aeneid* and one of the *Metamorphoses* of Ovid, or the *Eclogues.* The student should be familiar with the life of Virgil and an account of his times and writings. A correct rhythmical reading of the text is to be encouraged.

Greek

Greek Grammar (one unit).

Xenophon's Anabasis, four books (one unit).

German (four units)

First year the student should acquire:

(1) A correct pronunciation, training of the ear, eye, and organs of speech.

(2) A vocabulary of a thousand words of every-day use; facility of combining these words into simple sentences. As a means to this, 100 to 150 pages of easy narrative prose and poetry should be read, from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.

(3) From two to three hundred German idioms.

(4) The essentials of German grammar, to be taught by means of oral and written exercises based upon the reading lessons.

Second year the pupil should:

(1) Read 150 to 200 pages of prose and poetry.

(2) Practice reading smoothly and with expression.

(3) Carefully translate selected passages of the text into idiomatic English. To translate easy sentences which the student already understands is a waste of time.

(4) Translate sentences from English into German, using words and idioms of the text read.

(5) Study topically German grammar, chief rules of orthography, etymology and syntax; illustrate these words, phrases, and sentences selected or composed by the student.

One or two additional years of work in literature will be accepted.

Students presenting four years of high-school German are admitted to advanced standing.

French and Spanish

French (four units).—This work comprises the principles of French grammar, including acquaintance with the verb, regular and irregular, and ability to translate easy English sentences into French and simple French prose into English.

One or two additional years of work in language will be accepted.

Spanish (four units).—The first year's work includes grammar and reader; second year, grammar reviewed, reading of some modern writer, composition and conversation.

One or two additional years of work in language will be accepted.

Scandinavian Languages

Norwegian or *Swedish* (four units).—The student should acquire the principles of grammar, ability to read and translate ordinary prose and easy poetry, also to translate from English, and a fair acquaintance with the history of the Scandinavian countries. Two additional years' work in literature will be accepted.

HISTORY AND SOCIAL SCIENCES

History

Ancient History (one unit).—This study should begin with a brief survey of the oriental peoples who have most influenced European development, and should be carried down to the establishment of Charlemagne's empire.

Modern History (one unit).—From Charlemagne to the present. It is desirable to give at least half of the year to the last period from 1789.

English History (one-half unit).—The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents should receive careful study.

Senior American History (one-half unit).—No attempt should be made to cover the whole field in this time. In the study of any period in the nineteenth century

special attention should be paid to economic development and the westward movement.

Social Sciences

American Government (one-half or one unit).—This should be a study of our government, national, state, and local, as it is organized and actually operated today. The instruction should aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters, and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil, and criminal cases.

Elementary Economics (one-half unit).—In the study of Economics it is desirable to avoid two extremes, abstract theory on the one hand, and controversial questions, such as the tariff, trusts, and trade unions, on the other hand. Emphasis should be placed on historical and descriptive matter, especially relating to the economic development of England and the United States. Some good elementary text-book should be mastered and a reasonable amount of collateral reading required.

History of Commerce (one-half or one unit).—This forms the natural introduction to the study of present economic conditions. It would be well to give special attention to the economic history of England and the United States. The work should be based on a text-book, supplemented by carefully directed map work and assigned readings. This should be preceded by a year course of medieval and modern European history.

Commercial Geography (one-half or one unit).—This describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial regions of the world with reference to resources, industries, transportation facilities, and commerce. It should be based on a text-book supplemented by map work and assigned readings.

NATURAL SCIENCES

Physics (one unit).—It is suggested that the year's work be confined to four of the seven subjects mentioned below.

(1) Mechanics of solids, (2) liquids and gases, (3) sound, (4) heat, (5) light, (6) and (7) electricity and magnetism (to count as two subjects, but not to be divided).

Chemistry (one unit).—The full year's work should include a study of both the non-metals and metals with laboratory experiments illustrating the common chemical laws and the commoner chemical reactions.

Botany (one-half or one unit).—The course in Botany should extend through the school year whenever it is at all possible, even if as much time can not be given to it each week as when it occupies a single semester. The course should follow as closely as possible the nature and work of plants during the changing seasons of the year. The major portion of the work should be with living plants, naming the common plants of the neighborhood, both cultivated and native, and studying plant parts from the seed to maturity.

Zoology (one-half or one unit).—Animals should be studied as living units in their relation to one another and their environments. This study should include developmental stages as well as the adult stage. The aim of the teacher should be to foster a love for animate nature and to develop accuracy in observation and description.

Astronomy (one-half unit).—An elementary course in general astronomy as presented in any good modern text-book will satisfy this requirement.

Geology (one-half unit).—These subdivisions should receive special attention: physiographic geology, the building of the land and the evolution of its existing contours; geodynamics, the modifying of the earth by atmosphere, water, terrestrial heat, plants, and animals, and a brief survey of historical geology.

Physiography (one-half unit).—The following topics should be emphasized; meteorology, the leading facts relating to the atmosphere and its phenomena, including some acquaintance with the work of the United States weather bureau; land sculpture, as it treats of the origin, development, and decadence of land forms; and the influence of these processes on the physical environment of man.

VOCATIONAL SUBJECTS

Not more than four units are allowed in the following vocational subjects, including business subjects, manual subjects, domestic art and science, and agriculture.

Business Subjects

Business Law (one-half unit).—The object of this study is not to make "every man his own lawyer," but rather to enable him to keep out of legal complications. Text-book supplemented by study of a few typical cases, and practice in drawing up ordinary legal papers, such as bills, notes, checks, etc.

Business Arithmetic (one-half unit).—The object is, first of all, absolute accuracy and, secondly, speed in ordinary business complications. The topics to be emphasized are fundamental operations, common fractions having as denominator 2, 3, 4, 6, and 8, a few common weights and measures, percentage and its applications, and useful short methods, especially interest and other calculation tables. The work should be based on a text-book, supplemented by numerous live exercises from current sources.

Elementary Bookkeeping (one unit).—A text-book should be employed with exercises so arranged that no two pupils will do exactly the same work, and no credit should be allowed unless the work is done neatly, accurately, and at a satisfactory rate of speed. It is suggested that double periods be provided, and all work be done in class under the eye of the instructor. The set used should include the journal, cash book, sales book, ledger, check book, bank pass book, and trial balance book.

Advanced Bookkeeping and Business Practice (one unit).—Thoro drill on standard business forms, such as bills, receipts, checks, notes, etc., also on the use and meaning of business symbols and abbreviations. The student should become acquainted with the bill book and invoice book, and loose leaf and voucher systems of bookkeeping. Each student should carry on a business of his own, first as an individual, then as a partnership, and finally as a corporation. Credit on this course should mean that the student lacks only age and actual business experience to become a competent bookkeeper.

Stenography and Typewriting (two units).—This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone. Nothing but the touch method should be used in typewriting. The essentials are, first, accuracy and speed in taking dictation and transcribing notes; secondly, correct spelling, capitalization, punctuation, and paragraphing. The minimum speed at the end of the first year should be 75 words per minute in dictation and 25 words per minute on the machine; and at the end of the second year, 100 words per minute in dictation, and 35 words per minute in transcribing notes. Thoro training should also be given in care of the machine, in modern methods of manifolding, and in filing papers.

Manual Subjects

Owing to the fact that drawing and shop work do not require outside preparation they should not be credited by the schools on the same basis as the academic subjects. Therefore half credits are allowed; that is, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject.

Freehand Drawing (two units).
Mechanical Drawing (two units).
Joinery (one-half unit).
Wood Turning and Cabinet Making (one-half unit).
Pattern Making and Forge Shop (one-half unit).

Machine Shop, including Chipping, Filing, and Work on the Iron Lathe (one-half unit).

Drill Press and Iron Planer (one-half unit).

Clay Modeling (one-half unit).

Wood Carving (one-half unit).

Note restriction for the College of Engineering and the Mechanic Arts, page 21, section 4.

Home Economics

Domestic Art (two units).

Domestic Science (two units).

Agriculture

Agriculture is accepted for from one to four units from schools receiving special state aid for Agriculture and also from other schools in which such course in Agriculture is approved by the State High School Board, as fast as the said schools are prepared to offer work in Agriculture.

NORMAL TRAINING SUBJECTS

One to three units are accepted from schools giving normal courses approved by the State High School Board, providing the applicant has had one year of subsequent teaching experience.

DEGREES

The candidate for a degree must complete the requirements for graduation in his course. Any person may undergo, at suitable times, an examination in any subject, and if such person pass in all the studies and exercises of the course, he is entitled to the appropriate degree; provided, however, that at least one full year (the one immediately preceding the granting of the degree) must be spent at the University, before such degree shall be granted, and provided that examination, in every case, be held before a committee of the Faculty appointed for that purpose.

For detailed information concerning requirements, see pages 12-16, also the bulletin of the appropriate college or school.

THE UNIVERSITY STATE TEACHERS' CERTIFICATE

The University State Teachers' Certificate is granted to all graduates of the College of Education and to those graduates of the Colleges of Agriculture and of Science, Literature, and the Arts who satisfy the requirements as stated in the bulletins of those colleges.

This certificate by State Law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of the student's successful teaching experience, the certificate may be made permanent by the endorsement of the Superintendent of Education and the President of the University.

EXPENSES

FEES

DEPOSIT FEE

At the beginning of each year, in addition to the first semester incidental fee, a deposit fee of five dollars (freshman in Medicine and Dentistry, ten dollars) is required of every student to cover the following possible charges:

Change of registration $2.50
Examination for removal of condition at set time.....$1.00 a subject
Rental of post-office box, university post-office (required of all) ..... .50 a year
Locker rental, locker key deposit..... $0.50 to $1.00 a year
Case-book deposit (Law School), laboratory breakages, or damage to University property.
Penalties for late registration or late payment of fees.

A penalty fee of one dollar ($1.00) must be paid by all students who register or pay fees after the prescribed time. (See calendar, page 7.) After the day previous to that on which classes begin, the penalty for delay increases at the rate of twenty-five cents a day.

The unused balance of the deposit fee will be returned at the end of each year. If, at any time during the college year, the amount of charges against a student exceed the amount of the deposit, a second fee of five dollars ($5.00) will be required.

SPECIAL FEES

The following special items may be included in the expenses of a student:

Minnesota Union membership (required of men)....$1.00 a semester
Special examination for removal of condition, at other than the set time $5.00
Examination on subject taken out of class 5.00
No fee for such examinations on first entering the University, if taken within the first six weeks.
Military uniform, men 15.00
Gymnasium suit, men and women 5.00

INCIDENTAL FEES

One-half of the annual incidental fee, which includes all laboratory charges, is payable at the beginning of each semester. Cards entitling the student to admission to classes will not be issued until the fees have been paid.

Science, Literature, and the Arts:

Annual incidental fee, resident	$ 30.00
Annual incidental fee, non-resident	60.00
Elective	
Music, Instrumental (one lesson per week), annually	64.00
Music, Instrumental (two lessons per week), annually	128.00

College of Engineering and the Mechanic Arts:

Annual incidental fee, resident and non-resident	$ 50.00

College of Agriculture:

Annual incidental fee, resident	$ 30.00
Annual incidental fee, non-resident	60.00

College of Forestry:

Annual incidental fee, resident	$ 30.00
Annual incidental fee, non-resident	60.00
Itasca Park fee, freshman year	3.00
junior year	5.00

Law School:

Annual incidental fee	$ 65.00

Medical School:

Annual incidental fee	$150.00
Hospital fee (junior and senior years)	1.00
School for Nurses, preliminary course, tuition fee(no fees thereafter)	25.00
Course for Embalmers	50.00

College of Dentistry:

Four-year Course

Annual incidental fee, first year	75.00
Annual incidental fee, second and third years	175.00
Annual incidental fee, fourth year	150.00

Three-year Course

Fees same as second, third and fourth years in four-year course.

Both Courses

Instruments and appliances, estimated	350.00
Books, estimated	75.00

College of Pharmacy:

Annual incidental fee, two-year course	$ 82.50
Annual incidental fee, three-year course	55.00

School of Mines:

First Year Five-Year Courses

Annual incidental fee	$ 55.00
Books (Estimated)	20.00
Note books and supplies (Estimated)	5.00

Freshman Year

Annual incidental fee	$ 55.00
Books (Estimated)	25.00

Draughting instruments (Estimated)	$ 15.00
Note books and supplies (Estimated)	5.00

Sophomore Year

Annual incidental fee	$ 55.00
Field work (May 1st to July 1st) {Surveying, Geological}	$100.00 to 150.00
Books (Estimated)	15.00
Note books and supplies (Estimated)	5.00

Junior Year

Annual incidental fee	$ 55.00
Field work (May 1st to July 1st) {Mining, Metallurgy}	$175.00 to 250.00
Books (Estimated)	30.00
Note books and supplies (Estimated)	5.00

Senior Year

Annual incidental fee	$ 55.00
Books (Estimated)	15.00
Note books and supplies (Estimated)	5.00

School of Chemistry:

Annual incidental fee	$ 55.00

College of Education:

Annual incidental fee, resident	$ 30.00
Annual incidental fee, non-resident	60.00

The Graduate School:

Annual incidental fee	$ 30.00

STUDENTS EXEMPT FROM FEES

All fellows, scholars, assistants, instructors and all members of the teaching staff and scientific bureaus or experiment stations shall not be required to pay university fees or tuition.

FEES FOR STUDENTS OF ONE COLLEGE TAKING WORK IN ANOTHER

Where a student of a given college or school elects courses in another, such courses being accepted by the college in which the student is registered as a part of its curriculum, the tuition shall be that of the college in which he is registered.*

If, at any time, such student desires credit for this course towards the degree offered by the second college, he shall pay such additional tuition as is required by the second college, charged in accordance with the schedule indicated below.

*A student paying full fees in a given college, electing courses in a lower fee college, shall pay no additional fees for the work so elected, but if electing in a higher fee college may have the option of paying the pro rata fees of both or the full fees of the first and pro rata fees of the second.

FEE SCHEDULE FOR STUDENTS CARRYING LESS THAN FULL WORK

Students carrying less than the complete schedule of work may pay fees on a credit-hour basis. The following table indicates the charge for each college, also the minimum amount that may be paid by any student.

College or School	Credit Hour Fee	Minimum Total
Annual incidental fee, resident		$ 30.00
Science, Literature, and the Arts	$2.00	$ 5.00
Engineering	2.50	10.00
Agriculture	2.00	5.00
Law	5.00	10.00
†Medicine	3.00	10.00
†Dentistry	3.00	10.00
Pharmacy	3.00	10.00
Mines	2.00	10.00
Chemistry	3.00	10.00
Education	2.00	5.00
Graduate School	2.00	5.00

†In these two colleges the pro-rating is on the basis of clock hours.

LIVING EXPENSES

Board and Room (women)—Sanford Hall, the one dormitory for women, accommodates ninety girls, about one-half of whom may be freshmen. The charge for room and board is $225 for the University year. Applications should be sent to the Director of Sanford Hall, University of Minnesota.

After June 1 the Registrar will supply a list of approved boarding and rooming places. Women may not engage rooms in houses not on this list without permission of the Dean of Women. Luncheons on the cafeteria plan are served daily in Shevlin Hall.

(Men)—New students will find that they will be more likely to secure comfortable rooms and suitable board if they will consult the general secretary of the Young Men's Christian Association immediately upon arrival at the University, or if they will correspond with that officer before coming to the University.

Three meals a day may be secured at the Minnesota Union on the cafeteria plan at practically cost prices.

(All Students)—The expense of living at the University varies greatly according to individual habits and tastes. In general the scale of expenses is below rather than above that of similar institutions in the middle west and is considerably lower than that of most institutions situated in the eastern states. The price of board ranges from three dollars per week to six dollars. The average amount paid during the year 1912-13 was $3.93, but excellent board may be procured for $3.50.

Furnished rooms vary in price from $5 to $18 per month. Two students rooming together would of course reduce this expense. The average amount paid for room rent in 1912 was $1.64 a week, or a little

over $7.00 a month. Thirty-four per cent of the students paid less than $6.50, and 14 per cent paid less than $5.50 a month.

General expenses—Three years ago the University made a thoro canvass of all students to find out what they were paying for room and board and other expenses. The total expenses for the academic year, including tuition and other fees, were found to range from less than $250 to over $850. There were 34 students who reported their expenses as less than $250; 38 who spent from $250 to $300; and 113 who spent from $300 to $350. The average expenses for Science, Literature, and Arts students, without counting tuition, were about $440.

Student Employment—Many students earn considerable sums in outside work during both the university year and the summer vacation, and some earn their entire college expenses in this way. Forty-eight per cent of the men and 12 per cent of the women did outside work during the college year, and their average earnings were $161.16 for men, and $99.14 for women. There were 223 men who earned over $200 during the college year. As for the summer vacation, 85 per cent of the men and 16 per cent of the women earn something toward their university expenses. The average summer earnings of the men were $161, and of the women, $68. It is therefore a fairly common occurrence for a man to earn at least $300 towards a total expense of say $400.

If it is possible for the student to have part of his expenses paid, he should not attempt to earn his way entirely by his own exertions. It is a comparatively easy thing for a young man to earn a part of his living while attending the University and yet do good work in his classes. Students who really want work seldom fail to find it. In coming to the University, the student should bring enough money to carry him through at least the first semester without relying on outside work. By that time the student will have adjusted himself to the new environment and will know how to use his time to the best advantage.

Men who desire advice and assistance in securing a position to help pay their expenses should confer with the Director of Student Employment at the University. Women for the same purpose should consult the Dean of Women, Shevlin Hall.

Experiences of Students—Four articles (one by a young woman) on "Earning one's way through College" written by University students are published in the Minnesota Code. A copy will be sent free to any address upon application.

SCHOLARSHIPS, LOANS AND PRIZES

GRADUATE FELLOWSHIPS AND SCHOLARSHIPS

Shevlin Fellowships

The University of Minnesota offers four Shevlin Fellowships of $500 each for the year 1915-16. They are open to graduate students, one each in the Colleges of Agriculture, Chemistry, Medicine, and Science, Literature, and the Arts. Applications for these fellowships must be made on or before March 1. Blank applications can be obtained from the Dean of the Graduate School.

Assistants and Scholars

The following Assistantships and Scholarships are also open to graduate students. They carry stipends ranging from $225 to $800 with remission of tuition in the Graduate School. Appointments are made upon the recommendation of the departments concerned. Applications may be made through the Dean of the Graduate School.

Agriculture	16 Assistants
Animal Biology	3 Assistants
Astronomy	1 Scholar
Botany	3 Assistants
Chemistry	7 Assistants
Comparative Philology	1 Scholar
Economics	2 Scholars
Education	2 Scholars
English	1 Assistant, 2 Scholars
Geology and Mineralogy	2 Scholars
German	2 Scholars
History	2 Assistants, 2 Scholars
Latin	1 Scholar
Mathematics	1 Scholar
Medicine	6 Teaching Fellows*, 5 Scholars
Philosophy and Psychology	2 Scholars
Physics	2 Scholars
Political Science	2 Scholars
Rhetoric and Public Speaking	6 Scholars
Romance Languages	2 Assistants, 1 Scholar
Scandinavian	1 Scholar
Sociology and Anthropology	2 Scholars

The Albert Howard Scholarship Fund

This scholarship, amounting to $240 a year, is awarded to graduate students in the College of Science, Literature, and the Arts. The income from this fund will not be available during the year 1916-17.

*Special Requirements. Address inquiries to Dean of the Medical School.

Class of 1890 Scholarship

As a gift of the class of 1890 the annual income from the sum of $2,500 will be available in September, 1916, to a graduate of the College of Science, Literature, and the Arts or the College of Engineering who has shown distinguished ability and initiative as a student and who desires to make further preparation for public service.

UNDERGRADUATE SCHOLARSHIPS

The Moses Marston Scholarship in English

The annual income of one thousand dollars is to be used to further English study. The scholarship is awarded by the English Department as a recognition of special capacity for literary and linguistic studies.

The Minneapolis Steel and Machinery Company Scholarship

This scholarship of $500 is available for work by a graduate student in the laboratories of the College of Engineering. The subject upon which work will be carried on is to be determined by agreement between the Company and the College.

The Minneapolis College Woman's Club Scholarship

For the year 1915-16 this scholarship amounts to $150. In awarding it the preference will be given to students in the junior and senior classes and to graduate students. Application for this scholarship may be made to the Dean of Women.

The St. Paul College Woman's Club Scholarship

For the year 1915-16 a scholarship of $100 is available. In awarding it, the character, the scholarship, and the need of the applicants will be considered. Although open to all women in the junior and senior classes and to graduate students preference will be given to young women from St. Paul. Applications for it may be made to the Dean of Women.

STUDENT LOAN FUNDS

Unless otherwise stated, all applications for loans should be made to the University Comptroller.

The Gilfillan Trust Fund

The annual income from this fund of $50,000 is at the disposal of the Executive Committee of the Board of Regents either as a gift or a temporary loan to worthy students of the University who are residents of Minnesota. The income of $2,000 is loaned to students on their notes in amounts not exceeding $200 to any one person in one year, at the rate of five per cent per annum. The regulations governing the administration of the income from the fund may be learned by addressing the President of the University.

The Elliot Scholarship Loan Fund

The income from this fund of $5,000 is loaned students in the School of Mines on the following conditions: the financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work, and promise of usefulness in his profession. When money is available, it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest, at the earliest convenience of the recipients.

The Puritan Colony Scholarship Loan

For the year 1915-16 this scholarship loan amounts to $100. It is available for women students of New England birth or ancestry. In awarding it the preference will be given to young women in the junior and senior classes. Application for it may be made to the Dean of Women.

School of Agriculture—Class of 1902 Trust Fund

A fund of $100 is available for temporary loans to deserving students needing such help who are not below the junior class in the School of Agriculture. Applications should be made to the Dean.

The Ludden Estate Loan Fund

Six hundred and twenty-five dollars is annually available for short or temporary loans in limited amounts, to students in any department of the University.

The Ludden Real Estate Loan Fund

The sum of $3,000 is available for loans to students in any department of the University.

Loan Fund for Women Students

This fund is to be used for emergency loans to women students whose character and scholarship recommend them for assistance. Application may be made to the Dean of Women.

Home Economics Self-Government Loan Fund

The sum of $250 is available for small emergency loans to women in the division of Home Economics whose character and scholarship recommend them for assistance. Application may be made to the Dean of Women.

PRIZES

The John S. Pillsbury Prize

Three prizes of one hundred, fifty, and twenty-five dollars each, have been awarded annually for the best work in the Department of Rhetoric and Public Speaking, as evidenced finally by an oration in public.

The Frank H. Peavey Prize

This prize of one hundred dollars is awarded to the members of the team winning the annual freshman-sophomore debate.

The '89 Memorial Prize in History

A prize of twenty-five dollars each year is given for the best thesis in history, written from the sources, by a member of the graduating class.

The Frank O. Lowden Prize

The annual income from $3,000 is available to orators competing in the Northern Oratorical League. A prize of one hundred dollars will be given to the orator winning the first place and fifty dollars to the winner of second place.

The Andrew Lanquist Prize

An annual prize of twenty-five dollars is awarded to the student who during the current year, has received the highest rank in the study of Swedish.

The William Jennings Bryan Prize

A prize of fifty dollars will be awarded every fourth year to the writer of the best essay upon a topic in Political Science to be announced. The essay which is limited to ten thousand words, must be handed to one of the instructors in Political Science by May 1. The next award will be made in 1917.

The Alumni Weekly Gold Medal

This medal is awarded annually by the Faculty Committee on Debate and Oratory, to that member of the graduating class who has, in the judgment of the Committee, made the best record in forensics during his college course. The medal is awarded only to a student who has shown himself broadminded, unselfish, industrious, and willing to work courteously and enthusiastically with others so as to serve the highest interests of debate and oratory in the University.

The Rollin E. Cutts Prize in Surgery

The income from $500 is awarded in the form of a gold medal to that member of the senior class of the Medical School who presents the best thesis showing original work upon a surgical subject.

The Dr. J. W. Bell Prize in Physical Diagnosis

An annual prize of $100 is offered in the Medical School, to the student showing the highest proficiency in physical diagnosis. Information as to special conditions connected with this prize may be obtained from the Dean of the Medical School.

The Mercer Prize

Three medals were awarded annually, to the three winning debaters in a Law School debate, or series of debates, conducted under rules laid down by the Law Faculty.

The Briggs Prize in Foundry Practice

Seventy-five dollars annually, in two prizes, accompanied by gold medals, will be awarded to sophomores in the College of Engineering for the best essays relative to foundry practice. No prize will be awarded if less than five essays are submitted in competition. Essays should contain about 3,000 words, and must be submitted to the Professor of Rhetoric on or before May 1.

The George C. Andrews Prize

This prize is offered annually to the Post-Senior Mechanical Engineers for the best essays on any subject connected with heating and ventilation. It consists of $50 in cash accompanied by a suitable medal; a second prize of $25 in cash accompanied by a medal is also given. The winner of the first prize is offered a position with the George C. Andrews Heating Company.

ORGANIZATIONS AND PUBLICATIONS

SELF-GOVERNMENT ORGANIZATIONS

The Minnesota Union was organized in the spring of 1908 "to promote the best interests and welfare of the University of Minnesota, and comradeship among its members, and to erect and maintain a suitable club house for such purposes." All men students of the University are active members of the Union and are assessed a membership fee of one dollar a semester, payable at the time of registration. The Legislature gave the Chemistry Building for the use of the Union and $17,500 for remodeling.

The dining room is in operation, and the club rooms on the second floor are fitted up for temporary use until funds are available for remodeling them. The dining room serves three meals a day at practically actual cost. Students are advised to ascertain the Union prizes for board before making arrangements elsewhere.

The Women's Self-Government Association is open to all women students of the University. Its purpose is to create a sense of unity and fellowship among the women, to promote and maintain the highest standards of University life and to regulate all matters of student conduct not falling under the jurisdiction of the Faculty. The headquarters of the Association are in Shevlin Hall. Members of the Association will be in readiness during the opening days to meet new students and to serve them in every way possible. The dues are fifty cents a year.

The Home Economics Self-Government Association—The women in the College of Agriculture, altho nominally members of the Women's Self-Government Association, have an independent organization, the Home Economics Self-Government Association, which is open to all women in the College of Agriculture. The form of organization and the purpose of the Association are similar to those of the Women's Self-Government Association, but adapted to the needs of the students in the College of Agriculture.

The All-University Council is composed of representatives elected from the senior class of each college or school. Its function is mainly that of a student self-government body, representing the student body in matters affecting student interest, controlling their activities to a large extent, and endeavoring to unify the spirit and promote the best possible welfare of the University.

College Councils—Several of the colleges of the University have their own councils articulating with the All-University Council and having similar functons.

MISCELLANEOUS ORGANIZATIONS

There are at the University more than two hundred student organizations representing religious, ethical, literary, scientific, dramatic, athletic,

social and other activities. A complete list of these organizations with brief statements concerning each is given in the Minnesota Blue Book and Students' Social Register, a copy of which will be sent upon request.

PUBLICATIONS

Research Publications of the University of Minnesota.—These were begun in 1912 with the support of a special appropriation by the Legislature. These publications will contain the results of original investigations by members of the University. They appear in the form of several series of studies, which will offer opportunity for the publication of large monographs and of papers of special importance to the people of this State, for which insufficient provision has been made heretofore.

The Minnesota Daily, the University newspaper, is published five times each week during the University year by the Minnesota Daily Association. Its staff is composed entirely of students.

The Junior Annual, called "The Gopher," is a book published annually by the junior class of the University.

The Minnesota Magazine is a monthly magazine devoted to the cultivation of literary taste and effort among the students of the University. It is managed by a board of editors chosen from the senior class.

The Minnesota Alumni Weekly is published each Monday during the University year, thirty-six numbers in all. It is published in the interests of the alumni and the University.

The Minnesota Engineer of the Society of Engineers is issued quarterly. It is devoted to the publication of articles upon engineering subjects.

The Agrarian is a book published annually by the senior class of the School of Agriculture.

The Minnesota Farm Review is a paper published and managed by the Alumni Association of the School of Agriculture. It is the official organ of the Alumni Association and the Farmers' Club. The *Review* is intended to be a medium through which former students may keep in touch with the Agricultural School and with one another. It also endeavors to bring the farmers of the State into closer touch with the School, the College, and the Experiment Station. To this end, the paper strives to present the latest progress in the experimental work of the various stations and to call attention to the most practical farm practices.

The Botanical Survey publishes *Minnesota Botanical Studies* and *Minnesota Plant Studies.* The former is devoted to the results of investigations carried on in the Survey and in the Department of Botany. The latter is a series of popular booklets, treating of the plants of the State. In addition, the Survey publishes at intervals semi-popular scientific monographs, such as *Minnesota Plant Life, Minnesota Plant Diseases,* and *Minnesota Freshwater Algae.*

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DEGREES GRANTED IN 1914

TOTAL—703

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

BACHELORS OF ARTS—233

Louise Abrahamson
Helen Louise Acomb
George Rodney Ainsworth*
Elizabeth Aiton
Marguerite Hughes Allison
Oscar Enoch Alm
Arthur Henry Anderson
Edna Olivia Anderson
Ruth Mills Anderson
Agnes Mary Armstrong
Charlotte Aune
Willoughby Maynard Babcock, Jr.
Claire Marie Barrett
Martha Frances Beck
Arthur Lawrence Beckendorf
Viola Beebe
Laurence Belknap
Laura Bergan
Martha Berkey
Alice Leora Berry
George Ephraim Blanchette
Grace Geneva Blodgett
Harold Samuel Boquist
Ruth Lucena Boyce
Bess Boyle
Sadie Boyson
Anna Pauline Brezler
Elfie Brodeen
Lola Christine Brodtkorb
Lillian Byrnes
Laurence Hammond Cady
Leah Marguerite Capps
William Holman Cartwright
Harry Perkins Chaffee
Rolph Fuller Chamberlain
Royal Norton Chapman*
Mae Pauline Chesnut
George Henshaw Childs
Alice Marguerite Colter
Grace Elizabeth Conners
Walter Winston Cooper
Margaret Quinlan Corkrey
Florence Margaret Craig
Hale Luzerne Crilly
Robert Mabie Crounse*
Ethel Ardell Curry
Vera Adeline Curtis
Hazel Cuzner
Edwin Theodore Dahlberg
Mary Dale
John Horton Daniels*
Dorothy Jane Davis
Eleanor Davis
Pearl Minnie Day
Lester Dickinson
Florence Mary Donohue
Helen Louisa Drew
Alta Duxbury
Alma Minna Eckhoff
Kathleen Ethel Eggar
Alice Florentine Erickson
Agnes Olive Ericson
Grace Evans
Mary Evans
Marion Phillis Fee
Arthur Kingsbury Fillebrown
Julia Ann Fitzpatrick
Agnes Elizabeth Flaskerud
Nina May Ford
Signe Marie Franzen
J. John Friesen
Jeanette Florence Frisch
Alfred Gauger
Dorothy Agnes Gilbert
Fredericke Glaessner
James Richard Glynn
Florence Ruth Goldberg
Clara Gonska
Harriet Gwendoline Goodwin
Gertrude Elizabeth Gorman
Thomas Henry Granfield
Edna Ruth Gray
Angela Catherine Griffin
Bessie Alpha Grimm
Ernest David Groenig
Helene Groth
Edna Loretta Handy
Elsie Hankey
Dorothy Marguerite Hannaway
Ivan Oscar Hansen
Herbert Hanson
Gladys Harrison

*Rendered a real service as adviser to freshmen during the year 1913-14.

Harold Albert Hauenstein
Effie Donna Heighstedt
Margaret Elvina Heinemann
Edith Gertrude Herbst
George Montgomery Hicks
Henry Godfrey Hodapp*
Ethel Theresa Howard
Nellie Marion Hubbell
Walter Irvin Hughes*
Vivien Sarah Hunter
Harriet Genevieve Hurley
Margaret Isabelle Hutchinson
Linda James
Meta Anita John
Carolyn Adams Johnson
Constance Pearl Johnson
Herman Ferdinand Johnson
Ruth Alice Johnson
Winifred Irene Kelly
Bessie Ella Kesson
Stella Rosanna Kesson
Celia Julia Kopplin
Irene Ottilie Kranz
Walter Joseph Kennedy*
Gertrude Kulberg
Hazel Kunzi
Leonard Lampert
Ruth Evangeline LaPlant
Clara Annetta Larson
Alice Daly Leahy
Mabel LeBorious
Catherine Jean Leland
Frances Lindeman
Margaret Lloyd
Bernard Nathaniel Lovgren*
May Helen Lydon
Blanche Edith Lyman
Florence Louise McCray
Veronica McDonald
John Paul McGee*
Marie Meland
Ethel Marjorie Mellem
Theron Gray Methven
Isalinda Hingeley Miller
Viola Fuller Miner
Norman Stuart Mitchell*
Frances Charlotte Mooney
Allen Moore*
Gertrude Moore
Marion A. Moorhead
Cornelia Morgan
Estelle Margaret Moynihan
Imogene Charlotte Nelson
Olive Amelia Nelson
Orrelle Oberg
Myrtle O'Connor
Clarence Chester Winfield O'Gordon
Julia Oredalen
Olina Oredalen
Frances Mae Owen
Laura Louise Owens
Elsie Nellie Pagenhart
Lillian Olivia Paige
Hobart Kingsbury Painter, Jr.*
Esther Mary Pardee
Anna Lorraine Partington
Sydney Allen Patchin
Harold Winfield Patten
Emma Paulson
Henry Thomas Paulson
Barbara Pecor
Hazel Florence Perry
Effie Elvira Peterson
Myrtle May Pfiffner
George Diedrich Plesscher
Donald Lane Pomeroy*
Robert Edwin Porter
Alta Morrill Potts
Gertrude Prindle
August Ludwig Prodoehl
Jeanette Geneva Qualee
Nellie Irene Raine
Mark Matthew Reed
Wilma Louise Reed
Mildred Mae Richardson
Hugo Ringstrom
Florence June Robinson
Zora Ingersoll Robinson
Ella Amelia Rundquist
Harold Levi Rypins*
Myrtle Elsie Savidge
Emmons W. Sawyer*
Marion Elizabeth Schaller
Irvin August Schmidt
Frances Schmitz
Herman W. Schroeder
Marjorie Frances Schulze
Ruby Gertrude Seham
Eleanor Norcross Shenehon
Alfred Henry Siedenberg
Arthur Siedenberg
Lucien Douglas Sinclair
Alma Gertrude Skoglund
Cedric Burnett Smith
Lucile Smith
Emma Belle Stein
Marion Ruth Stevens
Matie Edith Stoner
Alma Marie Strand
Joseph Dennis Sullivan
Katherine Ellen Sullivan
Florence Helen Swanson
Elsie Katherine Tanner
Gladys Caroline Taylor

*Rendered a real service as adviser to freshmen during the year 1913-14.

Adeline Theoline Tenold
Hazel Vinita Thoen
Minnie A. Thompson
Ella Alice Margaret Thorp
Bertha Herborg Thorpe
Bernice Muriel Travis
Gladys Lucile Travis
Emma Antoinette Treibel
Anna Mary Trieloff
Harriet Lena Trieloff
Mildred Behse Trumble
Frederick Gale Tryon*
Ruth Farrington Tupper
Marguerite Turner
Ruth Vandyke
Emma Vondrak
Josephine Ware
Vera Warren
Bennett Addison Webster*
Mildred Maud Werring
Agnes Westman
Arthur Prescott Winter
Hazel Elena Woodward
Stephanie Maria Worlitsek
Vera Linn Wright
Stella Gertrude Yerxa
Mildred Ruth Ziegler

BACHELOR OF ARTS—*In Music*—1

Grace Mary Donohue

BACHELORS OF SCIENCE—17

John Warren Bell
Eric Thorston William Boquist
Arthur Ferdinand Bratrud
Paul I. Carman
James Nicholas Dunn
Bernard Gallagher
William Ginsberg
Abraham Irving Haskell
Carl Lembke
Fredolph Herman Magney
Oliver Helmer Peterson
Carl Wilhelm Paulson
John Henry Frederick Schroeder
Iver Ferdinand Selleseth
William Raymond Shannon
Percy Alson Ward
Clayton K. Williams

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

CIVIL ENGINEERS—13

Byron Harry Bradley, B.S.
Edward Gummer Chilton, B.S.
Benjamin John Curtis, B.S.
Maurice William Hewett, B.S.
Walter Edwin Koepke, B.S.
Helmer Victor Kruse, B.S.
Albin Larson
Harry Douglas Lovering, B.S.
George Alfred Morse, B.S.
Arthur Warren Quiggle, B.S.
Harold Hutchins Thurston, B.S.
Donald William Webster, B.S.
Benjamin Wilk, B.S.

ELECTRICAL ENGINEERS—9

Allen Guthrie Dewars, B.S.
Clarence Arthur Dow, B.S.
Rudolph Conrad Goebel, B.S.
Ralph Leon Goetzenberger, B.S.
Frederick Wilhelm Hoorn, B.S.
Vincent Herbert Irwin, B.S.
Alexander Simon Theodore Lagaard, B.S.
William Louis Mahoney, B.S.
Walter William Wentz

MECHANICAL ENGINEERS—4

Albert Buenger, B.S.
Edward Fowler Critchett, B.S.
Edward Kopper, Jr.
Melvin Ovestrud, B.S.

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*Rendered a real service as adviser to freshmen during the year 1913 14.

BACHELORS OF SCIENCE—*In Engineering*—53

Eugene Herbert Adler
Peter Paul Bisek
Walter C. Brenchley
Harold Vivien Burnett
Wendell Phillips Chapman
James Albert Colvin
Harvey Girard Dimond
William Karl Doolittle
William Ripley Dorr
Roy Owen Dunham
Carl Edwin Ekberg
Douglass Elliott
Eugene Lucien Fallon
John Henry Gammell
Carl Albin Gunnarson
Laurence Darwin Hammond
Harold Russell Harris
James Leo Hartney
Arthur Charles Hubbell
John Carroll Hustad
Otto Emanuel Jackson
Carl John Johnson
Edgar William Johnson
Elmer Walter Johnson
George Ray Jones
Maurice Bernhart Lagaard
Louis Larson
Arthur Louis Layden
Henry Stanley Loeffler
Harris John Mayer
Karl John Mertz
Herbert Walter Meyer
Carl Theodore Nordstrom
Lester M. Mitchell
Leonard Eugene Ott
John Sherman Peoples
Albert Leander Peterson
Andrew Morton Peterson
John Roger Price
John Howard Putz
Renville S. Rankin
Burton Robertson
Harvard Seldon Rockwell
Fletcher Rockwood
Carl William Schroeder
Dow Irving Sears
Clarence Julian Snow
Everett Spencer Tallmadge
Paul William Thayer
Cedric Stanley Weatherill
Howard Nelson Weigel
Hugh Brown Wilcox
Karl Fred Wuest

COLLEGE OF AGRICULTURE

BACHELORS OF SCIENCE—*In Agriculture*—34

Philip Arthur William Anderson
Edwin Emil Bauman
Walter Spurgeon Beach
Harold Lamont Borst
George Brandt
Spencer Boyd Cleland
Benjamin Cole
James Martin Curran
Franc Pomeroy Daniels
Mathias Peter Hajicek
William C. Farnquist
Carl Alfred Halverson
Harlow James Hanson
Thomas Robert Howell
Peder Johnsrud
John Francis Kelley
Alfred James Lashbrook
Arthur Bernard McDonald
Fred Fremont Moore
Carl Alvin Oppel
Ward Stearns Orsinger
Alfred George Perkins
Algert Lenus Peterson
Roy Maynard Peterson
Frank Joseph Piemeisel
Lynn Shelby Robertson
Felix John Schneiderhan
Raymond Sisler
Ray Patterson Speer
Albert Stanek
Samuel Holliston Thompson
Jay Patterson Voak
William Woods Wilcox
Donald Wilson

BACHELORS OF SCIENCE—*In Home Economics*—27

Minnie Stewart Allison
Gena Marguerite Aure
Martha Christine Blegen
Vivian Elizabeth Brodeen
Beryl Beatrice Brown
Genevieve Lida Burgan
Leola Cunningham
Lucy Genevieve Dorsey
Viola Ellison
Frances Adelia Ford
Susan Marion Gillard
Janet Etta Coulter Green

Mary Viebert
Alice Maud Hillman
Dorcas Elizabeth Hubbard
Mirdyaleen Maxwell
Esther Ruth Nelson
Julia Annette Nelson
Adelia Olson
Mary Alice Papez
Mary Elizabeth Pickett
Olive May Potter
Caroline Florentine Sheire
Marion Luella Walters
Agnes Isabelle Webster
Ethel Jean Willis
Viola Wood

THE COLLEGE OF FORESTRY

BACHELORS OF SCIENCE—*In Forestry*—12

Donald Ross Aldworth
Kenneth Jay Braden
Thomas Sherwood Claggett Cummings
George Foster Freeman
Samuel Alexander Graham
George Clarence Lindeberg
Alfred Theodore Mueller
Stanley Lakeman Ringold
Logan Rose
Adrian Archibald Achilles St. Marie
Harold Walter Spink
James Rudolph Torgrim

THE LAW SCHOOL

BACHELORS OF LAW—35

Zepherin Lewis Begin
Nels Carter Christensen
Hugh A. Curran
Alexander Edward Douhan
Arthur Christopher Erickson
Harvey Leroy Freeland
Robert Virgil Gleason
John Jacob Hadler, B.A.
Peder Magnus Hage
Oscar Coleman Hauge*
Harvey Sheely Hoshour, B.A.*
Clay Johnson
Harold Junack
Ray Klimenhagen
Elsie Henry Latimer, B.A.
Thomas Erwin Latimer, B.A.
William McAlmon
Elmer W. McDevitt
Alan Johnston McBean, B.A.
John William McCauley
William Edwin MacGregor
Richard Dominic Manahan*
Philip Joseph Meighen
John Bernard Probst
Frank Herbert Simmons
Leighton R. Simons
Charles Simpson
John Skadberg
Rollin Leonard Smith, B.A.
Glenn Stennett Stiles
Franklin Dietrich Tonne
Hammond Turner
Russell Otto Webster
George Aaron Weedell
Raymond Ziesmer*

THE MEDICAL SCHOOL

DOCTORS OF MEDICINE—31

Nels Philip Anderson, B.S.
Alva Alonzo Conley, B.S.
Lawrence Lewellyn Craven, B.S.
Sigfred Engh, B.S.
Louis Martin Field, B.A.
Frank Peter Frisch, B.S.
George Francis Ghostley, B.S.
Hugo John August Julius Hartig, B.S.
Gilbert Hendrickson, B.S.
Hermina Hermansen, B.S.
Alexander Josewich, B.S.
Zerah Putnam King
Gilbert Kvitrud, B.S.
Richard Ormond Leavenworth, B.S.
Clifford Morell, B.S.
Joseph Moses, Jr.
Thomas Myers, B.S.
Katherine Ann Nye, B.S.
Axel Oftedal
Edward Sivern O'Hare

*Rendered a real service as adviser to freshmen during the year 1913-14.

Daniel Pennie, B.S.
Hugh Williamson Reynolds
Olof Ivar Sohlberg, B.S.
Saul S. Soloway, B.S.
Harold Ward Stone, B.S.
George Sutton, B.S.
Kenneth Taylor, B.S., M.A.
Carl Andrew Traeger, B.S.
Fredrick Arthur Willius, B.S.
Karl Christian Wold, B.S.
Floyd Owen Woodward, B.S.

GRADUATES IN NURSING—6

Maude Frances Elizabeth Angle
Lana Martha Babcock
Dorothy Greenwalt
Bera Elisabeth Lemstrom
Signa Eugenie Lindquist
Caroline Andrea Manger

THE COLLEGE OF DENTISTRY

DOCTORS OF DENTAL SURGERY—86

Bert George Anderson
Lincoln Fred Anderson
Clinton Harvey Beers
Valentine Harry Berens
Hulda Emelia Berger
Earl Diedrich Bettenhausen
Abner Gustaf Bjorklund
George Henry Blum
Hans Ernest Braasch
Joseph Sinclair Brown
Albert Louis Bruener
LeRoy Carlson
Wilbur Andrew Carlson
Frank Dale Cervery
Walter Edward Clifford
Charles Leo Coleman
Edward Cooperman
Francis Aloysius Crahen
Harold Vincent Eastburn
Roy Hoff Eveland
Oscar Eckman
Henry Herman Ewy
William Feller
Ranthus Fouch
Joseph Fournier
Jerome Louis Fritsche
Nellie Letitia Fay
Samuel George Gingold
Earl Gilmore Girvin
William Glad
Orville Sigfried Haarmann
Mede Jeral Hance
Joseph Arthur Hanson
Ferdinand Hedtke
James Heley
Edward Robert Hilden
Emmette Russell Horr
Hans Sunde Humerfelt
Charles S. James
Elmer Johnson
Oscar Theodore Johnson
Stewart Wilhelm Johnson
Walter William Larson
Benjamin Richard Lund
Milton Theodore Lundblad
Charles C. Matson
Walter Merkert
Frank Martin Miller
Benjamin Franklin Moll
Robert Douglas Monaghan
Clarence L. Nelson
Walter Joseph Nelson
Floyd Victor Newell
George Oberg
Carl Reuben Oman
Harry Arthur Perlich
Leo Roman Pirsch
Walter Wilbur Preine
Clarence Deane Price
Maurice O. Runberg
Leland James Salisbury
Charles William Schien
John James Sculley
Joyce Sheils
William Lees Smith
Edward Solberg
Neil Alexander Stacey
Benjamin John Stahmann
Forrest Phinley Storms
Fred Christian Stucke
Elmer Julius Sundby
George Charles Swanbeck
Lee Roy Sweitzer
Merrill Gustav Swenson
Henry Albert Taarud
Orrin John Tagland
Styner Nicolai Thams
Earl Thompson
Robert Towne Thompson
Reuben Laurentius Toren
Clarence Henning Turnquist
Herbert Ellis Turnquist
George Greenman Van Campen
Merl Milton Van Campen
Raymond Oscar Weiss
Robert Wiberg

THE SCHOOL OF MINES

ENGINEERS OF MINES—9

Arthur Philip Anderson
Alfred Charles Bierman
Howard Nelson Eidemiller
Ernest Levi Larson
Orrin Weston Potter
Howard Quinlan
Louis George Ravicz
John Henry Robertson
Harold Wasson

THE COLLEGE OF PHARMACY

MASTERS OF PHARMACY—2

Oscar Blosmo, Ph.C.
John Abner Handy, Ph.C., B.S.

BACHELORS OF PHARMACY—29

Harry Alfred Ames
Henry Bernard Anderson
Grover Cleve Backman
Rasmus Bartelson
Arthur Theodore Blomquist
Harry Walter Christianson
Leonard Albert Dunnum
Liguori Mary Ertel
Joseph Paul Faas
Milton George Giese
Theodore John Hast
Morris Wyllys Henney
William Ernest Hildebrandt
Noel Holm
Ethel Adah Jardine
Louis Christian Jensen
Harold Ernest Meyer
Irl David Mix
Lenus Alfred Norin
Clarence Alfred Perkins
Helmer Alvind Roen
Bernard Rotegard
Roy Theodore Scott
Carl Swanson
Sigfred Miller Vikre
Alvin Urban Wallen
Sam Arthur Weisman
Charles Edwin Wright

THE SCHOOL OF CHEMISTRY

CHEMICAL ENGINEERS—5

[illegible]nderson, B.S.
[illegible] Berman, B.S.
[illegible]rn, B.S.
Henry Peterson, B.S.
Ralph Elmer Porter, B.S.

[illegible]ACHELORS OF SCIENCE—3

Darwin May
[illegible]Marshall Tinkham

THE COLLEGE OF [illegible]

[illegible]—3

[illegible]cent Merten

BACHELORS OF ARTS—[illegible]cation—53

Hazel Allen
Herman Ferdinand Anderson
Marjorie Helene Atwood
Ruth Katherine Barr
Martha Bertine Birkeland
Florence Marie Brawthen
Helen Beatrice Conary
Edith Bland Cowin
Herbert Arnold Falk
Henry O. Dyck

George Lee Fleming
Knut Olsen Gjernes
Frances Elizabeth Griswold
Orlando M. Hanson
Harold Eyvind Harbo
Cleveland Hayes
Merlin Frank Heilig
Clara Pauline Hendrickson
Velma Carolyn Hoovel
Susie Huff
Arthur Walfred Johnson
Emil Josi
Elsa Petronella Krauch
Ella Lorentzen
Clara McCune
Mary Kerr McElroy
Edna Belle McKenzie
Genevieve McLane
Margaret McQuilkin
Alma Leona Mayer
Helen Robinson Messenger
Worel Charles Miles
Clara H. Miller
Albert S. Murray
Nels Frank Nelson
George Netteland
Nellie Marie Pender
Mabel Clara Peterson
Elizabeth Mabel Pritchard
Nathaniel Janarius Quickstad
Jo Evelyn Quigley
Alice Maria Roen
Helen Isabel Rugland
Robert Ellsworth Scott
John Shoemaker
Thomas Jenkins Smart
Elizabeth May Smith
Cassie Rose Spencer
Vivian Ilda Tarbox
Amelia Katherine von Levern
Anna Wiecking
Martha Frances Wolff
Frank Yukel

THE GRADUATE SCHOOL

MASTERS OF ARTS—30

Anna Kimber Boutelle
B.A. '04, Minnesota
Major, History
Minor, Philosophy
Thesis, Central Assemblies in England under Norman Kings, 1066-1155: A study in Terminology

Axel Brett
B.A. '12, Gustavus Adolphus
Major, Scandinavian
Minor, Philosophy
Thesis, Psychological Abnormalities in August Strindberg

Luella Mae Bussey
B.A. '13, Minnesota
Major, English
Minor, Rhetoric
Thesis, A Study of the Structure of Emerson's Essays

Hallie Chalfa[illegible]
B.A. '[illegible]
Major, Philology
Minor, English
Thesis, A Comparison of the Old High German Tatian with the Monsee Fragments and the Northumbrian Glosses with Reference to the Treatment of the Latin Original

Homer Alexander Desmarais
'07, le Petit Seminaire, Montreal
'09, St. Paul Seminary
Major, French
Minor, Latin
Thesis, The French-Canadian Pronunciation

Zoe Donaldson
B.A. '12, Minnesota
Major, English
Minor, Rhetoric
Thesis, To Determine the Relative Shares of Shakespeare and [illegible] Thomas Heywood in the A[illegible] of Troilus and Cressi[illegible]

Donald E[illegible]
Bernice Burns Foster
B.A. '11, Minnesota
Major, Education
Minor, English
Thesis, The Marking System

Camille Elizabeth Freund
B.A. '08, Radcliff
Major, English
Minor, German
Thesis, The Use Made by Barclay of Brant's Narrenschiff

Mary Ella Hartwell
B.A. '06, Albion College
Major, Mathematics
Minor, Physics
Thesis, The Generation of Conic Sections by Projective Ranges and Pencils: A Study of the Nature of the Conic by Means of the Nature of the Projective Relation in its Generation

Aloys Philip Hodapp
B.A. in Education '10, Minnesota
Major, Geology
Minor, Chemistry
Thesis, The Origin and Accumulation of Petroleum

Edwin Thomas Hodge
B.A. '13, Minnesota
Major, Geology
Minor, Chemistry
Thesis, The Composition of Waters in Mines of Sulphide Ores

Sophia Augusta Hubman
B.A. '13, Minnesota
Major, German
Minor, English
Thesis, The Philosophy of the German Short Story

Anna May Lane
B.A. '10, Minnesota
Major, History
Minor, English
Thesis, A Critical Edition of the First Three Months of D'Ewes Notes of the Long Parliament of 1640

Albertine Marie Elizabeth Larson
B.A. '08, Northwestern
Major, Latin
Minor, English
Thesis, The Life and Principate of the Emperor Claudius

Ammy Brynhild Lemstrom
B.A. '13, Minnesota
Major, Sociology
Minor, History
Thesis, A Study of Prehistoric Finnish Culture, Based on the Kalevala

Rita Dallas MacMullan
B.A. '12, Minnesota
Major, Psychology
Minor, Sociology
Thesis, The Estimation of Temporal Intervals

Ruth Elizabeth Marshall
B.A. '13, Minnesota
Major, History
Minor, English
Thesis, Was There a Cabinet Council Under the Earlier Stuarts

Torger August Lillehei
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Major, Scandinavian
Minor, Philosophy
Thesis, Alexander Kielland's Authorship

Ruth Mohl
B.A. '13, Minnesota
Major, German
Minor, Philosophy
Thesis, The Ethics of Marie von Ebner Eschenbach, as Reflected in Her Works

Anders Orbeck
B.A. '13, Minnesota
Major, English
Minor, Philology
Thesis, A Study of Pope's Satirical Method With Some Comparison with that of Horace

Benjamin Palmer
B.A. '11, Minnesota
Major, Political Science
Minor, Law
Thesis, The History and Law of Land Drainage with Special Reference to Minnesota

Charles Whittington Pfeiffer
B.A. '12, Carleton College
Major, Economics
Minor, Political Science
Thesis, The Regulation of Public Utilities with Special Reference to Gas Companies in Minnesota

Vera Sara Reynolds
B.A. '05, Albion College
Major, History
Minor, Political Science
Thesis, The Mexican War and the Disposition of Territories in the Thirtieth Congress 1847-1849

Anna Adelaide Smart
B.A. '11, Smith
Major, Psychology
Minor, Philosophy
Thesis, A Methodological Study of Dreams

Edgar Kirke Soper
B.A. '08, Leland Stanford
Major, Geology
Minor, Mining Engineering
Thesis, The Buried Rock Surface and Pre-Glacial River Valleys of Minnesota and Vicinity

Esther Swenson
B.A. '11, Minnesota
Major, English
Minor, Philosophy
Thesis, A Critical Study of the Ludus Coventriae with Reproduction of the Text from the Original Manuscript

Carrie Osborn Upham
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Major, History
Minor, English
Thesis, Some Problems Suggested by a Critical Study of Sir Thomas Peyton's Manuscript Journal of the Long Parliament

Alice Lucile Van Fossen
Ph.B. '12, Hamline
Major, English
Minor, Education
Thesis, The New Conception of Woman in Modern Drama

Gustav Paul Warber
B.S. in Agriculture '13, Minnesota
Major, Agricultural Economics
Minor, Sociology
Thesis, Agricultural Credit in the United States

MASTERS OF SCIENCE—11

Mark Wilder Bray
B.A. '12, Lawrence College
Major, Chemistry
Minor, Minerology
Thesis, Contribution to our Knowledge of the Terpenes

William Lane Cavert
Ph.B. '10, Union College
B.S. '12, Cornell University
Major, Farm Management
Minor, Economics
Thesis, An Investigation of Farm Organization and Profits as Affected by Tenure in Northfield Township, Rice County, Minnesota

Francis Alexander Corniea
B.S. in Agriculture '11, Minnesota
Major, Farm Management
Minor, Economics
Thesis, The Organization of State Institution Farms with a Plan for the Reorganization of the Farm in Connection with the School for Feeble-Minded at Faribault

Henry Joseph Hoffmann
B.S. in Chemistry '12, Minnesota
Major, Chemistry
Minor, Physics
Thesis, A Quantitative Determination of the Amount of Extract in the Human Kidney and the Examination of its Nature

De Forest Hungerford
B.S. '10, Kansas Agricultural College
Major, Soils
Minor, Botany
Thesis, A Preliminary Study of Some Minnesota Peat Soils

George Peter Koch
B.S. '13, State College of Washington
Major, Agricultural Chemistry
Minor, Soils
Thesis, The Diastase and Invertase Content of Wheat Flour and their Relation to Baking Strength

Vaman Ramchandra Kokatnur
B.A. '12, Bombay, India
Major, Chemistry
Minor, Geology
Thesis The Action of Trioxymethylene on the Various Hydrocarbons in the Presence of Aluminum Chloride

George Shikataro Nishihara
B.S. '12, University of Arizona
Major, Geology
Minor, Mineralogy
Thesis, The Rate of Reduction of Acidity of Descending Waters by Certain Ores and Gangue Mineral and its Bearing upon Secondary Sulphide Enrichment

THE SCHOOL OF MINES

ENGINEERS OF MINES—9

Arthur Philip Anderson
Alfred Charles Bierman
Howard Nelson Eidemiller
Ernest Levi Larson
Orrin Weston Potter
Howard Quinlan
Louis George Ravicz
John Henry Robertson
Harold Wasson

THE COLLEGE OF PHARMACY

MASTERS OF PHARMACY—2

Oscar Blosmo, Ph.C.
John Abner Handy, Ph.C., B.S.

BACHELORS OF PHARMACY—29

Harry Alfred Ames
Henry Bernard Anderson
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Joseph Paul Faas
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Noel Holm
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Lenus Alfred Norin
Clarence Alfred Perkins
Helmer Alvind Roen
Bernard Rotegard
Roy Theodore Scott
Carl Swanson
Sigfred Miller Vikre
Alvin Urban Wallen
Sam Arthur Weisman
Charles Edwin Wright

THE SCHOOL OF CHEMISTRY

CHEMICAL ENGINEERS—5

Fredolf Anderson, B.S.
Harry Cicero Berman, B.S.
Herbert Arthur Kern, B.S.
Henry Peterson, B.S.
Ralph Elmer Porter, B.S.

BACHELORS OF SCIENCE—3

Harry Cicero Berman
Darwin May
Willis Marshall Tinkham

In Chemistry—3

Ingvald Oliver Juvrud
Howard Vincent Merten
Ernest Frederick Tibbling

THE COLLEGE OF EDUCATION

BACHELORS OF ARTS—*In Education*—53

Hazel Allen
Herman Ferdinand Anderson
Marjorie Helene Atwood
Ruth Katherine Barr
Martha Bertine Birkeland
Florence Marie Brawthen
Helen Beatrice Conary
Edith Bland Cowin
Herbert Arnold Falk
Henry O. Dyck

George Lee Fleming
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Susie Huff
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Emil Josi
Elsa Petronella Krauch
Ella Lorentzen
Clara McCune
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Genevieve McLane
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Jo Evelyn Quigley
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John Shoemaker
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Vivian Ilda Tarbox
Amelia Katherine von Levern
Anna Wiecking
Martha Frances Wolff
Frank Yukel

THE GRADUATE SCHOOL

MASTERS OF ARTS—30

Anna Kimber Boutelle
B.A. '04, Minnesota
Major, History
Minor, Philosophy
Thesis, Central Assemblies in England under Norman Kings, 1066-1155: A study in Terminology

Axel Brett
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Minor, Philosophy
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Minor, Latin
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Minor, Rhetoric
Thesis, To Determine the Relative Shares of Shakespeare and of Thomas Heywood in the Authorship of Troilus and Cressida

Donald Folsom
B.A. '12, Nebraska
Major, Botany
Minor, Pathology
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Bernice Burns Foster
B.A. '11, Minnesota
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Minor, English
Thesis, The Marking System

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B.A. '08, Radcliff
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Minor, German
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Minor, English
Thesis, Some Problems Suggested by a Critical Study of Sir Thomas Peyton's Manuscript Journal of the Long Parliament

Alice Lucile Van Fossen
Ph.B. '12, Hamline
Major, English
Minor, Education
Thesis, The New Conception of Woman in Modern Drama

Gustav Paul Warber
B.S. in Agriculture '13, Minnesota
Major, Agricultural Economics
Minor, Sociology
Thesis, Agricultural Credit in the United States

MASTERS OF SCIENCE—11

Mark Wilder Bray
B.A. '12, Lawrence College
Major, Chemistry
Minor, Minerology
Thesis, Contribution to our Knowledge of the Terpenes

William Lane Cavert
Ph.B. '10, Union College
B.S. '12, Cornell University
Major, Farm Management
Minor, Economics
Thesis, An Investigation of Farm Organization and Profits as Affected by Tenure in Northfield Township, Rice County, Minnesota

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B.S. in Agriculture '11, Minnesota
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Thesis, The Organization of State Institution Farms with a Plan for the Reorganization of the Farm in Connection with the School for Feeble-Minded at Faribault

Henry Joseph Hoffmann
B.S. in Chemistry '12, Minnesota
Major, Chemistry
Minor, Physics
Thesis, A Quantitative Determination of the Amount of Extract in the Human Kidney and the Examination of its Nature

De Forest Hungerford
B.S. '10, Kansas Agricultural College
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Minor, Botany
Thesis, A Preliminary Study of Some Minnesota Peat Soils

George Peter Koch
B.S. '13, State College of Washington
Major, Agricultural Chemistry
Minor, Soils
Thesis, The Diastase and Invertase Content of Wheat Flour and their Relation to Baking Strength

Vaman Ramchandra Kokatnur
B.A. '12, Bombay, India
Major, Chemistry
Minor, Geology
Thesis The Action of Trioxymethylene on the Various Hydrocarbons in the Presence of Aluminum Chloride

George Shikataro Nishihara
B.S. '12, University of Arizona
Major, Geology
Minor, Mineralogy
Thesis, The Rate of Reduction of Acidity of Descending Waters by Certain Ores and Gangue Mineral and its Bearing upon Secondary Sulphide Enrichment

Arvid Egede Nissen
E.M. '13, Minnesota
Major, Geology
Minor, Mineralogy
Thesis, An Investigation of Argentiferous Galena Ores

Gerald Philip Plaisance
B.S. in Agriculture '13, Minnesota
Major, Animal Husbandry
Minor, Physiology
Thesis, Variation in the Digestion of Feeds by Calves of the Same Age and Type

Victor Yngve
B.S. in Chemistry '13, Minnesota
Major, Chemistry
Minor, Physics
Thesis, The Dissociation Tensions of Certain Hydrated Chlorides and the Vapor Pressure of their Saturated Solutions

MASTER OF FORESTRY

Philip Torrey Allen
B.S. in Agriculture '07, Minnesota
1910-12, College of Forestry

DOCTORS OF PHILOSOPHY—2

Julius Valentine Hofmann
B.S. in Forestry '11, M.F. '12, Minnesota
Major, Botany (Sylviculture)
Thesis, Natural Reproduction of Coniferous Forests

Harold Hiram Brown
B.A. '09, M.A. '10, Syracuse University
Major, Chemistry
Minor, Mineralogy
Thesis, Contribution to Our Knowledge of the Chemistry of Wood; Douglas Fir and its Resin

DOCTOR OF SCIENCE

Harry Vaughn Harlan
B.S. '04, M.S. '09, Kansas Agricultural College
Major, Agronomy
Minor, Plant Pathology
Thesis, Some Distinctions in Our Cultivated Parleys with Reference to their Use in Plant Breeding

HONORS AND PRIZES

DEGREES WITH DISTINCTION

In Animal Biology

Royal Norton Chapman

In Economics

Harold Albert Hauenstein
John Paul McGee
Sydney Allen Patchin

In English

Harold Samuel Boquist

In French

Nellie Irene Raine

In History

Willoughby Maynard Babcock, Jr.

In Latin

Margaret Quinlan Corkrey

In Mathematics

Vera Linn Wright

In Rhetoric

Harold Levi Rypins

In Sociology

Henry Thomas Paulson

HONORS IN PUBLIC SPEAKING

Harvey Sheely Hoshour
Donald Lane Pomeroy
Frederick Gale Tryon
Raymond Ziesmer

THE SHEVLIN FELLOWSHIPS

Science, Literature, and the Arts

Frances Helen Relf, B.A. '11, M.A. '12, Minnesota

Agriculture

Frank J. Piemeisel, B.S. in Agriculture '14, Minnesota

Medicine

William Raymond Shannon, B.S. '14, Minnesota

Chemistry

Vaman Ramchandra Kokatnur, B.A. '12, Bombay, India; M.S. '14, Minnesota

HONOR GRADUATES OF THE MILITARY DEPARTMENT TO BE REPORTED TO THE ADJUTANT GENERAL OF THE UNITED STATES ARMY AND THE ADJUTANT GENERAL OF THE MINNESOTA NATIONAL GUARD

Cadet Colonel

Harry Douglas Lovering

Cadet First Lieutenant

Willoughby Maynard Babcock, Jr.

Cadet Captains

Theron Gray Methven
Harold Winfield Patton
Fletcher Rockwood
Albert Raymond Shiely
Donald Wilson

PRIZES

The Alumni Weekly Gold Medal

Donald Lane Pomeroy

The '89 Memorial Prize in History

Willoughby Maynard Babcock, Jr.

The Mercer Prize Medals

Sigurd Hagen
Henry W. Haverstock
Lester Edwin Nelson

The Briggs Prize in Foundry Practice

First Prize, Milton Pierce Morrill
Second Prize, Danforth King Gannett

The Dr. J. W. Bell Prize in Physical Diagnosis

Olof Solhberg. Thesis: "The Reflexes in Health, Organic and Functional Diseases"
Honorable Mention to Louis Martin Field. Thesis: "The Value of the Orthodiagraph"
Floyd Owen Woodward. Thesis: "Some Observations Upon the Diagnostic Value of the Pirquet Tuberculin Reaction in Adults"

The Rollin E. Cutts Prize in Surgery

Frederick A. Willius. Thesis: "Studies on Transplantation of the Pancreas"
Honorable Mention to George H. Ghostley. Thesis: "Bacteriological Examination of Knives Used in Surgery"

DEGREES AND PRIZES CONFERRED SINCE JUNE 12, 1913

BACHELORS OF ARTS

Stephen Bakalyar
Mary Pauline Crissman
Foster Helm Kreis
Lawrence Jacques
Carl Alfred Larson
Lawrence Joseph George Loken
Frances Parmelee
Mellie Daughter Quayle
Alfred George Smaltz
Horace Sumner Villars
Earl Stewart Wallace

In Education

Margaret Haigh
Marja Brown Steadman
Lenna MaBelle Stiles
Andrew O. Utne

BACHELORS OF SCIENCE

Baldwin Borreson
Robert Carl Cook
Theodore Frederick Hammermeister
Erling Wilhelm Hansen
Albert Ingvald Haugen
Frank G. Murphy

In Engineering

Myron Harry Bradley
Benjamin John Curtis
William Rinehardt Everett
Arthur Warren Quiggle

In Agriculture

Fred Bearl Carpenter
Percy Everling Hagen

In Home Economics

Imadee Marguerite Fraiken
Ethel Alberteen Smith

In Chemistry

Hedwig Melanie Sutter

CIVIL ENGINEER

William Henry Bailey, B.S.

BACHELORS OF LAWS

Felix Francisco Bangs, B.A.
Lewis Lloyd Hansen
William Carl Hass
Albert Lucian Hershman
Carl Clarence Meixner
Charles Lester Melvin
James Arthur Peterson, B.S.
Rexford Monroe Sheild

DOCTORS OF DENTAL SURGERY

Arnold R. Lotz
Joseph Paul Werrick

BACHELOR OF PHARMACY

Alfred Errickson

MASTERS OF ARTS

Elisabeth Carey
B.A. '11, Minnesota
Major, Rhetoric
Minor, English
Thesis, An Inquiry into the Nature and Limits of the Grotesque in Literature with Emphasis upon its Relation to the Comic Based upon a Study of the Works of Charles Dickens

Stanley Sloane Gillam
B.A. '12, Minnesota
Major, Economics
Minor, Political Science
Thesis, Economic Development in Minnesota from 1849 to 1873

Herman Olof Olson
B.A. '11, Union College (Nebraska)
Major, Swedish
Minors, German, English
Thesis, The Religious Movements in Sweden from the Memorable Uppsala Synod in February, 1593, to the Issuance on October 23, 1860, of the Two Royal Ordinances Providing for Greater Religious Liberty in Sweden

	Men	Women	Total
Freshman Class—			
Civil	32	...	32
Electrical	34	...	34
Mechanical	37	...	37
Architectural Engineers	17	...	17
Architects	23	1	24
General Course	5	...	5
Undecided	45	...	45
	193	1	194
Irregular Students	16	2	18
Total	472	3	475

DEPARTMENT OF AGRICULTURE

	Men	Women	Total
College of Agriculture—			
Agricultural Course:			
Senior Class	47	...	47
Junior Class	60	...	60
Sophomore Class	105	...	105
Freshman Class	138	...	138
Special Students	12	...	12
	362	...	362
Forestry Course:			
Senior Class	8	...	8
Junior Class	7	...	7
Sophomore Class	4	...	4
Freshman Class	22	...	22
	41	...	41
Home Economics:			
Senior Class	...	42	42
Junior Class	...	50	50
Sophomore Class	...	69	69
Freshman Class	...	89	89
Special Students	...	23	23
	...	273	273
College Summer School:			
Total registration	113	41	154
Duplicates registered 1914-15	26	3	29
Net Registration	87	38	125
Total for College	490	311	801
Central School of Agriculture—			
Fourth and Fifth Year Class	14	13	27
Senior Class	102	65	167
Junior Class	191	87	278
Freshman Class	284	109	393
Special Students	6	4	10
Total for School	597	278	875
Dairy School	138	1	139
Less duplicates	25	...	25
Net Dairy School	113	1	114

	Men	Women	Total
Farmers' Week	540	87	627
Junior Short Course	279	124	403
Traction Engineering	20	...	20
Teachers' Training School	89	941	1,030
Total for Short Courses	1,041	1,153	2,194
Northwest School of Agriculture, Crookston—			
School of Agriculture	124	55	179
Farmers' Short Course	1,412	406	1,818
Junior Short Course	24	22	46
Teachers' Training Course	5	140	145
Total, Crookston	1,565	623	2,188
West Central School of Agriculture, Morris—			
School of Agriculture	76	57	133
Teachers' Training School	9	155	164
Total, Morris	85	212	297
Total in Department of Agriculture	3,778	2,577	6,355
Less duplicates	2	...	2
	3,776	2,577	6,353

LAW SCHOOL

Regular Law

	Men	Women	Total
Third-Year Day	48	...	48
Second-Year Day	32	...	32
*First-Year Day	49	...	49
	129	...	129

Special Law

Third-Year Day	4	...	4
Second-Year Day	12	...	12
First-Year Day	32	...	32
	48	...	48

*Number includes seven Seniors in the College of Science, Literature, and the Arts taking First-Year Law.

MEDICAL SCHOOL

	Men	Women	Total
Sixth-Year Class	35	1	36
Fifth-Year Class	35	1	36
Fourth-Year Class	58	2	60
*Third-Year Class	72	3	75
Unclassed Students	14	1	15
	214	8	222

The School for Nurses			
Third-Year Class	...	12	12
Second-Year Class	...	12	12
First-Year Class	...	14	14
Accredited	...	10	10
Preliminary	...	5	5
	...	53	53
Short Course in Embalming	50	4	54

*Second- and First-Year students are listed in the College of Science, Literature, and the Arts.

COLLEGE OF DENTISTRY

	Men	Women	Total
Third-Year Class	72	...	72
Second-Year Class	86	1	87
First-Year Class	98	5	103
Irregular Students	3	1	4
	259	7	266

COLLEGE OF PHARMACY

	Men	Women	Total
Graduate Students	1	...	1
Senior Class	27	6	33
Junior Class	60	7	67
	*88	13	101

*All but ten are of collegiate grade.

SCHOOL OF MINES

	Men	Women	Total
Senior Class	16	...	16
Junior Class	13	...	13
Sophomore Class	20	...	20
Freshman Class	31	...	31
First-Year Class	9	...	9
Special Students	1	...	1
	90	...	90

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

	Men	Women	Total
Post-Senior Class	3	...	3
Senior Class	5	...	5
Junior Class	6	...	6
Sophomore Class	20	...	20
Freshman Class	12	...	12
Irregular Students	6	...	6
	52	...	52

COLLEGE OF EDUCATION

	Men	Women	Total
Senior Class	16	27	43
Junior Class	18	15	33
Unclassed Students	3	30	33
	37	72	109

GRADUATE SCHOOL

	Men	Women	Total
Registration	147	75	222

UNIVERSITY SUMMER SESSION

	Men	Women	Total
Registration	281	336	617
Duplicates registered 1914-15	146	96	242
Net Registration	135	240	375

COLLEGE OF DENTISTRY SUMMER SESSION

	Men	Women	Total
Registration	34	2	36
Duplicates registered 1914-15	28	...	28
Net Registration	6	2	8

MEDICAL SCHOOL SUMMER SESSION

	Men	Women	Total
Registration	57	2	59
Duplicates registered 1914-15	25	...	25
Net Registration	32	2	34

GENERAL EXTENSION DIVISION

	Men	Women	Total
Minneapolis Academic Courses	148	547	695
Minneapolis Business Courses	443	42	485
Minneapolis Engineering Courses	209	6	215
Minneapolis Law Courses	31	...	31
	831	595	1,426
St. Paul Academic Courses	25	93	118
St. Paul Business Courses	146	9	155
St. Paul Engineering Courses	11	...	11
	182	102	284
Duluth Business Courses	58	...	58
Duluth Engineering Courses	16	...	16
	74	...	74
St. Cloud Academic Courses	4	24	28
St. Cloud Business Courses	30	...	30
	34	24	58

	Men	Women	Total
Albert Lea Business Courses	39	10	49
Austin Business Courses	31	...	31
Northfield Business Courses	18	7	25
Correspondence Courses	50	67	117
Merchants' Short Course	231	7	238
	369	91	460
Retail Selling—Store Classes:			
Schuneman & Evans, St. Paul	94	86	180
L. S. Donaldson Co	88	74	162
Minneapolis Dry Goods Co	53	31	84
George A. Gray Co., Duluth	70	54	124
Skinner & Chamberlain, Albert Lea	23	19	42
	328	264	592
Total for General Extension Division	1,818	1,076	2,894

Names for the Correspondence Courses and the Store Classes in Retail Selling and Merchants' Short Course do not appear in Register.

SUMMARY OF TOTALS

	Men	Women	Total
College of Science, Literature, and the Arts	864	954	1,818
College of Engineering and the Mechanic Arts	472	3	475
Department of Agriculture	3,776	2,577	6,353
Law School	177	...	177
Medical School (including School for Nurses and the Short Course for Embalmers)	264	65	329
Medical Summer Session (net)	32	2	34
College of Dentistry (including Summer Session, net)	265	9	274
College of Pharmacy	88	13	101
School of Mines	90	...	90
School of Analytical and Applied Chemistry	52	...	52
College of Education	37	72	109
Graduate School	147	75	222
Summer Session, 1914 (less duplicates)	135	240	375
Grand Total	6,399	4,010	10,409
Less duplicates	41	10	51
Net Total	6,358	4,000	10,358
Students of collegiate grade	3,022	1,730	4,752
Students of sub-collegiate grade	3,336	2,270	5,606
General Extension Division	1,818	1,076	2,894

Ten Pharmacy students are not of strictly collegiate grade, but have been so grouped.

Bulletin of The University of Minnesota

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

1915-1916

VOL. XVIII. NO. 4. AUGUST 1915

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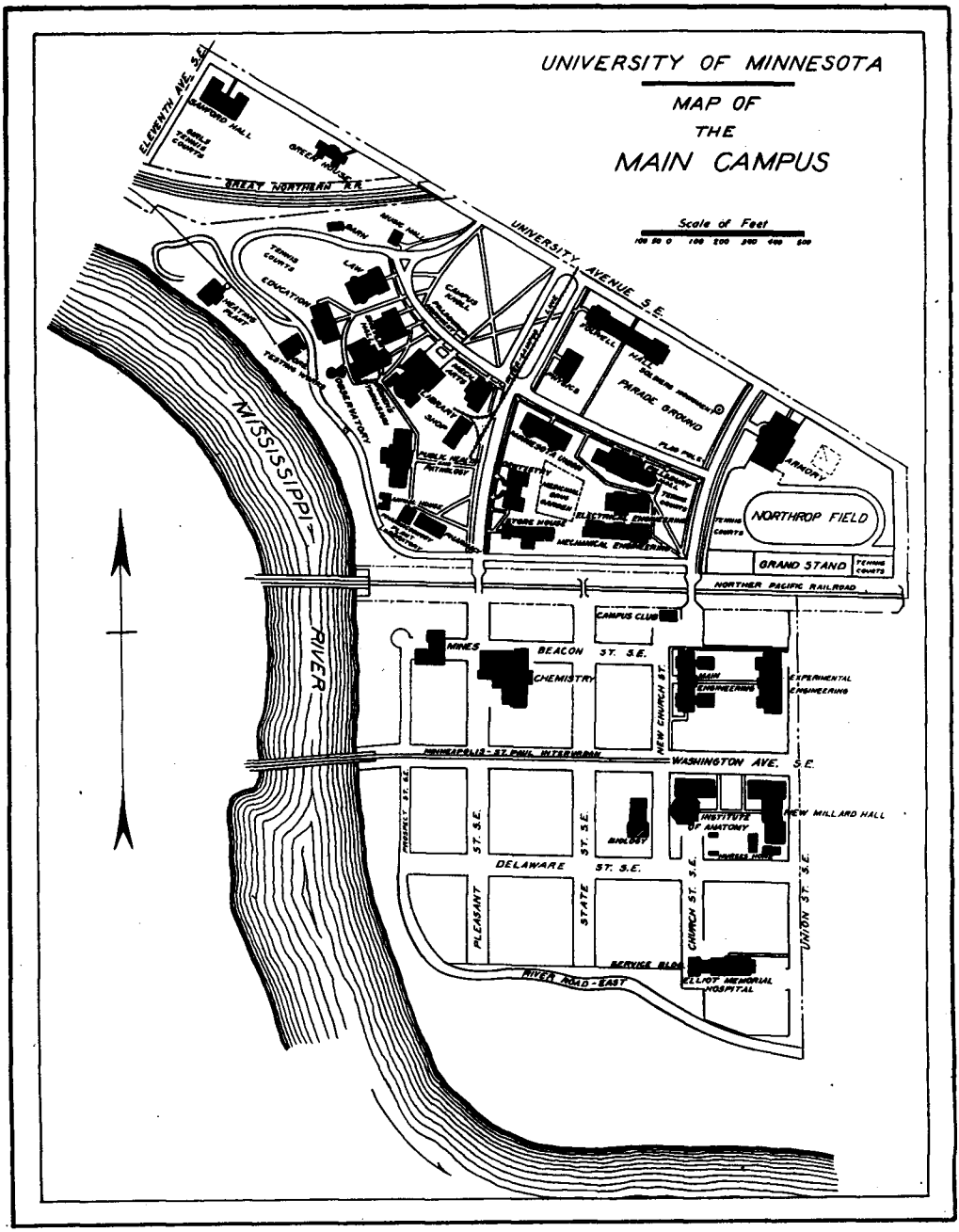
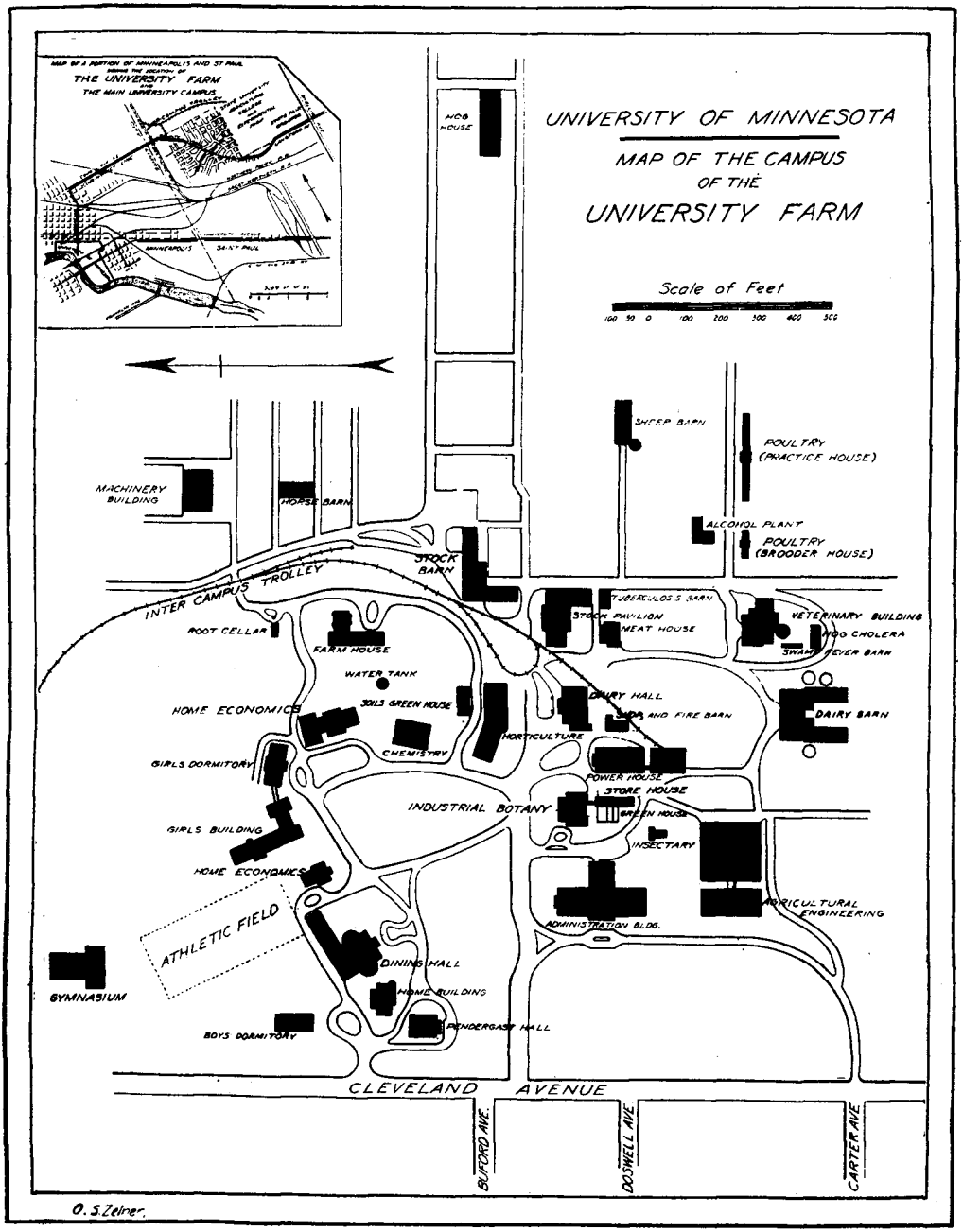


Area of Main Campus, 108.5 acres



Area of University Farm, 422.56 acres

1915

JULY

Su	Mo	Tu	W	Th	Fr	Sa
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

AUGUST

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

SEPTEMBER

..	..	..	1	2	3	4
5	6	**7**	8	9	10	11
12	13	14	**15**	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

OCTOBER

..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

NOVEMBER

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	**25**	**26**	**27**
28	29	30	..	..	..	..
..	..	..	..	..	..	..

DECEMBER

..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	**18**
19	**20**	**21**	**22**	**23**	**24**	**25**
26	**27**	**28**	**29**	**30**	**31**	..
..	..	..	..	..	..	..

1916

JANUARY

Su	Mo	Tu	W	Th	Fr	Sa
..	..	..	..	..	..	1
2	**3**	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	**31**	..	..	..	..	..

FEBRUARY

..	..	1	2	3	4	5
6	7	8	9	10	11	**12**
13	14	15	16	17	18	19
20	21	**22**	23	24	25	26
27	28	29	..	..	..	..
..	..	..	..	..	..	..

MARCH

..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

APRIL

..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	**20**	**21**	**22**
23	**24**	**25**	**26**	27	28	29
30	..	..	..	..	..	..

MAY

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	**30**	31	..	..	..
..	..	..	..	..	..	..

JUNE

..	..	..	..	1	2	3
4	5	6	7	**8**	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

JULY

Su	Mo	Tu	W	Th	Fr	Sa
..	..	..	..	..	..	1
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

AUGUST

..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
..	..	..	..	..	..	..

SEPTEMBER

..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
..	..	..	..	..	..	..

OCTOBER

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

NOVEMBER

..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

DECEMBER

..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

UNIVERSITY CALENDAR

1915-1916

The university year covers a period of thirty-eight weeks, beginning on the Tuesday before the second Thursday in September. Commencement Day is always the second Thursday in June.

1915			
August	31	Tuesday	Registration closes except for new students
September	1-8	Week	Fees payable except for new students
September	7-14	Week	Examinations for the removal of conditions (except Colleges of Agriculture and Forestry), entrance examinations, registration of new students, and payment of fees
September	15	Wednesday	First semester begins
September	27	Monday	Agricultural College, farm experience examination
October	4	Monday	School of Agriculture, first term begins
October	7	Thursday	Senate meeting, 4:00 p.m.
November	8	Monday	Dairy School opens
November	24	Wednesday	Thanksgiving recess begins 9:00 p.m.
November	29	Monday	Thanksgiving recess ends 8:00 a.m.
Nov. 29 to Dec. 4		Week	Second semester condition examinations, Colleges of Agriculture and Forestry
December	2	Thursday	Senate meeting, 4:00 p.m.
December	6-11	Week	Short course for ice-cream makers
December	11	Saturday	Dairy School closes
December	17	Friday	Christmas vacation begins 9:00 p.m.
December	17	Friday	School of Agriculture, first term closes
1916			
January	3-8	Week	Farmers' Short Course
January	4	Tuesday	Christmas vacation ends 8:00 a.m.
January	18	Tuesday	Registration for second semester closes
January	21	Tuesday	School of Agriculture, second term begins
January	24	Monday	Final examinations begin
January	25	Tuesday	Payment of fees for second semester closes
February	2	Wednesday	Second semester begins
February	3	Thursday	Senate meeting, 4:00 p.m.
February	12	Saturday	Lincoln's Birthday: a holiday
February	22	Tuesday	Washington's Birthday: a holiday
March	30	Wednesday	School of Agriculture closes

April	3-8	Week	Junior Short Course
April	19	Wednesday	Easter recess begins 9:00 p.m.
April	19-22		Superintendent's and Principals' short course
April	27	Thursday	Easter recess ends 8:00 a.m.
May	1-6	Week	Condition examinations in certain colleges
May	2	Tuesday	Traction Engineering Course begins
May	4	Thursday	Senate meeting, 4:00 p.m.
May	26	Friday	Final examinations begin
May	30	Tuesday	Memorial Day: a holiday
June	1-8	Week	Military Encampment, Fort Snelling
June	3	Saturday	Second semester closes
June	4	Sunday	Baccalaureate service
June	5	Monday	Senior class day exercises
June	7	Wednesday	Alumni Day
June	8	Thursday	Forty-fourth Annual Commencement.
June	9	Friday	Summer vacation begins
June	12	Monday	Summer Session begins

The university year for 1916-17 will begin Tuesday, September 12.

Program of Entrance Examinations 1915-1916

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 112, Library Building, unless otherwise specified.

Any student finding a conflict in his program should report to the Registrar for adjustment.

Tuesday,	Sept. 7	9 a.m.	Business Subjects, Elementary Algebra, Plane Geometry
		2 p.m.	Manual Subjects, Domestic Art and Science, Agriculture, Higher Algebra, Solid Geometry
Wednesday,	Sept. 8	9 a.m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology, Physics, Physiology
		2 p.m.	American Government, History, Economics, Commercial Geography, History of Commerce, Economic History of England, Economic History of the United States
Thursday	Sept. 9	9 a.m.	English
		2 p.m.	German, Greek, French, Latin, Scandinavian, Spanish

A representative of each department will be at the office of the head of the department each forenoon of entrance examination week from 9 to 12 to give information and advice.

Condition Examinations

Regular examinations for the removal of conditions are given at no other times than (1) the week following the Easter recess, (2) the registration week in September, and (3) the week following the Thanksgiving recess, for students in the Colleges of Agriculture and Forestry.

The examinations in second-semester courses are given in the September period and those in first-semester courses are given after the Easter recess or in September, or at both times, as each school or college may determine. No student may take more than one examination to remove a condition.

Examination schedules for the respective schools and colleges may be secured at the Registrar's office.

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*Absent on leave, 1915-16.

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2235 Como Ave. W., St. Paul

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*Absent on leave, 1915-16.

†Absent on leave, second semester, 1915-16

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*Absent on leave, 1915-16

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EDMOND KRAUS, Instructor in Voice 221 Groveland Ave.
WOLF KRITCHEVSKY, D.Sc., Instructor in Chemistry 568 6th Ave. N.
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JAMES S. MIKESH, B.A., Instructor in Mathematics
MARCEL ARISTIDE MORAUD, Licencié ès Lettres, Instructor in French
ROBERT P. MORE, M.A., Instructor in German
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JOHN C. WEST, B.S., Instructor in Physical Education for Men

ASSISTANTS AND SCHOLARS

1915-1916

ANIMAL BIOLOGY

ADOLPH RINGOEN, M.A., Assistant
HELEN A. SANBORN, B.A., Assistant
HERBERT E. METCALF, B.S., Teaching Fellow
EARL L. ABRAMSON, B.A., Scholar
LESTER R. JOHNSON, B.A., Scholar
JEAN ST. J. PLANT, B.A., Scholar
L. D. GRANT, Helper
GEORGE A. THIEL, Helper

ASTRONOMY

HUGH B. WILCOX, B.A., Scholar

BOTANY

DONALD FOLSOM, B.A., Assistant
FRANCES L. LONG, B.A., Assistant
HARVEY L. STALLARD, Ph.B., Assistant

COMPARATIVE PHILOLOGY

JOHN F. EYNCK, B.A., Scholar

ECONOMICS

L. J. COCHRANE, M.S., Assistant
J. E. CUMMINGS, B.A., Assistant
SYDNEY A. PATCHIN, B.A., Assistant
HARRY L. ALTMAN, B.A., Scholar
HOWARD L. HALL, B.A., Scholar
HARRY D. HARPER, B.A., Scholar
NOEL G. SARGENT, B.A., Scholar

ENGLISH

MARIE C. LYLE, M.A., Assistant
DAGMAR DONEGHY, B.A., Scholar

GEOLOGY AND MINERALOGY

T. M. BRODERICK, M.S., Assistant
J. P. GOLDSBERRY, M.A., Teaching Fellow
PHILIP CARY, B.A., Scholar
W. B. LANG, B.A., Scholar

GERMAN

ARNOLD W. SHUTTER, B.A., Teaching Fellow
LOUISE G. FRARY, M.A., Scholar
CAMILLE E. FREUND, M.A., Scholar

HISTORY

RUTH ELIZABETH MARSHALL, M.A., Teaching Fellow
ROY TOWNE, M.A., Teaching Fellow
GLADYS M. CAMPBELL, B.A., Scholar
THORGNY C. CARLSON, B.A., Scholar
SYBIL FLEMING, B.A., Scholar
JEANETTE SAUNDERS, B.A., Scholar

MATHEMATICS

VERA L. WRIGHT, M.A., Scholar

MUSIC

GLADYS JENNESS, B.A., Scholar

PHILOSOPHY AND PSYCHOLOGY

BEN KORTMANN, B.A., Scholar
C. E. RENDESTVEDT, B.A., Scholar

PHYSICAL TRAINING

NOAH W. JOHNSTON, Assistant
HUBERT FOURNIER, Attendant
F. M. WASHBURN, Student Assistant

PHYSICS

ADOLPH GARBEN, B.A., Scholar
OSWALD ROGNLEY, B.A., Scholar

POLITICAL SCIENCE

RALPH EDWIN RICHARDS, B.A., Scholar
RINEHART J. SWENSON, B.A., Scholar

RHETORIC AND PUBLIC SPEAKING

MARJORIE MORTLAND, B.A., Theme Clerk and Scholar
MAE PAULINE CHESNUTT, B.A., Scholar
ELEANOR EATON, B.A., Scholar
BARBARA HEALY, B.A., Scholar
HILDEGARDE WANOUS, B.A., Scholar

ROMANCE LANGUAGES

George S. Barnum, B.A., Teaching Fellow
Earl Alonzo Barrett, B.A., Teaching Fellow
Florence Donohue, B.A., Scholar

SCANDINAVIAN

Jens H. Hjelmstad, M.A., Scholar

SOCIOLOGY AND ANTHROPOLOGY

Marion Robbins, M.A., Scholar
Robert R. Thompson, B.A., Scholar

GENERAL INFORMATION

ADMISSION

Admission is either by certificate or by examination. Candidates must have completed the equivalent of a four-year high school course and must present:

1. Four units of English; or three units of English and four units of a foreign language; or three units of English and two units in each of two foreign languages.
2. One unit of Algebra and one unit of Plane Geometry.
3. Enough additional work to make in all fifteen units, of which not more than four may be in vocational subjects.

A detailed statement of admission requirements may be found in the Bulletin of General Information.

Attention is called to the following new rule regarding advanced standing.

Credits of advanced standing are to be provisional and finally adjusted upon the following basis: Any student who, after one year's residence, has failures in at least six hours work shall lose all advanced credit except in those courses which have been continued in this college with a grade of at least C. Credits removed in this way can be secured only by special examination.

CLASS ROUTINE AND SCHOLASTIC REQUIREMENTS

Classes are held every week day except Saturday afternoon. Recitation periods are fifty minutes long and begin at eight, nine, ten, eleven, one, two, three, four and five o'clock. A general assembly of faculty and students is held at noon on days to be announced.

Most of the courses of instruction are given in three periods a week on alternate days. Students are advised to try and arrange their programs so as to secure as even a distribution of classes as possible.

Examinations are held at the close of each semester. A student's grade is based upon his class work and examinations. Four grades, A, B, C, and D, are given for work done satisfactorily. Work not done satisfactorily is marked I (incomplete), E (condition), or F (failure). An incomplete must be removed within one month after the opening of the following semester; otherwise it becomes a condition. A condition, if not removed before the opening of the corresponding semester of the following year becomes a failure. A failure must be removed by pursuing the work again in class the next time the course is offered.

Students whose absences exceed four weeks in the aggregate during a semester are not permitted to take the semester examinations without permission of the Administrative Board. Any student reported below

grade in sixty per cent of his work, or in three subjects, at the middle or close of the first semester or midde of the second semester is dropped from the rolls and not allowed to re-enter the University until the opening of the following year.

Requirements for graduation are expressed in credit hours, indicating amount of work; and in honor points, indicating grade of work. Each credit hour demands on the average three hours a week of the student's time; that is, one recitation with two hours of preparation, or three hours of laboratory work. Honor points are computed as follows: each credit hour with the grade of A carries three honor points; each credit hour with the grade of B, two honor points; each credit hour with the grade of C, one honor point.

COURSES OF STUDY

A student may, while registered in the College of Science, Literature, and the Arts, pursue one of the following courses:

Courses given within this College:

A general course leading to the degree of Bachelor of Arts.

An intensive course leading to the degree of Bachelor of Arts with Honors.

A four-year course leading to the degree of Bachelor of Arts in Music.

Combined arts and professional courses:

A six-year course leading to the degrees of Bachelor of Arts and Bachelor of Laws.

A five-year course leading to the degrees of Bachelor of Arts and Bachelor of Science in Chemistry.

An eight-year course leading to the degrees of Bachelor of Arts and Doctor of Medicine.

A seven-year course leading to the degrees of Bachelor of Science and Doctor of Medicine.

A six-year course leading to the degrees of Bachelor of Arts and Doctor of Dental Surgery.

REGULATIONS APPLYING TO ALL COURSES

Military Drill is required of all freshman and sophomore men, and Physical Education of all freshman men and women.

Rhetoric 1-2 is required of all freshmen.

No student may elect work during any semester in more than five departments.

Students, except those in the third and fourth years of the Honors Course, must elect at least fourteen hours a week. Permission to take less than this number must be secured from the Administrative Board.

Students may ordinarily elect not more than seventeen credit hours. After the freshman year a student who has, during the preceding semester or two semesters, earned an average of one and one-half honor points for each credit hour taken and who has had no condition or failure the preceding semester, may elect eighteen hours.

I. GENERAL COURSE LEADING TO THE DEGREE OF BACHELOR OF ARTS

The degree of Bachelor of Arts will be conferred by the College of Science, Literature, and the Arts, upon any student who fulfills all the requirements stated below.

AMOUNT AND GRADE OF WORK

1. During his entire course the student must earn one hundred and twenty hours of credit and one hundred and twenty honor points.
2. A student must secure an average of one and one half honor points per credit hour in the courses which constitute his major subject.
3. No student may receive credit for more than two beginning modern language courses except by special permission.
4. At least thirty credits must be earned in residence at this college. If the term of residence is only one year, that year must be the senior year; and, in any case, at least half of the work of the senior year must be done in residence.

DISTRIBUTION OF WORK

5. The subjects of the curriculum are divided into three distribution groups, as follows:

Group A. Rhetoric, English, Comparative Philology, Ancient and Modern Languages and Literatures, Music.

Group B. History, Economics, Political Science, Sociology and Anthropology, Education, Philosophy and Psychology.

Group C. Mathematics, Drawing and Descriptive Geometry, Home Economics; Animal Biology, Botany, Bacteriology, Human Anatomy, Human Physiology; Astronomy, Chemistry, Geology and Mineralogy, Physics.

6. Subjects open to freshmen are: Rhetoric, Ancient and Modern Languages, History, Mathematics, Home Economics, Animal Biology, Botany, and Chemistry. All freshmen must take Rhetoric 1-2.

7. Subjects for which freshmen register must be continued throughout the year.

8. Each student during his freshman year must elect work in at least two of the groups A, B, and C, and during his freshman and sophomore years must elect a total of two years' work in each of the three groups.

9. In Group C six credits in biological science (Animal Biology, Botany, Bacteriology, Human Anatomy, and Human Physiology), and six credits in physical science (Astronomy, Chemistry, Geology and Mineralogy, and Physics) are required of all students. For this reason every student is advised to take one of these sciences in his freshman year.

10. Before the end of his sophomore year each student must choose a *major subject* and report his choice to the Registrar. The head of the department in which the student has made his selection will then assign him to an adviser.

11. The requirements for a major in any particular department are given in the departmental statement. In the distribution group to which his major subject belongs, known as the major group, the student must elect, subject to the approval of his adviser, at least forty-two credit hours. At least twelve of the forty-two credit hours must be outside of the major subject.

12. Usually two *minor subjects* are required, one in each of the two

remaining distribution groups. The requirements for minors are given in the departmental statements.

13. In one of the minor groups the student must secure twenty-four credits, in the other eighteen credits. When Group C is the eighteen-credit group, a student who takes one year of mathematics is not required to secure a minor in this group.

14. During the junior and senior years each student must secure thirty credits in *starred courses.* With few exceptions these are courses open only to juniors and seniors. They are indicated in the bulletin and on the program by an asterisk (*).

ELECTION OF SUBJECTS IN OTHER COLLEGES OR SCHOOLS

Certain courses given in other colleges or schools of this University are open to junior and senior students of this college who have the specified prerequisites. Provided no duplication of subjects occurs, these courses may be taken on the same terms as courses given in this college and will count toward the B.A. degree. Such courses will be printed on the registration blanks.

By resolution of the Board of Regents students in any college electing work in any other college must complete the work so elected before they are allowed to come up for the degree for which they are candidates.

BACHELOR OF ARTS WITH DISTINCTION

This degree will not be given after 1917. Students of the classes of 1916 and 1917 may learn the requirements for this degree from their faculty advisers.

THE UNIVERSITY STATE TEACHERS' CERTIFICATE

The University State Teachers' Certificate is granted to graduates of the College of Science, Literature, and the Arts who complete the following prescribed work in addition to the general requirements for the degree of Bachelor of Arts stated above, and who receive the recommendation of at least one department concerned with high school studies.

a. General Psychology ..... 6 credits
(Normally taken during the sophomore year)

b. Prescribed work in Education
This work must include all of the following courses except in the case of honor students
Practice Teaching..... 3 credits
Teachers' Courses in two subjects, together carrying at least..... 3 credits
Technique of Teaching..... 3 credits
History of Education..... 3 credits
Social Aspects of Education..... 3 credits
Honor students must take Psychology, Practice Teaching, Teachers' Courses, and at least one of the last three subjects named.

Part of this work must be taken in the junior year. The student must inform himself in advance so as to arrange his program properly.

For the year 1915-16 seniors will take General Psychology as a part of the required fifteen credits in Education and will take one of the last three courses mentioned above.

SPECIAL TRAINING COURSES FOR TEACHERS

Special attention is called to the opportunity for training in a number of specialized fields. The State of Minnesota has provided for special aid for teachers of defectives, for high school librarians, teachers of manual training, agriculture, home economics (domestic science), commercial branches, and for heads of high school departments for training rural teachers. Special courses for preparing teachers of agriculture and teachers of home economics will be found described in the College of Agriculture bulletin. For descriptions of courses preparing for the remaining lines, consult bulletin of the College of Education.

SPECIAL COURSES FOR TWIN CITY TEACHERS

Arrangements have been made for offering courses in various departments at times which will make them readily available for teachers in the Twin Cities and environs. These courses will be scheduled to come Saturday mornings or week days after four p.m. For list of these courses, see special announcement issued by the College of Education. This announcement will be ready early in September.

COURSE IN BUSINESS EDUCATION

The faculty has approved the policy of establishing a four-year course in business education, which course will also lead to the degree of Bachelor of Arts. It is hoped that the details of this vocational curriculum, which is now in process of preparation, can be published at an early date.

In the meantime, freshmen who signify their intention of taking this vocational course may make a beginning at once by taking Economics 1a in the first semester of the freshman year followed by either Economics 3b or Economics 2b, or both, in the second semester. In all other respects such students will be subject to the requirements of the regular curriculum until the details of the proposed vocational curriculum shall be announced.

II. COURSE LEADING TO THE DEGREE OF BACHELOR OF ARTS WITH HONORS

The degree of Bachelor of Arts with Honors is given upon the completion of a specialized and intensive course of study.

Students who desire this degree are strongly advised to register for

it and seek the advice of the major department as early in their course as possible. The election of the honors course must be made and the major subject chosen before the end of the sophomore year.

Students electing the honors course must present at the end of the sophomore year sixty credits and ninety honor points and must demonstrate to the major department their ability to use one or more foreign languages specified by the department.

The honors course requires 105 credits in class work and a satisfactory thesis in the major subject. The student must maintain an average standing of B in the major subject and also in the work of the junior and senior years, and must be recommended for graduation by the staff of the major department.

A student in good standing in the honors course may transfer to the general course, and a student who at any time falls below the standing required in the honors course will be transferred to the general course by the Administrative Board. The conditions of the transfer in all cases are to be determined by the Board.

OUTLINE OF COURSE

The requirements in the freshman and sophomore years are the same as for all students.

The requirements for the junior and senior years are as follows:

1. Major Subject.

The student shall devote half his time during these two years to work defined by the major department and approved by the Advisory Committee. All such courses must rest on sophomore work as prerequisites. The departments shall provide for an advancing sequence in the student's work during the junior and senior years. At least one year (six credits) must consist of individual work in advanced courses whose object is to prepare the student for independent investigation. The thesis shall be prepared in connection with this work and under the direction of the instructor.

The thesis shall give evidence of ability to use successfully the laboratory and library materials and methods required in the subject and a thoro command of present knowledge on the topic selected.

2. Electives.

In addition to the major the student shall complete enough elective courses to make a total of 105 credits. The student is advised to take from twenty-four to thirty hours in his junior year.

III. FOUR-YEAR COURSE IN ARTS AND MUSIC, LEADING TO THE DEGREE OF BACHELOR OF ARTS IN MUSIC

The requirements for admission are the same as those for admission to the regular freshman class, together with one of the following requirements in Music, according to the instrument selected:

Pianoforte: Candidate must be able to play Czerny's School of Velocity, and the easier Haydn and Mozart Sonatas.

Violin: Candidate must be able to play the first ten of Kreutzer's Forty Etudes, and the easier Handel and Mozart Sonatas.

Violoncello, organ and orchestral instruments: Candidates must pass entrance examinations equal to the above grade.

Voice: Candidate must possess good natural equipment, some previous vocal training, be a ready sight reader, and have a reading knowledge of the standard German and English songs.

The number of credits required for the degree in Music is one hundred and twenty, not counting Military Drill or Physical Education, which are required the same as for the B.A. degree; fifty-four to fifty-eight of the one hundred and twenty credits required must be in subjects other than Music. During the four years the student must earn one hundred and twenty honor points.

The number of credit hours a semester is the same as for the B.A. degree.

Not more than nine nor less than six credit hours may be elected aside from Music during any one semester.

Two one-half hour lessons, plus twelve to fifteen hours' practice a week for one semester, are required in order to gain four credits in applied Music.

OUTLINE OF COURSE

Freshman Year (Sixteen or Seventeen Credits Each Semester).

1. Elect four credits from A, or four credits from B, including Voice.

A	B
Piano (4)	Piano (2)
Organ (4)	Organ (2)
Violin (4)	Violin (2)
Cello (4)	Cello (2)
	Voice (2)

2. Harmony (3)
3. Rhetoric (3)
4. Beginning Modern Language (6)
5. Chorus or Orchestra Elective (1)

Sophomore Year (Fifteen or Sixteen Credits each Semester).

1. Elect four credits from A, or four credits from B, including Voice.

A	B
Piano (4)	Piano (2)
Organ (4)	Organ (2)
Violin (4)	Violin (2)
Cello (4)	Cello (2)
	Voice (2)

2. Counterpoint (2)

3. Acoustics (3) First Semester; Experimental Psychology (3) Second Semester
4. English Survey (3)
5. Modern Foreign Language (3)
6. Chorus or Orchestra Elective (1)

Junior Year (Fifteen Credits Each Semester).

1. Elect four credits from A, or four credits from B, including Voice.

A	B
Piano (4)	Piano (2)
Organ (4)	Organ (2)
Violin (4)	Violin (2)
Cello (4)	Cello (2)
	Voice (2)

2. History of Music (3)
3. Musical Composition (1) or Analysis (1)
4. Modern Language (3) or English Literature (3)
5. Public School Music (3) or Normal Piano (2) and Appreciation of Music (1)
6. Chorus or Orchestra or Ear Training (1)

Senior Year (Fifteen Credits Each Semester).

1. Elect four credits from A, or four credits from B, including Voice.

A	B
2. Piano (4)	Piano (2)
Organ (4)	Organ (2)
Violin (4)	Violin (2)
Cello (4)	Cello (2)
	Voice (2)

3. Composition (2) or Bach and Beethoven (2) First Semester; Wagner and Brahms (2) Second Semester
4. History (3)
5. Public School Music (3) or Normal Piano (3)
   Ensemble (2)
6. Chorus or Orchestra or Critical Concert Attendance (1)

Students who enter the University for the purpose of studying Music, but not wishing to complete the course leading to a degree, are required to register for Courses 1-2 and 17-18 in Music, and at least six credits in other courses outside the Department of Music, preferably modern languages, to be selected with the approval of the Administrative Board.

COMBINED ARTS AND PROFESSIONAL COURSES

IV. SIX-YEAR COURSE IN ARTS AND LAW, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND BACHELOR OF LAWS

The work of the first three years of this course is done in the College of Science, Literature, and the Arts and is subject to the regulations which govern the work of other Arts students. During these three years the student must secure not less than ninety credits, including fifteen credits in starred courses. The first year of the course in the Law School counts as the equivalent of the fourth year (thirty credits) of the Arts course. During the four years the student must earn one hundred and twenty honor points.

SHORTER PRE-LEGAL COURSES

While the faculty of the Law School strongly recommend the above course, two other courses are open to students who wish the degree of Bachelor of Laws alone. They may take two years' work in the College of Science, Literature, and the Arts, under the regulations which govern other Arts students, or they may take the special pre-legal course outlined below. The student's registration blank must show which course is chosen and that course must be followed without variation. In either case the student must secure at least fifty-eight credits in order to be eligible for admission to the Law School.

In case any student after taking the special pre-legal course shall become a candidate for the B.A. degree, he must satisfy all the regular requirements for that degree.

Students who offer for entrance less than two units of natural science must take one year of natural science.

FRESHMAN YEAR	Credits	
Rhetoric 1-2	6	
Mathematics or Science	6 (or 10)	
(1) The student must complete the equivalent of Mathematics 1 and 2, or 3 and 4. If he has had this he may elect 6 credits in science.		
Language	6 (or 12)	
(1) The student with two or more units of entrance credits in Latin is strongly advised to take Latin (6 credits).		
(2) The student not taking Latin must take French or German.		
History 3-4	6	5-18
Economics 3a or 3b	6	
Political Science 1		
Military Drill and Gymnasium, for men		
		28-36

SOPHOMORE YEAR

	Credits
Rhetoric 15-16	6
Language	4-6
A continuation of the same language taken in the freshman year.	
History 5-6	6
Economics:	
3 (if not previously taken), 4, and not more than three of the following courses: 2, 5, 13, 15, 18, 22, 35-36, 42, 43, 47	6-18
Political Science:	
Not less than one nor more than four of the following courses: 1 (if not previously taken), 3, 5, 6, 7, 9.	
Military Drill, for men	
	28-34

V. FIVE-YEAR COURSE IN ARTS AND CHEMISTRY, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND BACHELOR OF CHEMISTRY

During his first three years the student does his work in the College of Science, Literature, and the Arts subject to the regulations governing other Arts students, and must secure at least ninety credits, including fifteen credits in starred courses. This work must include:

a. Rhetoric 1-2 and twelve credits in German.
b. Eighteen credits in Group B (see page 20).
c. The following courses:
   General Chemistry and Qualitative Analysis, or equivalent.
   Quantitative Analysis, one year.
   Technical Drawing 21-22, one year.
   Geology 21, one semester.
   Metallurgy 2 (men) or Geology 22 (women), one semester.
   Biological Science, one year.
   General Physics with laboratory work, one year.
   Mathematics, ten credits.
   Glass Blowing, one credit.

The fourth year of the course is the same as the junior year of the Analytical Course of the School of Chemistry and counts as the equivalent of the fourth year (thirty credits) of the Arts course. During the four years the student must earn one hundred and twenty honor points.

POST-SENIOR YEAR

The student's fifth year is the same as the fourth year of the Analyti-

cal Course of the School of Chemistry, and upon its completion he will be entitled to the degree of Bachelor of Science in Chemistry.

During the senior and post-senior years the student, if prepared, has the privilege of specializing for not less than two semesters along one of the following lines: Organic Chemistry, Physical Chemistry, Analytical Chemistry, Applied Chemistry, Photochemistry, Physiological Chemistry, Geochemistry, Bromatology.

VI. EIGHT-YEAR COURSE IN ARTS AND MEDICINE, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND DOCTOR OF MEDICINE

During the first three years of this course the student does his work in the College of Science, Literature, and the Arts subject to the regulations governing other Arts students and must secure ninety credits including fifteen credits in starred courses. The first year of the course in the Medical School counts as the equivalent of the fourth year (thirty credits) of the Arts course. During the four years the student must earn one hundred and twenty honor points.

FRESHMAN AND SOPHOMORE YEARS

The following subjects must be included:

Rhetoric 1-2, six credits.

Zoology 1-2, six credits.

Qualitative Analysis and Medical Organic Chemistry with the elementary courses prerequisite to them.

German sufficient to secure a reading knowledge, to be tested by a committee of the Medical faculty.

Physics, 1, 2, 3 and 4, eight credits. This work must be preceded by Mathematics 1 and 2, ten credits, or 3 and 4, six credits.

JUNIOR YEAR

The work of the junior year is elective, subject to the requirement of fifteen credits in starred courses.

SENIOR YEAR

This year is taken in the Medical School, and is counted toward the B.A. degree.

VII. SEVEN-YEAR COURSE IN SCIENCE AND MEDICINE, LEADING TO THE DEGREES OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

To be eligible for admission to the Medical School, students in this course must secure in the College of Science, Literature, and the Arts not less than sixty credits including the subjects required during the

freshman and sophomore years of the Eight-Year Course in Arts and Medicine.

JUNIOR AND SENIOR YEARS

The work during these two years is taken in the Medical School, and is credited toward the B.S. Degree. To secure this degree the student must have one hundred and twenty credits and one hundred and twenty honor points.

Students who have completed elsewhere two or more years of collegiate or university work which includes the required subjects specified above and which is in other respects the full equivalent of the two years of Academic work required in the seven-year combined course, will be awarded the degree of Bachelor of Science on recommendation of the Faculty of the College of Science, Literature, and the Arts, provided they meet the scholarship requirements stated above. The credit value of work done elsewhere shall be determined by the Administrative Board of the College of Science, Literature, and the Arts, but such credits shall not become effective until the student shall have completed, with the required standing, two full years of work in the Medical School of the University of Minnesota.

VIII. SIX-YEAR COURSE IN ARTS AND DENTISTRY, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND DOCTOR OF DENTAL SURGERY

During the first three years of this course the student does his work in the College of Science, Literature, and the Arts, subject to the regulations governing other Arts students and must secure ninety credits, including fifteen credits in starred courses. The final year of the course in the College of Dentistry counts as the equivalent of the fourth year (thirty credits) of the Arts course. During the four years the student must earn one hundred and twenty honor points.

DEPARTMENTAL STATEMENTS

EXPLANATION OF COURSE NUMBERS

Odd numbers indicate first-semester courses; even numbers, second-semester courses. A combination of the two (e. g., 5-6) indicates courses continuing through the year. In the case of courses repeated the second semester, the suffix *a* indicates first semester; the suffix *b*, second semester.

All undergraduate courses are numbered from 1 to 100. All courses open to undergraduates and graduates are numbered from 101 to 200. Strictly graduate courses are numbered from 201 up.

STARRED COURSES

Courses marked with an asterisk (*), called starred courses, are courses which are open only to juniors, seniors, and graduate students, and which have at least nine prerequisite credits if the department offers work in the freshman year, and at least six prerequisite credits if the department offers no work in the freshman year. It is provided, however, that courses in foreign languages for which there is a prerequisite of five years in secondary school and college, at least one year of which is in college, shall be starred courses.

For graduation a student must secure during the junior and senior years thirty credits in starred courses.

ANIMAL BIOLOGY

Professors HENRY FRANCIS NACHTRIEB, JOHN B. JOHNSTON, THOMAS S. ROBERTS, CHARLES P. SIGERFOOS; Associate Professor HAL DOWNEY; Assistant Professors ELMER J. LUND, OSCAR W. OESTLUND; Instructors GEORGE DELVIN ALLEN, CHARLES E. JOHNSON; Assistants ADOLPH RINGOEN, HELEN SANBORN; Teaching Fellow HERBERT E. METCALF.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

For B.A. with Honors, freshman year, Course 1-2; sophomore year, the student may elect from Courses 7-8, 15-16, 19-20, 23-24; during the junior year the student must elect from Courses 31 to 144, and must include some line of work begun in the sophomore year which he expects to pursue during the senior year under 161-162.

For a Teacher's Certificate an average of B in Courses 1-2, 31-32, 28, and nine other credits in Animal Biology and six credits in Botany.

JOURNAL CLUB

The professors, instructors and advanced students of the department meet once a week to review and discuss current zoological literature and to listen to reports from those carrying on investigations.

COURSES

Introductory Courses

No.	Title	Credits	Offered to	Prerequisites
1-2.	General Zoology	6†	All	None
7-8.	Histology-Embryology	6†	Soph., jr., sr.	1-2
12.	Histological Technique	3	Soph., jr., sr.	1-2 and 7-8
15-16.	General Physiology	6†	Soph., jr., sr.	1-2
19-20.	Comparative Anatomy of Vertebrates	6†	Soph., jr., sr.	1-2
23-24.	Entomology	6†	Soph., jr., sr.	1-2
28.	Ornithology	3	Soph., jr., sr.	1-2
30.	Neurology	3	Soph., jr., sr.	1-2
*31-32.	Nature Study	3	Jr., sr.	12 credits
*51.	Protozoology	3‡	Jr., sr.	9 credits inc. 1-2
*56.	Morphology of Invertebrates	3‡	Jr., sr.	9 credits inc. 1-2
*79.	Mammalogy	2	Jr., sr.	1-2 19-20

Advanced and Graduate Courses

*101-102.	Advanced Entomology	6	Jr., sr., grad.	1-2, 23-24
*115-116.	Morphology of Vertebrates	6 or 12	Jr., sr., grad.	1-2, 7-8 or 19-20
*119-120.	Vertebrate Histology	6	Sr., grad.	1-2, 7-8, 12
*123-124.	Blood of Vertebrates	6 or 12†	Sr., grad.	1-2, 7-8, 12, 137-138, reading knowledge of French and German.
*125-126.	Comparative Neurology	6†	Honors and grad.	7-8 or 19-20 and six other credits in Zoology or Human Anat.
*131-132.	Embryology	6†	Jr., sr., grad.	1-2, 7-8
*143-144.	Genetics and Eugenics	6	Sr.,grad.	1-2, 7-8, 15-16
*161-162.	Problems	6 or 12	Sr., grad.	1-2 and other courses prescribed by department.

†Both semesters must be completed before credit is given for the first semester.
‡Courses 51 and 56 may be combined for a year-course.

INTRODUCTORY COURSES

1-2. General Zoology. A survey of the animal kingdom, emphasizing the principles of structure, physiology, embryology, classification, and evo-

lution of animals. Textbook, lectures, and quizzes. SIGERFOOS, LUND, G. D. ALLEN, RINGOEN, SANBORN.

7-8. HISTOLOGY AND EMBRYOLOGY. A comparative microscopic study of the origin and structure of the tissues of vertebrates and invertebrates, and of the organs of mammals. Textbook, lectures, and laboratory. DOWNEY, and Assistant.

12. HISTOLOGICAL TECHNIQUE. Practical work in the preparation of histological and embryological material. DOWNEY.

15-16. GENERAL PHYSIOLOGY. A general study of the changes of energy and matter involved in the activities of the lower organisms. Laboratory, lectures and quizzes. LUND.

19-20. COMPARATIVE ANATOMY OF VERTEBRATES. First semester: Anatomy of lower vertebrates, cyclostomes to reptiles or birds inclusive. Second semester: Mammalian anatomy with the cat as type. Textbook, lectures, and quizzes, laboratory syllabus and laboratory work. JOHNSON and Assistant.

23-24. ENTOMOLOGY. Elements of entomology leading up to discussion of the principles of taxonomy and their application to the classification of insects. Textbook, lectures, quizzes, and laboratory work. OESTLUND and Assistant.

28. ORNITHOLOGY. The study of the structure and classification of birds with special reference to the common birds of Minnesota. Laboratory, textbook, lectures, and quizzes. Some field work. ROBERTS.

30. ELEMENTS OF NEUROLOGY. A brief study of the nervous system; intended for students in psychology and the social sciences. JOHNSTON and W. F. ALLEN.

*31-32. NATURE STUDY. Discussions, reference, field and laboratory work, through the year, twice a week first semester or once a week second semester. Especially for the fitting of teachers in secondary schools. SIGERFOOS.

*51. PROTOZOOLOGY. Lectures, reference and laboratory work on the structure and life-histories of Protozoa, with special reference to the relations of the Protozoa to diseases of animals. SIGERFOOS.

*56. MORPHOLOGY OF INVERTEBRATES. An intensive study of the Crustacea and some of the smaller phyla of the animal kingdom. Mainly reference and laboratory work. SIGERFOOS.

*79. MAMMALOGY. The classification, natural history, and economic aspects of North American mammals with special reference to the mammals of Minnesota. Open to those able to work independently under direction, class limited to six. Laboratory, textbook, and reference work. JOHNSON.

ADVANCED AND GRADUATE COURSES

*101-102. ADVANCED ENTOMOLOGY. Advanced work in the ecology and taxonomy of insects. Lectures, laboratory and field work. OESTLUND.

*115-116. MORPHOLOGY OF VERTEBRATES. An advanced course in comparative or special anatomy of vertebrates, including anatomical technique. Students qualified will be directed into lines of research. Conference, reference, and laboratory work. JOHNSON.

*119-120. VERTEBRATE HISTOLOGY. Primarily advanced work on vertebrate tissues. Conference, reference and laboratory work. DOWNEY.

*123-124. BLOOD OF VERTEBRATES. A comparative study of blood and blood-forming organs of vertebrates. Major portion of time to be devoted to research. DOWNEY.

*125-126. COMPARATIVE NEUROLOGY. A study of the structure and functions of the nervous system of vertebrate animals and of the evolution of the chief nervous mechanisms. JOHNSTON.

*131-132. EMBRYOLOGY. A brief survey of general embryology, and the organogeny of the vertebrates with special reference to the circulatory system. Conference, reference and laboratory work with Kellicott's *General Embryology* and *Outlines of Chordate Development* as texts. NACHTRIEB.

*143-144. GENETICS AND EUGENICS. Facts and theories of heredity and the application of the laws governing natural inheritances for the improvement of a race. Lectures, reference, conference, and laboratory work. Not offered in 1915-1916. NACHTRIEB.

*161-162. PROBLEMS. Advanced work in some special line. DOWNEY, JOHNSON, JOHNSTON, LUND, NACHTRIEB, OESTLUND, SIGERFOOS.

ART

It is expected that adequate opportunities for work in the fine arts and architecture will be offered to the students of this college in the near future. The following course is offered through the coöperation of the Minneapolis Society of Fine Arts. Mr. Breck, Director of the Minneapolis Institute of Arts, will lecture on Ancient Art; Miss Margaret T. Jackson, Director's Assistant at the Institute, on Christian, Romanesque, Gothic, and Renaissance Art; and Mr. Robert Koehler, Director Emeritus of the Minneapolis School of Art, on Art from the XVII Century to the present day.

HISTORY OF ART: A general survey of the history of Occidental Art from the earliest times to the present day. Two lectures a week and required reading. Second semester. Prerequisite, History 1-2 or twelve credits in Greek, Latin, or English.

ASTRONOMY

Professor FRANCIS P. LEAVENWORTH; Assistant Astronomer WILLIAM O. BEAL.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, Courses 51-52 and 101-102 (the latter taken as a three-hour course) or Courses 13-14 and 101-102 (the latter taken as a three-hour course).

For a Major, Courses 21, 51-52, and 101-102 (the latter taken as a six-hour course), and Mathematics 4.

For B.A. with Honors, the general requirements (page 22), Courses 51-52, 101-102 (as a six-hour course), and six credits in Physics.

ASTRONOMICAL OBSERVATORY

The Astronomical Observatory contains a ten and one-half-inch refracting telescope furnished with a third lens for converting it into a photographic telescope; a five-inch star camera; a filar micrometer; a spectroscope by Brashear; a meridian circle and zenith telescope; a Repsold photographic measuring machine; a chronograph, and astronomical clocks.

COURSES

No.	Title	Credits	Offered to	Prereq. Courses
9-10.	Descriptive Astronomy..	3	Soph., jr., sr.	None
11a or 11b.	Descriptive Astronomy..	3	Soph., jr., sr.	None
13-14.	Descriptive Astronomy and Observatory Practice	6	Soph., jr., sr.	None
21.	Spherical Trigonometry with Applications.....	3	Soph., jr., sr.	Math. 1-2 and 6, or Math. 3-4 and 6
*51-52.	General Astronomy.....	6	Jr., sr.	1 yr. Math.
*62.	Elements of Practical Astronomy	3	Jr., sr.	1 yr. Math.
*101-102.	Practical Astronomy....	6 or 12	Jr., sr.	Math. 7 and 11
*140.	Method of Least Squares	2	Sr., grad.	Math. 51

9-10. DESCRIPTIVE ASTRONOMY. Same as Course 11. One evening session each week, one and one-half hours long, throughout the year. BEAL.

11a or 11b. DESCRIPTIVE ASTRONOMY. Lectures on the Elements of Astronomy, illustrated by lantern slides. LEAVENWORTH.

13-14. DESCRIPTIVE ASTRONOMY AND OBSERVATORY PRACTICE. Lectures and recitations on the Elements of Astronomy; lectures illustrated by lantern slides. Laboratory exercises, problems, and telescopic observations. No credit given until both semesters are completed. BEAL.

21. SPHERICAL TRIGONOMETRY WITH APPLICATIONS. Text, lectures, problems, geodetic and astronomical applications. BEAL.

*51-52. GENERAL ASTRONOMY. A thoro study of the general principles of Astronomy, illustrated by lantern slides and telescopic observations. No credit given until both semesters are completed. LEAVENWORTH.

*62. ELEMENTS OF PRACTICAL ASTRONOMY. Theory and use of astronomical instruments in determining time, latitude, longtitude, and positions of heavenly bodies. The observational work may all be done in daylight. BEAL.

*101-102. PRACTICAL ASTRONOMY. Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares. LEAVENWORTH.

*140. METHOD OF LEAST SQUARES. The combination and adjustment of observations and the discussion of their precision as applied especially to Engineering, Physics, and Astronomy. LEAVENWORTH.

BACTERIOLOGY

Assistant Professor W. P. LARSON; Instructors, A. T. HENRICI, MARGARET WARWICK.

COURSES

No.	Title	Credits	Offered to	Prerequisite
58a or 58b.	General Bacteriology....	4	All	Gen. Chem. and either Zool. 1-2 or Bot. 1
59.	Special Bacteriology....	3	All	Bact. 58
104.	Special Bacteriological Technique	3	All	Bact. 58

58a or 58b. GENERAL BACTERIOLOGY. Preparation of culture media. The morphology of bacteria. Methods of staining and of identification. Anaerobic bacteria. Principles of sterilization and disinfection. Examination of air, water, milk. Relation of bacteriology to the industries. LARSON, WARWICK, HENRICI.

59. SPECIAL BACTERIOLOGY. Study of pathogenic bacteria. Bacteriological methods in clinical diagnosis. Principles of infection and immunity with practical application of serum reactions. LARSON, WARWICK, HENRICI.

104. SPECIAL BACTERIOLOGIC TECHNIQUE. An advanced course offering an opportunity for additional work in bacteriology and affording the opportunity of working out special problems. Limited to ten students. LARSON.

BOTANY

Professors FREDERIC E. CLEMENTS, CARL OTTO ROSENDAHL, JOSEPHINE E. TILDEN; Assistant Professors HERBERT F. BERGMAN, FREDERIC K. BUTTERS, NED L. HUFF; Assistants DONALD FOLSOM, FRANCES L. LONG, HARVEY STALLARD.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, 12 credits, of which not more than six credits may be in introductory courses.

For a Major, 24 credits.

For B.A. with Honors, the general requirements (page 22); 36 credits in Botany, of which 24 shall be selected from advanced Courses 105-06 to 119-20 inclusive. Those electing the Honors Course are urged to secure 12 credits during the sophomore year.

For a Teacher's Certificate, an average of at least one honor point for each credit hour in one introductory and one intermediate course, and in Course 121-122.

Students entering the department without preparation must take Course 1, followed by 2, 3b or 4. Students coming from an approved high school course must take Course 3a followed by 2 or 4. Those who expect to pursue botany for a single year only will take Course 3b or 4 during the second semester, while those who expect to take a major in botany are advised to take Course 2.

COURSES

No.	Title	Credits	Offered to	Prerequisite
	Introductory Courses			
1a or 1b.	General Botany.....	3	All	None
2.	Structural Botany.....	3	All	1 or 3a
3a or 3b.	Evolution of Plants.....	3	All	1 or approved High School Botany
4.	Field and Garden Botany	3	All	1 or 3a
	Intermediate Courses			
5-6.	Plant Morphology.....	6	Soph., jr., sr.	6 credits: see statement
7-8.	Taxonomy	6	Soph., jr., sr.	6 credits: see statement
9-10.	Physiology and Ecology..	6	Soph., jr., sr.	6 credits
11-12.	Industrial Botany.....	6	Soph., jr., sr.	6 credits, inc. 2 or 3
13-14.	Mycology	6	Soph., jr., sr.	6 credits
	Advanced Courses			
*103.	Foodstuffs and Textiles..	3	Jr., sr., grad.	9 credits
*105-106.	Algae	6	Jr., sr., grad.	9 credits
*107-108.	Mosses and Ferns.....	6	Jr., sr., grad.	9 credits, inc. 2 or 3, or 5-6
*110.	Gymnosperms	3	Jr., sr., grad.	7-8 or 107-108

No.	Title	Credits	Offered to	Prereq. courses
*111-112.	Advanced Taxonomy.....	6	Jr., sr., grad.	7-8
*113-114.	Advanced Ecology.....	6	Jr., sr., grad.	9-10
*115-116.	Advanced Physiology.....	6	Jr., sr., grad.	9-10
*117-118.	Cytology	6	Jr., sr., grad.	18 credits
*119-120.	Advanced Industrial Botany	6	Jr., sr., grad.	11-12
*121-122.	Plant Studies and Methods	6	Jr., sr., grad.	12 credits

INTRODUCTORY COURSES

1a. General Botany. A study of the external form and organs of flowering plants, root, stem, leaf, fruit and seed, and of their relations to each other, together with simple greenhouse experiments to illustrate the various functions. Clements, Butters, Huff, Bergman, Folsom, Long, Stallard.

1b. General Botany. Same as Course 1a.

2. Structural Botany. A study of the microscopic structure of flowering plants, the cell, tissues and tissue systems, as seen in the root, stem, leaf, etc. Butters, Stallard.

3a. Evolution of Plants. A comparative study of selected types of plants, illustrating the evolution of land plants from the simplest forms. Huff, Bergman.

3b. Evolution of Plants. Same as Course 3a.

4. Field and Garden Botany. Greenhouse, garden and field study of the form, behavior, naming and relationships of flowering plants, together with individual problems in the pollination, reproduction and propagation of common flower types. Clements, Folsom, Long.

INTERMEDIATE COURSES

5-6. Plant Morphology. A comparative study of the form, structure and life history of typical algae, fungi, liverworts, mosses, ferns and seed plants. Course 6 (but not 5) open to those who have taken Course 3. Butters.

7-8. Taxonomy. A general study of the classification and relationships of flowering plants. Laboratory and field practice in the determination of species, together with lectures and quizzes. Rosendahl.

9-10. Physiology and Ecology. Greenhouse and field study of physical factors and plant responses, absorption, transport, water loss, nutrition, growth, fertilization, reproduction and adaptation: field study of habitat, migration, competition, invasion, and succession. Clements, ...

11-12. Industrial Botany. Laboratory study of the plants useful to

man, including those which furnish food, shelter, fuel, clothing, etc. TILDEN.

13-14. MYCOLOGY. The classification and life history of the various groups of fungi, based on identification, field work, and cultures. CLEMENTS.

ADVANCED COURSES

*103. PLANT FOODSTUFFS AND TEXTILES. A special study of the botany of foods, textile fibers and fabrics, together with an inquiry into the relation of plants to household processes and problems. For young women. TILDEN.

*105-106. ALGAE. A detailed comparative study of the structure and classification of the algae, including an examination of blue-green and green freshwater forms and the more important brown and red marine species. TILDEN.

*107-108. COMPARATIVE MORPHOLOGY OF MOSSES AND FERNS. Designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lecture, laboratory and field work. BUTTERS.

*110. MORPHOLOGY AND TAXONOMY OF GYMNOSPERMS. A comparative study of cycads, conifers, and their allies, their structure and history with especial attention to the classification of living forms. Lectures, reference reading, and laboratory work. Not offered in 1915-16. BUTTERS.

*111-112. ADVANCED TAXONOMY. An advanced course in which special attention is given to the taxonomy of difficult natural groups, involving systematic principles and practice, rules of nomenclature, systems of classification, etc. Laboratory, field work, lectures and quizzes. ROSENDAHL.

*113-114. ADVANCED ECOLOGY. Critical study of plant habitats by means of instruments; adaptations produced by water and light; careful examination of causes and reactions of plant formations. Class discussion and quizzes, field and greenhouse work. CLEMENTS, ...

*115-116. ADVANCED PLANT PHYSIOLOGY. The relations of factor, function, and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work. CLEMENTS, ...

*117-118. CYTOLOGY. A survey of cell structure and the various phenomena of division, fusion, and metamorphosis, together with a review of the history of cytological investigation. Methods of cytological research indicated in the laboratory. ROSENDAHL.

*119-120. ADVANCED INDUSTRIAL BOTANY. A study of the origin, distribu-

tion and cultivation of plants yielding products of economic value; the nature and uses of these products and the processes by which they are obtained from the plants. TILDEN.

*121-122. PLANT STUDIES AND METHODS. The subjects of nature study and high-school botany presented as they are to be taught; the material taken up in detail in proper sequence, and training in method afforded by practice in the University High School. CLEMENTS.

CHEMISTRY

Professors GEORGE B. FRANKFORTER, CHARLES F. SIDENER; Associate Professor EVERHART P. HARDING; Assistant Professors IRA H. DERBY, FRANCIS C. FRARY, WILLIAM H. HUNTER, EDWARD E. NICHOLSON; Instructors ROSS A. BAKER, FRANK W. BLISS, LILLIAN COHEN, J. GERHARD DIETRICHSON, WOLF KRITCHEVSKY, LILLIAN L. NYE, EARL PETTIJOHN, FREDERICK POPPE, WOLDEMAR STERNBERG, EARLE K. STRACHAN, STERLING TEMPLE; Assistants CURTIS W. APPLEBY, WALTER M. LAUER, R. D. MAY, H. A. MURTA, A. T. NEWMAN, ADOLPH NIETZ, A. O. UTNE.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

In Chemistry the purpose of the honors course is served by the Five-Year Course in Arts and Chemistry. (See page 27.)

For a Teacher's Certificate, an average of at least one and one-half honor points for each credit hour in Courses 1-2 or 3-4 and 7-8 or 11-12; and 20.

COURSES

Division of General and Inorganic Chemistry

No.	Title	Credits	Offered to	Prereq. courses
1-2.	General Chemistry.....	6†	Those entering without Chemistry	None
21-22.	Inorganic and Qualitative Chemistry	10†	Those entering without Chemistry	None
3-4.	Adv. Gen. Chem. and Qualitative Analysis....	6†	Fr., soph., jr.	Entrance credit in Chemistry
7-8.	Qualitative Analysis.....	6†	Soph., jr., sr.	1-2
10.	Glass Blowing.....	1	Jr., sr.	None
17.	Inorganic Colloquium....	2	Sr.	11-12
20.	Teachers' Course.....	2	Sr.	3-4 or 7-8, or 21-22
*169-170.	Chemistry of the Rare Elements	4†	Jr., sr.	11-12

Division of Analytical Chemistry

No.	Title	Credits	Offered to	Prereq. courses
11-12.	Quantitative Analysis....	8†	Soph., jr., sr.	3-4 or 7-8, or 21-22
*107-108.	Advanced Quantitative Analysis	6†	Jr., sr.	11-12

Division of Organic Chemistry

13-14.	Medical Organic Chemistry	6	Soph.	3-4 or 7-8, or 21-22
18.	Organic Colloquium.....	2	Sr.	35-36
35-36.	Organic Chemistry.....	8†	Jr., sr.	3-4 or 7-8, or 21-22
*115.	Adv. Organic Chemistry.	2	Sr.	35-36
*116.	Theoretical Organic Chem.	2	Sr.	35-36

Division of Physical Chemistry

*121-122.	Physical Chemistry.....	4†	Jr., sr.	36-36 Physics 2 and 4
*123-124.	Physico-chemical Lab.....	2†	Jr., sr.	See statement
*125-126.	Adv. Physical Chemistry.	6†	Sr.	121-122
*128.	Radiochemistry	2	Jr., sr.	3-4 or 7-8, or 21-22 Physics 2 and 4

Division of Technological Chemistry

27-28.	Chemistry in Every Day Life	4†	Jr., sr.	3-4 or 7-8, or 21-22

Division of Industrial Chemistry

15.	Photochemistry	2	Jr., sr.	3-4 or 7-8, or 21-22
16.	Color Photography.....	2	Jr., sr.	15

†Both semesters must be completed before credit is given for the first semester.

DIVISION OF GENERAL AND INORGANIC CHEMISTRY

1-2. General Chemistry. A study of the metallic and non-metallic elements, with a brief introduction to organic chemistry. Cohen, and Assistants.

3-4. Advanced General Chemistry and Qualitative Analysis. Lectures and laboratory work. A discussion of the general chemical theories and laws, with qualitative analysis. Frankforter, Dietrichson, and Assistants.

7-8. Qualitative Analysis. The general reactions of the metals and acids with their qualitative separation. The ionic theory and the law of mass action with special reference to common qualitative reactions. Nicholson, Bliss, and Assistants.

10. Glass Blowing. The course includes the methods used in the construction and repair of simple glass apparatus. Frary.

17. Colloquium in Inorganic Chemistry. A thoro -quiz in inorganic chemistry. Dietrichson.

20. TEACHERS' COURSE. For those who expect to teach Chemistry. COHEN.

21-22. INORGANIC AND QUALITATIVE CHEMISTRY. This includes a study of the non-metals, metals, and qualitative analysis, together with a thoro discussion of the fundamental laws and theories of chemistry. COHEN.

*169-170. CHEMISTRY OF THE RARE ELEMENTS. The descriptive chemistry of the rare elements and their analytical separation. NICHOLSON.

DIVISION OF ANALYTICAL CHEMISTRY

11-12. QUANTITATIVE ANALYSIS. First semester: A general discussion of quantitative methods, with laboratory work in gravimetric analysis. Second semester: A discussion of standard solutions and the necessary stoichiometric calculations with laboratory work in volumetric analysis. SIDENER, PETTIJOHN, STERNBERG, and Assistants.

*107-108. ADVANCED QUANTITATIVE ANALYSIS. The work in this course will be adapted as far as possible to the needs and desires of the individual students. SIDENER.

DIVISION OF ORGANIC CHEMISTRY

13-14. MEDICAL ORGANIC CHEMISTRY. An outline of the chemistry of carbon, including the preparation of some of the more important organic compounds. Special emphasis laid on those substances used in medicine. Open only to students in Arts and Medicine Course. HUNTER, KRITCHEVSKY, and Assistants.

18. COLLOQUIUM IN ORGANIC CHEMISTRY. A thoro quiz in general organic chemistry. FRANKFORTER.

35-36. ORGANIC CHEMISTRY. The aliphatic and the aromatic series with the preparation of the more important compounds. FRANKFORTER, KRITCHEVSKY, and Assistants.

*115. ADVANCED ORGANIC CHEMISTRY. The general reactions of organic chemistry, such as substitutions and condensations in a detailed manner. HUNTER.

*116. THEORETICAL ORGANIC CHEMISTRY. A consideration of theories that apply especially to carbon compounds, such as relation of properties to constitution, the carbon valence theory. HUNTER.

DIVISION OF PHYSICAL CHEMISTRY

*121-122. PHYSICAL CHEMISTRY. A consideration of the theories and laws, phenomena and processes which form the basis of chemical science. Charts, models, and experiments employed to supplement and illustrate the discussions. DERBY.

*123-124. PHYSICO-CHEMICAL LABORATORY PRACTICE. Physico-chemical methods and measurements. Open only to students pursuing Course 121-122, or who have had it or its equivalent. DERBY.

*125-126. ADVANCED PHYSICAL CHEMISTRY. The theories of chemistry treated systematically from the standpoint of thermodynamics and the molecular theory. Suited to the needs of candidates for the higher degrees and all others interested in the advances of modern physical chemistry. STRACHAN.

*128. RADIOCHEMISTRY. The occurrences, methods of isolation and investigation, and physico-chemical properties of the radioactive substances, together with a brief consideration of the chemical, geological, and biological bearing of the subject. DERBY.

DIVISION OF TECHNOLOGICAL CHEMISTRY

27-28. CHEMISTRY OF EVERY-DAY LIFE. A discussion of the inorganic and organic substances used in every-day life. FRANKFORTER, HARDING.

DIVISION OF INDUSTRIAL CHEMISTRY

15. PHOTOCHEMISTRY. A discussion of the general principles of photochemistry and their application to dry-plate photography and the ordinary printing processes. FRARY.

16. COLOR PHOTOGRAPHY. Theory and practice in the preparation and use of orthochromatic and panchromatic plates; photography in natural colors. FRARY.

COMPARATIVE PHILOLOGY

Professor FREDERICK KLAEBER.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, Courses 101, 102, 105, 108, 109, 110.

For a Major, Courses 101, 102, 105, 108, 109, 110, with German 3-4 (or 5-6) and 7-8 as prerequisites.

For B.A. with Honors. The required credits in the major may be elected from the undergraduate courses of the department and English 8, 101, 103 and German 107-108.

This department, besides offering courses in the general principles of linguistic science, affords an opportunity for elementary studies in Comparative Indo-European Philology, and more particularly the investigation of Old Germanic dialects. Related courses in English Philology will be found under English Language and Literature.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
*101.	Science of Language.....	2	Jr.,sr., grad.	See statement
*102.	Life of Words.....	2	Jr.,sr., grad.	Same as for 101
*104.	Germanic Philology.....	2	Jr.,sr., grad.	Same as for 101
*105.	Universal Language.....	2	Jr.,sr., grad.	Same as for 101
*106.	Science of Language (Advanced)	2	Jr.,sr., grad.	Same as for 101
*108.	Comparative Phonology..	2	Jr.,sr., grad.	German 7-8
*109-110.	History of German Language	4†	Sr., grad.	German 53, 54

†Both semesters must be completed before credit is given for either semester.

*101. General Introduction to the Science of Language. Sufficiently general to be of use to all students who wish to obtain an insight into the life of language. Open to those who have fulfilled one of the following requirements: (1) five years of a foreign language, four of which may be in a high school and one in college; (2) two years of a foreign language in college; (3) six credits in Old English; (4) Courses 3 and 5 in English. Klaeber.

*102. The Life of Words. Etymology and semasiology. Growth of vocabulary; change of words in form and meaning. Lectures and exercises with special reference to English and other Germanic languages. Alternates with Course 110. Not given in 1915-16. Klaeber.

*104. Introduction to Germanic Philology. Not given in 1915-16. Klaeber.

*105. The Universal Language. Comparison of the principal families of languages in grammatical and lexical respects. History of the movement for the creation of an international language. Consideration of Volapük, Esperanto, Ido, and other artificial languages. Alternates with Course 109. Not given in 1915-16. Klaeber.

*106. Science of Language (Advanced Course). Investigation of linguistic problems. Study of standard works. Reports on recent publications. Alternates with Course 108. Klaeber.

*108. Comparative Phonology of English and German. Elements of phonetics; history of English and German sounds; orthography. Lectures supplemented by practical exercises. Alternates with Course 106. Not given in 1915-16. Klaeber.

*109-110. History of the German Language. Lectures, discussions, assigned readings. Course may be conducted in German. Identical with German 109-110. Klaeber.

DRAWING AND DESCRIPTIVE GEOMETRY

Professor WILLIAM H. KIRCHNER; Assistant Professors FRANK B. ROWLEY, OTTO S. ZELNER; Instructors ROBERT W. FRENCH, LYALL DECKER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
21-22.	Technical Drawing.....	4	All	None

21-22. TECHNICAL DRAWING. Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings, and translations. KIRCHNER, FRENCH.

ECONOMICS

Professors JOHN H. GRAY, E. DANA DURAND; Assistant Professors ROY G. BLAKEY, J. FRANKLIN EBERSOLE, THOMAS WARNER MITCHELL; Instructors LLOYD M. CROSGRAVE, H. G. HAYES, A. C. JAMES, ROBERT J. MCFALL; in the General Extension Division, Associate Professor CLARE L. ROTZEL; Assistant Professors GERHARD A. GESELL, CHARLES H. PRESTON; Instructor RAYMOND V. PHELAN.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits

For a Major, twenty-four credits, including Course 4.

For B.A. with Honors, thirty credits in the major line of work with the usual supporting credits, and not less than sixty credits altogether in Group B (page 22).

For a Teacher's Certificate in business subjects, a major in Economics, including Accounting and Economic Geography.

Vocational Course in Business Education. Freshmen who signify their intention of taking the proposed four-year vocational course in preparation for business (see page 22) may elect Economics 1a the first semester followed by Economics 3b or Economics 2b, or both, the second semester. For these students 1a is prerequisite to 3b.

The departments of Economics, Political Science, History, and Sociology and Anthropology constitute a social science group. The subjects are intimately inter-related, and they are all of special importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one of the departments of the social science group ought to be familiar with at least the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others.

SUGGESTIONS AS TO COURSES IN THE DEPARTMENT

In order to aid students who have some idea as to their intended profession or calling to make a wise choice of courses, the accompanying tabular statement has been prepared.

These recommendations are merely suggestive and more courses are sometimes recommended than suffice to make up a technical minor or major in order that students may choose those courses which interest them the most.

Courses 3 and 4 are not included in these recommendations, as they must, in any case, precede the advanced courses, since they are required of all taking a major in Economics.

Students desiring merely a general acquaintance with Economics as part of a liberal education and as a preparation for citizenship are recommended to take the general courses and such others, amounting at least to a minor, as their interests may indicate.

ECONOMICS

In preparation for	Courses advised for a minor	Additional advised for a major
Law	91, 22, 145, 146	43, 143, 73, 104
Public Service	2, 91, 145, 146	164, 35-6, 101
Consular and Diplomatic Service	2, 31-2, 13, 22, 71, 101	43, 143, 73, 34
Journalism	2, 91, 73, 145, 146, 43	164, 161, 101, 104, 143
Engineering or Railway Service	46, 73, 146, 145	161, 35-6, 34, 131
Chemistry or Manufactures	2, 15, 22, 31-2, 146, 161	34, 35-6, 131, 101
Mining	2, 72, 146, 161, 31-2, 143	13, 22, 141
Banking and Finance	43, 47, 101, 143, 145	42, 35-6, 138, 141, 144, 255-56
General Business	2, 13, 22, 31-2, 43, 143	23, 24, 34, 35-6, 141, 145
Forestry or Agriculture	13, 15, 17, 22, 31-2	35-6, 43, 73, 143, 251-2
Teaching Business Subjects	2, 13, 31-2, 43, 103	34, 35-6, 42
Medicine	2, 43, 164	42, 34, 35-6
Social Service Work	2, 161, 162	164, 104, 31-2, 261-62
The Ministry	2, 161, 162	164, 104, 31-2
Public Accountancy	35-6, 34, 132	131, 46, 47, 43, 141, 145, 146, 101, 253-54
Insurance	34, 35-6, 46, 47	23, 24, 145, 146, 141

COURSES

General Courses

No.	Title	Credits	Offered to	Prereq. courses
1a or 1b.	Indust. Hist. since 1750..	3	Soph., jr., sr.	None‡
3a or 3b.	Elements of Economics..	3	Soph., jr., sr.	None‡
4a or 4b.	Advanced Economics.....	3	Soph., jr., sr.	3
5.	Economic Development...	3	Soph., jr., sr.	None
31-32.	Physical and Human Geography	6†	Soph., jr., sr.	None
*101.	Statistics	3	Jr., sr., grad.	6 credits inc. 3
*104.	Hist. of Economic Ideas.	3	Jr., sr., grad.	3 and 4
*105-106.	Economic Conference....	None	Sr., grad.	Accompanies seminars

Production, Transportation and Commerce

2a or 2b.	Industries and Commerce of the United States...	3	Soph., jr., sr.	None‡
13.	Econ. Geography of Foreign Countries	3	Soph., jr., sr.	3 credits
15.	Forest Economics and Conservation	3	Jr., sr.	3
18.	Agricultural Economics..	3	Jr., sr.	3
*251-252.	Seminar in Agr. Economics	6†	Sr.,grad.	3, 17, and 6 other credits in Economics or Farm Management
22.	Commercial Policies.....	3	Soph., jr., sr.	3
*72.	Economics of Colonization	3	Jr., sr.	6 credits inc. 3
*74.	Railway Problems.....	3	Jr., sr.	6 credits inc. 3

Business Administration

34.	Business Management....	3	Soph., jr., sr.	3
35-36.	Accounting Principles....	6†	Soph., jr., sr.	None
37.	Marketing of Products...	3	Jr., sr.	3
38.	Advertising, Salesmanship and Commercial Credit.	3	Soph., jr., sr.	3
*131.	Cost Accounting.....	3	Jr., sr., grad.	3 and 35-36
*132.	Accounting Problems.....	3	Jr., sr., grad.	3 and 35-36
*133.	Accounting Systems.....	3	Sr., grad.	35-36, and 131 or 132
*134.	Auditing	3	Sr., grad.	35-36, and 131 or 132
*138.	Bank Administration.....	3	Jr., sr., grad.	3 and 43, and consent of instructor
*253-254.	Seminar in Accounting...	6†	Sr., grad.	12 credits inc. 35-36; and 131

Finance

42.	Financial History.....	3	Soph., jr., sr.	3
43a or 43b.	Banking	3	Soph., jr., sr.	3
46.	Property Insurance.....	3	Soph., jr., sr.	3
47.	Personal Insurance.....	3	Soph., jr., sr.	3
*91.	Public Finance.....	3	Jr., sr.	6 credits inc. 3
*92.	State and Local Taxation	3	Jr., sr.	91

No.	Title	Credits	Offered to	Prereq. courses
*141.	Investment and Speculation	3	Jr., sr., grad.	3 and 43 or 143
*143.	Money and Prices	3	Jr., sr., grad.	3 and 42 or 43
*144.	Commercial Crises	3	Jr., sr., grad.	3 and 43 or 143
*145.	The Modern Business Corporation	3	Jr., sr., grad.	6 credits inc. 3
*146.	Public Utilities	3	Jr., sr., grad.	145
*255-256.	Seminar in Money and Banking	6†	Sr., grad.	12 credits inc. 43
*257-258.	Seminar in Econ. Development and Taxation	6†	Sr., grad.	12 credits
*259-260.	Seminar in Corporations.	6†	Sr., grad.	12 credits
	Economic Reforms			
*161.	Labor Problems	3	Jr., sr., grad.	3 and 4
*163.	Economic Conditions in Cities	3	Jr., sr., grad.	6 credits inc. 3
*164.	Economic Functions of the State	3	Jr., sr., grad.	6 credits inc. 3
*165.	History and Theory of Socialism	3	Jr., sr., grad.	6 credits inc. 3
*166.	Trade Unionism and Allied Problems	3	Jr., sr., grad.	6 credits inc. 3
*168.	Wages	3	Jr., sr., grad.	164 or 166 and consent of instructor
*261-262.	Seminar in Labor Problems	6†	Sr., grad.	161 or 163 and 164

†Both semesters must be completed before credit is given for the first semester.
‡See announcements concerning the proposed vocational course in business education on pages 22 and 44.

GENERAL COURSES

1a or 1b. Industrial History Since 1750. Economic effects of inventions, wars, political changes, increased supply of precious metals, improved transportation, and modifications of business organization; chief emphasis on Great Britain. Gray.

3a or 3b. Elements of Economics. A study of the principles that underlie the present industrial order with reference to present-day economic and social problems. Lectures to the entire class one hour each week and oral quiz in sections two hours each week. Hayes, James, Crosgrave, and Assistants.

4a or 4b. Advanced Economics. An advanced course in economic theory, devoted chiefly to a study of recent theories of distribution. Assigned readings, reports, and discussions. Hayes and Blakey.

5. Economic Development Prior to 1750. Development of commerce and commercial policies in Europe prior to the Industrial Revolution, as a preparation for the study of modern economic conditions and

theories. Textbook, supplemented by lectures and assigned readings. BLAKEY.

31-32. PHYSICAL AND HUMAN GEOGRAPHY. First semester: Land forms and agencies that change them; climatology and oceanography; topographic map interpretation; field excursions. POSEY.

Second semester. Influence of topography on activities of man; economic progress as a phase of adaptation to environment. McFALL.

*101. THEORY AND PRACTICE OF STATISTICS. Principles of collection, tabulation, and interpretation of statistical material, illustrated by present-day statistical data. Lectures, assigned readings, and special investigations by individual members of the class. DURAND.

*104. HISTORY OF ECONOMIC IDEAS. History of economic thought; scope and logical methods, relation to other social sciences; methods of investigation and instruction. Assigned readings, reports, and class discussions. HAYES.

*105-106. ECONOMIC CONFERENCE. Monthly meetings of the instructional staff, and advanced students in Economics. Lectures on bibliography by Mr. Gerould; papers prepared for advanced courses presented for criticism; reports on current economic events and literature.

PRODUCTION, TRANSPORTATION AND COMMERCE

2a. INDUSTRIES AND COMMERCE OF THE UNITED STATES. Same as 2b, but given at the College of Agriculture. DURAND.

2b. INDUSTRIES AND COMMERCE OF THE UNITED STATES. Agricultural, mining, and manufacturing industries and internal and foreign commerce. Leading individual industries—geographical distribution, methods of organization, production and marketing, and relationships to one another. Textbook, lectures, and assigned readings. DURAND.

13. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES. Economic basis of modern civilization; localization of industries; principal extractive, manufacturing, and distributive industres of leading foreign countries, especially markets for American products. Textbook with lectures and special reports. McFALL.

15. FOREST ECONOMICS AND CONSERVATION. Development of forest policies; relation of forests to other industries; effects of transportation rates and taxation; general problem of the conservation of natural resources. Lectures, assigned readings, and reports. McFALL.

18. PRINCIPLES OF AGRICULTURAL ECONOMICS. The fundamentals of economics applied to agricultural organization and management with special attention to factors affecting agricultural prices and to questions of land tenure and agricultural credit. Lectures and assigned readings. Given at the Agricultural College. DURAND.

22. COMMERCIAL POLICIES. Theory of international commerce; free trade, reciprocity, and protection, with special emphasis on the tariff history and policy of the United States; commercial treaties and foreign politics. Lectures, assigned readings, and reports. McFALL.

*72. ECONOMICS OF COLONIZATION. Economic causes of human migration; historical survey of colonization with reference to economic bases; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings and reports. McFALL.

*74. RAILWAY PROBLEMS. Methods of railway organization and operation; statistics of operation; economic principles of ratemaking and of government regulation; railroad discriminations; competition, pooling, and combinations. Foreign railways. Lectures, assigned readings, and special topics. McFALL.

*251-252. SEMINAR IN AGRICULTURAL ECONOMICS. Research problems in the marketing and distribution of farm products, agricultural credit, farm ownership and tenancy, and agricultural organizations. Given at the Agricultural College. DURAND.

BUSINESS ADMINISTRATION

34. BUSINESS MANAGEMENT. The principles of efficiency in business operation and forms of organization to apply them; the typical departments of a business: their functions, office organization and administration. Textbook, assigned readings, and lectures. MITCHELL.

35-36. PRINCIPLES OF ACCOUNTING. The purpose and principles of account classification; capital and revenue; accruals; valuation; depreciation; preparation and interpretation of balance sheets, income accounts, and other statements; corporation accounts. A laboratory course with supplementary lectures. MITCHELL.

37. MARKETING OF PRODUCTS. Merchandising problems of manufacturers, wholesalers and retailers; distributing systems and market organization; price policies; sales management. JAMES.

38. ADVERTISING, SALESMANSHIP AND COMMERCIAL CREDIT. Functions and principles of advertising; advertising media; planning and executing an advertising campaign. Principles of personal salesmanship. Problems of the Credit Department. JAMES.

*131. COST ACCOUNTING. Analysis of production cost; methods of recording materials, labor and machine costs; apportioning indirect expenses; relation of cost to general accounts; use of cost data to enforce operating efficiency. Laboratory with lectures. MITCHELL.

*132. ACCOUNTING PROBLEMS. A selection from C. P. A. examinations and other sources of difficult problems that confront the public accountant. MITCHELL.

*133. ACCOUNTING SYSTEMS. The special accounting problems of building societies, banks, department stores, insurance companies, railroad companies, and other types with a description of their accounting systems. MITCHELL.

*134. AUDITING. Preparation for, and conduct of, an audit; the auditor's report and certification, and legal responsibilities. Textbook, assigned readings, class discussions, and lectures. MITCHELL.

*138. BANK ADMINISTRATION. The modern commercial bank from the manager's point of view. Legal problems, department functions, profit-making methods, credits. Adjustment of bank policy to prospective business conditions. Lectures, and laboratory work in local banks. EBERSOLE.

*253-254. SEMINAR IN ACCOUNTING. Student reports and theses dealing with accounting systems, published reports, and interpretation of the accounts of business establishments located in or near the Twin Cities. MITCHELL.

FINANCE

42. FINANCIAL HISTORY OF THE UNITED STATES. American monetary and fiscal legislation from colonial times with especial emphasis upon the distinction between maintaining a standard of value and the providing of a revenue for the needs of government. BLAKEY.

43a or 43b. PRINCIPLES AND PRACTICE OF BANKING. Contemporary banking institutions, their organization and operation; loans, reserves, note issues, clearing houses, domestic and foreign exchange; the banking systems of foreign countries; and the Federal Reserve banks of the United States. EBERSOLE.

46. PROPERTY INSURANCE. Basic theory and critical examination of policy contracts of fire, marine, other casualty, title, and credit insurance. Textbook, lectures, and assigned readings. JAMES.

47. PERSONAL INSURANCE. Life insurance companies; types of policies and their uses; premium, reserve, surrender values, dividends, and rights and obligations of policy holders. Analysis of accident and liability insurance contracts and methods. Public regulation. JAMES.

*91. PUBLIC FINANCE. Public expenditures; public debt; budgetary legislation; tax systems. BLAKEY.

*92. STATE AND LOCAL TAXATION. Problems of state and local taxation. Historic survey of various taxes and examination of present procedure in taxing different kinds of property; tax reforms. Particular attention given to conditions in Minnesota. BLAKEY.

*141. INVESTMENT AND SPECULATION. The social process of saving and investment; government, municipal, corporation, and real estate loans; stock exchange operations and money market influences as they affect the prices and net yield of prime securities. EBERSOLE.

*143. MONEY AND PRICES. The functions of money; the nature of credit; changes in general prices, their causes and effects; international movements of gold; monetary standards and currency systems; the problem of securing an ideal money. EBERSOLE.

*144. PANICS, COMMERCIAL CRISES, AND CYCLES OF TRADE. American business conditions since 1890 with regard to the great cycles of alternate prosperity and depression and financial panics. Critical examination of all the available business barometers designed to forecast similar conditions. EBERSOLE.

*145. THE MODERN BUSINESS CORPORATION. The organizing, financing, and managing of corporations; the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. GRAY.

*146. PUBLIC UTILITIES. Economic and legal bases of classification. Relative advantages of public ownership and regulation. Central and municipal regulation compared. The basis of rates; relative rates; rates and service. Different theories of valuation. GRAY.

*255-256. SEMINAR IN MONEY AND BANKING. The various unsettled monetary and banking problems of the United States will furnish topics for individual investigation. EBERSOLE.

*257-258. SEMINAR IN ECONOMIC DEVELOPMENT AND TAXATION. Original investigation of various industries in the Middle West. The development of tax systems. Present problems in taxation. Not given in 1915-16.

*259-260. SEMINAR IN CORPORATION AND TRUST PROBLEMS. Practical and independent investigation by each student, under the guidance of the instructor, of some specific problem pertaining to corporations, trusts, or other monopolies. GRAY.

ECONOMIC REFORMS

*161. LABOR PROBLEMS. Modern labor problems: woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work, profit-sharing, coöperation, labor unions, strikes, boycotts, conciliation, and arbitration; economic causes and effects of immigration. CROSGRAVE.

*163. ECONOMIC CONDITIONS IN AMERICAN CITIES. The causes of economic dependence in American cities; the standard of living; the constructive agencies for economic betterment. Lectures, assigned readings, and visits of inspection in the Twin Cities. CROSGRAVE.

*164. THE ECONOMIC FUNCTIONS OF THE STATE. The proper limits of state interference with private property, freedom of contract and individual liberty. Police powers of the state. Legislation concerning factories, female and child labor, minimum wage, social insurance, etc. CROSGRAVE.

*165. HISTORY AND THEORY OF SOCIALISM. Economic utopias from Plato to Proudhon. Special attention to the theory, history, and practical significance of modern socialism. Lectures, assigned readings, and discussions. CROSGRAVE.

*166. TRADE UNIONISM AND ALLIED PROBLEMS. Development and activities of American trade unions. Economic and legal aspects of collective bargaining, closed shops, strikes, and boycotts. Employer's associations. Conciliation and arbitration. Social significance and probable future of trade unionism. CROSGRAVE.

*168. WAGES. The history of real and money wages during the last four centuries. Theories of wages from Adam Smith to the present. Wage statistics. Wage regulation with intensive study of minimum wage laws. CROSGRAVE.

*261-262. SEMINAR IN LABOR PROBLEMS. Original investigation and research, conducted in coöperation with the various agencies interested in promoting investigation of labor problems, affording training for practical work. Not given in 1915-16.

EDUCATION

Professors LOTUS D. COFFMAN, ALBERT W. RANKIN, FLETCHER H. SWIFT, Assistant Professor RAYMOND A. KENT; Instructors R. B. INGLIS, J. W. NORMAN; Lecturers .....

REQUIREMENTS OF THE DEPARTMENT

For a Minor, eighteen credits, including Philosophy 1-2, or equivalent.

For a Major, twenty-four credits, including Philosophy 1-2, or equivalent. Six credits in Psychology are prerequisite for all courses in Education.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a or 1b.	Brief Course in the History of Ed.....	3	Jr., sr.	Phil. 1-2
3a or 3b.	Social Aspects of Education	3	Jr., sr., grad.	Phil. 1-2
*101.	History of Educ. to Reformation	3	Jr., sr., grad.	Phil. 1-2 and 6 credits in dept. of History

No.	Title	Credits	Offered to	Prereq. courses
*101t.	History of Educ. to Reformation	3	Teachers only	Phil. 1-2
*102.	History of Educ. since Reformation	3	Jr., sr., grad.	Phil. 1-2 and 6 credits in dept. of History
*102t.	History of Educ. since Reformation	3	Teachers only	Phil. 1-2
*104.	Principles of Teaching	3	Sr., grad.	1 or 101-102 and 3
*105.	Educational Psychology	3	Sr., grad.	1 or 101-102 and 3
*111a or *111b.	Technique of Teaching	3	Jr., sr., grad.	Phil. 1-2
*114.	Current Problems in Elementary Teaching	3	Sr., grad.	1 or 101-102 and 3
*115a.	Practice Teaching	3	Sr., grad.	See statement
*115b.	Practice Teaching	3	Sr., grad.	See statement
*119.	School Curricula	3	Sr., grad.	1 or 101-102 and 3
*121.	School Organization and Administration	3	Sr., grad.	1 or 101-102 and 3
*123.	Theory of Supervision	3	Sr., grad.	1 or 101-102 and 3
*124.	Educational Administration	3	Sr., grad.	121
*125.	Methods in Educational Research	2	Sr., grad.	1 or 101-102 and 3
*126.	Units and Scales for Measuring Results	2	Sr., grad.	1 or 101-102 and 3
*128.	Auxiliary Education	3	Sr., grad.	105
*131.	Foreign School Systems	3	Sr., grad.	1 or 101-102 and 3
*131t.	Foreign School Systems	3	Teachers only	1 or 101-102 and 3
*141.	School Sanitation and Public Health	3	Sr., grad.	1 or 101-102 and 3
*142.	Industrial Education	3	Sr., grad.	1 or 101-102 and 3
*144.	Vocational and Moral Guidance	3	Sr., grad.	1 or 101-102 and 3
*146.	History and Principles of Religious Education	3	Jr., sr., grad.	Phil. 1-2

HISTORY OF EDUCATION

1a or 1b. A Brief Course in the History of Education. Current school problems and educational theories in the light of their history. Emphasis upon secondary education and those aspects of education of most immediate concern to high school teachers. Swift, Norman.

*101. History of Education to the Reformation. An interpretive historical study of educational institutions and ideals, designed for those who wish a more comprehensive historical view than can be gained in Education 1. The foundations of modern education—Hebrew, Greek, Roman, Medieval. Swift.

*101t. Same as Course 101, but for teachers only. A year course. Swift.

*102. History of Education Since the Reformation. Modern educational movements, current theories, and standards in the light of their history. For fuller description of general character of course, see Course 101. Swift.

*102t. Same as Course 102, but for teachers only. A year course. (Not offered in 1915-1916.) Swift.

PRINCIPLES OF EDUCATION

*111a or *111b. Technique of Teaching. Types of classroom exercises; preparation of teaching plans; hygiene of instruction; classroom management; the professional ethics of teaching; observation of high school work. Coffman.

*104. Principles of Method. An advanced course in principles of method with special application to high school subjects.

EDUCATIONAL PSYCHOLOGY

*105. Educational Psychology. An advanced course in psychology of the learning process.

SCHOOL ADMINISTRATION

3a or 3b. Social Aspects of Education. The school as a community factor; the present peculiar relation of the school to social problems; the function of the school in these relations. Required of all candidates for the University State Teachers Certificate. Kent, Rankin.

*114. Current Problems in Elementary Teaching. An advanced course in current problems. Definite problems will be assigned to each student to be worked out under the direction of the instructor through readings, visitation of schools and conferences and class discussion. Rankin.

*119. School Curricula. The curriculum as related to social, industrial, and economic conditions; a survey of the grammar grades and of the high school. Consideration of the possibilities of developing a curriculum better adapted to community needs. Rankin.

*121. School Organization and Administration. An introductory course in school administration. For students of teaching experience and for those looking forward to work as principals and superintendents. Rankin.

*123. Theory of Supervision. The problems involved in the training of teachers in service; studies of qualities of merit in teachers; factors in selecting teachers; the distribution of subject matter by grades; the time allotment of studies. Coffman.

*124. Educational Administration. The interpretation of present tendencies in the administration of state and city school systems. Coffman.

*125. Methods in Educational Research. A study of statistical and other methods as applied to educational investigation. This course is ordinarily required of all candidates for advanced degrees. Coffman.

*126. Units and Scales for Measuring Educational Results. An intensive study of the application of units and scales for measuring achievement in reading, composition, spelling, handwriting, and arithmetic. Coffman.

*128. Auxiliary Education. A study of educational provisions for defectives, blind, deaf, speech defectives, mental defectives. Institutions, subject matter, and methods.

SCHOOL SANITATION AND HYGIENE

*141a. School Sanitation and Public Health. A course in school hygiene in its broader aspects. Designed for all teachers and supervisors who are responsible for the health of school children. Treats of medical supervision and other problems arising from school environment. Rankin.

FOREIGN SCHOOLS

*131. Foreign School Systems. A study of existing school systems of other countries with a view to possible suggestions for development of public education in the United States. The emphasis in this course will be placed upon present conditions. In 1915-16, French Schools. Swift.

*131t. Same as 131, but for teachers only. Swift.

INDUSTRIAL EDUCATION AND VOCATIONAL GUIDANCE

*142. Industrial Education. Existing types of industrial and vocational schools and systems of training. Comparison of conditions in America and foreign countries. Organization of course of study.

*144. VOCATIONAL AND MORAL GUIDANCE. This course is designed for all who are interested in the problem of directing boys and girls toward their life work through education. It is of special value to superintendents, principals, and teachers of civics. (Not offered in 1915-16.)

MORAL AND RELIGIOUS EDUCATION

*146. HISTORY AND PRINCIPLES OF RELIGIOUS EDUCATION. Part I: The influence of religion and religious education as social and spiritual forces among certain selected types. Part II: Principles of education as applied to religious instruction and training. This course may be pursued as a graduate course under certain conditions. SWIFT.

METHODS OF TEACHING

For work in general methods see Courses 3 and *104 described above.

Teacher's Courses or Courses in the special methods of teaching high school subjects, are described in this bulletin in connection with the several departments concerned. For the year 1915-16 the courses in English and Rhetoric and Physics receive no credit except as courses in Education.

PRACTICE TEACHING

*115a or *115b. PRACTICE TEACHING. Teaching under supervision in the University High School and in the Minneapolis city schools, in the regular secondary school subjects. The course calls for one period daily at the school where the work is assigned. Prerequisites: Philosophy 1-2; Education 1, or 101-102, and the Teachers' Course in the department in which the student wishes to do practice teaching and the courses prerequisite to the said teachers' course for which see special departmental statements. Instructor should be consulted to insure correct registration.

ENGLISH

Professors RICHARD BURTON, HARDIN CRAIG, FREDERICK KLAEBER, ELMER E. STOLL; Assistant Professors JOSEPH W. BEACH, OSCAR W. FIRKINS, GEORGE N. NORTHROP.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, including Course 1-2.

For a Major, twenty-four credits, including Course 1-2, 3, 5, 8, 55.

For B.A. with Honors, the general requirements (page 22), a major in English, a reading knowledge of French, German, Italian, Greek, or Latin, and a final year's work in seminar for which a sequence shall have been specially arranged.

For a Teacher's Certificate, at least a minor in English and a minor in Rhetoric with an average of one and one-half honor points for each credit hour.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	General Survey Eng. Lit.	6	Soph., jr., sr.	Rhet. 1-2
3.	Old English	3	Soph., jr., sr.	None
4.	Advanced Old English	3	Soph., jr., sr.	3
5a or 5b.	Chaucer	3	Soph., jr., sr.	1-2
6.	Spenser	3	Soph., jr., sr.	1-2
8.	History of English Language	1	Jr., sr.	3
*55.	Shakespeare	3	Jr., sr.	1-2
*56.	Advanced Shakespeare	3	Jr., sr.	55
*59-60.	Modern Drama	6†	Sr.	1-2
*62.	Milton	3	Jr., sr.	1-2
*63.	19th Century Literature.	3	Jr., sr.	1-2
*66.	Browning-Tennyson	3	Jr., sr.	1-2
*67.	English Novel	3	Jr., sr.	1-2
*72.	English and Scottish Popular Ballads	3	Jr., sr.	1-2
*75.	Recent English Poetry	2	Jr., sr.	See statement
*101.	Middle English	2	Jr., sr., grad.	1-2 and 3, or 3 and 4
*103.	Piers the Plowman	2	Jr., sr., grad.	1-2 and 3, or 3 and 4
*105.	18th Century Poetry	3	Jr., sr., grad.	1-2
*107.	18th Century Prose	3	Jr., sr., grad.	1-2
*108.	Romantic Movement	3	Jr., sr., grad.	1-2
*109-110.	English Humorists	6	Jr., sr., grad.	1-2
*111-112.	17th Century Prose	6†	Jr., sr., grad.	1-2
*113-114.	Drama	6	Sr., grad.	12 credits
*115.	English Idiom	2	Jr., sr., grad.	1-2
*118.	Bible as Literature	3	Jr., sr., grad.	1-2
*119-120.	Principles of Literary Criticism	6†	Jr., sr., grad.	1-2
*122.	American Literature	3	Jr., sr., grad.	1-2
*123-124.	Seminar in Novelists	4	Sr., grad.	See statement
*125-126.	Biography	4	Sr., grad.	See statement
*128.	17th Century Drama	3	Jr., sr., grad.	55 or 131
*130.	Teachers' Course	3‡	Jr., sr., grad.	See statement
*131.	Elizabethan Drama	3	Jr., sr., grad.	55

†Both semesters must be completed before credit is given for the first semester.
‡Carries credit only in the department of Education.

1-2. General Survey of English Literature from the beginning to Robert Burns. Lectures, recitations, and assigned readings. Designed to cover the whole period in historical outline, and to prepare for a more minute study of special periods. Craig, Stoll, Beach, Northrop.

3. Old English. The language, with reading of representative selections of Old English prose and poetry. The relation to modern English is particularly emphasized. Klaeber, Firkins.

4. ADVANCED OLD ENGLISH. A continuation of the preceding course. KLAEBER.

5a or 5b. CHAUCER. The grammar and literary forms of fourteenth-century English, with selected readings from Chaucer's works. Special attention to the *Canterbury Tales*. Open to students who have taken or are taking Course 1-2. BEACH, FIRKINS.

6. SPENSER. The forms and literary influences in the Elizabethan period illustrated in the poetry of Edmund Spenser, with brief readings from the minor poems and extended study of the *Faerie Queene*. Open to students who have taken or are taking Course 1-2. FIRKINS.

8. HISTORY OF THE ENGLISH LANGUAGE. Outlines of the history of the language. Lectures and assigned readings. KLAEBER.

*55. SHAKESPEARE. An introductory study of Shakespeare's development as a poet and dramatist up to *King Lear*, with reading of representative plays. STOLL, NORTHROP.

*56. THE LATER PLAYS OF SHAKESPEARE. Shakespeare's development traced to the end. A careful analysis of four plays. Problems in the interpretation of Shakespeare's dramatic methods. STOLL.

*59-60. THE MODERN DRAMA. Contemporary drama from 1870 to the present; the new impulse in dramatic literature under the stimulus of latter-day thought. BURTON.

*62. MILTON. The principal poets of the time of Charles I and the Protectorate with special emphasis upon Milton. NORTHROP.

*63. OUTLINE OF NINETEENTH CENTURY LITERATURE. The main features of Victorian literature, with particular emphasis upon the poetry of Arnold and the prose of Carlyle. Not offered in 1915-16. NORTHROP.

*66. BROWNING AND TENNYSON. A reading of the representative work of the two major poets of the Victorian era, in order to show their quality and contrasted power. BURTON.

*67. THE ENGLISH NOVEL. Principles and personalities in the evolution of the English novel. Written reports on selected novels. BURTON.

*72. THE ENGLISH AND SCOTTISH POPULAR BALLADS. A study of a large number of traditional ballads, English and foreign, and an examination of ballad style and origins. Not offered in 1915-16. STOLL.

*75. RECENT ENGLISH POETRY. Poetry in England and America since 1870. The main poetic traditions and tendencies now prevailing. Given 9 to 11 Saturday mornings to accommodate teachers. Prerequisite English 1 and 2. Teachers may, in exceptional cases, be excused from this prerequisite. BEACH.

*101. INTRODUCTION TO MIDDLE ENGLISH. An outline of Middle English grammar, including the interpretation of selected texts. Alternates with Course 103. KLAEBER.

*103. PIERS THE PLOWMAN. A critical study of *Piers the Plowman*. Alternates with Course 101. Not offered in 1915-16. KLAEBER.

*105. EIGHTEENTH CENTURY POETRY. The Rise of Naturalism and Romanticism. Eighteenth-century English poetry from Pope to Burns, with special reference to the rise and growth of naturalism and romanticism. Not offered in 1915-16. CRAIG.

*107. EIGHTEENTH CENTURY PROSE. Lectures on eighteenth century prose and prose writers; readings by the students and essays on approved topics; special study of fiction and the essay. CRAIG.

*108. THE ROMANTIC MOVEMENT. The Romantic School of poets from Wordsworth to Keats and the influence of the revolution in France. Not offered in 1915-16. CRAIG.

*109-110. ENGLISH HUMORISTS. Manifestations of the comic spirit in modern English literature; humor, wit, comedy, and satire, with special reference to their use in a criticism of life; illustrations from dramatists, novelists, essayists, and poets. Not offered in 1915-16. BEACH.

*111-112. SEVENTEENTH CENTURY PROSE. First semester: general survey of the prose of the century to 1660. Second semester: literature of the Restoration, with particular study of Dryden. Course 3-4 in History is a desirable prerequisite. Not offered in 1915-16. NORTHROP.

*113-114. THE DRAMA: STRUCTURE AND EVOLUTION. First semester: theory of the drama, and history up to the nineteenth century. Second semester: recent drama, continental, English; open only to those who have completed first semester. FIRKINS.

*115. ENGLISH IDIOM. A discussion of current idiom with the purpose of relating it to the underlying principles of historic development. BURTON.

*118. THE BIBLE AS LITERATURE. A literary study of the Old Testament with special attention to forms and the critical study of selected readings. BURTON.

*119-120. PRINCIPLES OF LITERARY CRITICISM. A brief treatment of elements or forces in literature; an exposition of literary types in relation to the standards and methods of judging each. Instructor's permission to take the course must be obtained before registration. FIRKINS.

*122. AMERICAN LITERATURE. Lectures on American literature, with extensive readings from the principal poets and prose writers of the United States. CRAIG.

*123-124. SEMINAR IN NOVELISTS. Detailed study of selected novelists. In 1915-16, Henry James first semester, Thomas Hardy second semester. In 1916-17, George Meredith. Open upon approval of the instructor to graduate students and seniors who have completed twelve credits in English. BEACH.

*125-126. BIOGRAPHY. The rise and development of English biography, with attention to journals, memoirs, and letters. Open to graduates with a major in English or History and, upon approval of instructor, to seniors with twelve credits in English. NORTHROP.

*128. SEVENTEENTH-CENTURY DRAMA. The drama from the Restoration to the rise of sentimental comedy, special attention being given to the Comedy of Manners, from Etherege to Farquhar. STOLL.

*130. TEACHERS' COURSE. Methods of teaching English in high schools. Course of study, textbooks, and equipment; visits to Minneapolis and St. Paul high schools; theme-correcting. Open to juniors, seniors, and graduates qualifying for Practice Teaching. Credit only in Education. INGLIS.

*131. ELIZABETHAN DRAMA. A study of Elizabethan and Jacobean dramatists (Shakespeare not included) from Lyly to Shirley. STOLL.

GEOLOGY AND MINERALOGY

Professor WILLIAM H. EMMONS; Associate Professor CLINTON R. STAUFFER; Assistant Professors FRANK F. GROUT*, CHESSLEY J. POSEY; Instructors A. WALFRED JOHNSTON, EDGAR K. SOPER; Assistant T. M. BRODERICK; Teaching Fellow J. P. GOLDSBERRY; in the General Extension Division, Assistant Professor EDWARD M. LEHNERTS.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits. It is strongly recommended that a field course be included when this is practicable.

For B.A. with Honors, Courses 11, 29, 105, 111, 124, and a field course; and twelve credits selected from the following courses:

57, 58, 108, 109 in Paleontology
65, 104, 136 in Mineralogy
106, 115 in Petrology
112, 124, 138, 144 in Economic Geology
106, 124, 112 in Structural Geology
31, 32, 116, 118 in Geography

For a Teacher's Certificate, requirements the same as for a major, with an average of at least one and one-half honor points for each credit hour.

*Absent on leave 1915-16.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Geology	3	Soph., jr., sr.	None
3.	Laboratory Work	1	Soph., jr., sr.	Supports 1
4.	Geology of Minnesota	3	Soph., jr., sr.	1
5.	Economic Geology	3	Jr., sr.	1
6.	Historical Geology	3	Soph., jr., sr.	1
8.	Historical Geology Laboratory	1	Soph., jr., sr.	Supports 4 and 6
10.	Elements of Paleontology	3	Soph., jr., sr.	1
11.	Paleontology	5	Jr., sr.	6
15a or 15b.	Minerals and Rocks	1	Jr., sr.	1
21-22.	Elements of Mineralogy	6	Soph., jr., sr.	See statement
27a or 27b.	Outlines of Mineralogy.	1	Jr., sr.	None
29.	General Physiography	3	Soph., jr., sr.	None
31-32.	Phys. and Human Geography	6†	Soph., jr., sr.	None
34.	Meteorology	3	Soph., jr., sr.	1 or 29
36.	Geography of North America	3	Soph., jr., sr.	1 or 29
*55.	Teachers' Course in Geography	2	Jr., sr., grad.	See statement
*57.	Paleontology	3	Jr., sr.	6 and 10
*58.	Paleontology	3	Jr., sr.	57
*61.	Physical Mineralogy	3	Jr., sr.	22
*65.	Morphology of Minerals	3	Jr., sr.	22
*104.	Crystal Measurement	3	Jr., sr., grad.	65
*105a or 105b.	Elements of Rock Study	3	Jr., sr., grad.	See statement
*106.	Petrology	3	Jr., sr., grad.	105
*108.	Paleontologic Practice	3	Jr., sr., grad.	58
*109.	Advanced Paleontology.	3	Jr., sr., grad.	58
*110.	Advanced Paleontology.	3	Jr., sr., grad.	109
*111.	Ore Deposits	4	Sr., grad.	6, 22, 105
*112.	Problems in Ore Deposits	2	Sr., grad.	111
*115.	Advanced Petrology	3	Sr., grad.	106
*116.	Geography of Latin America	3	Jr., sr., grad.	1, 29, or 31-32 and 3 credits in Geog.
*118.	Geography of Eurasia	3	Jr., sr., grad.	Same as for 116
*124.	Structural and Metamorphic Geology	3	Sr., grad.	6, 22, 105
*136.	Advanced Mineralogy	3	Jr., sr., grad.	22
*138.	Testing Economic Minerals	3	Jr., sr., grad.	6, 22, 105
*144.	Interpretation of Geologic Maps	3	Jr., sr., grad.	111
*151.	Advanced General Geology	3	Jr., sr., grad.	6
*152.	Advanced General Geology	3	Jr., sr., grad.	151
*160.	Field Geology	6	Jr., sr., grad.	See statement
*188.	Field Work in Geography	6	Jr., sr., grad.	1 or 29

†Both semesters must be completed before credit is given for the first semester.

1. General Geology. A synoptical treatment of materials of the earth and of geologic processes. Physiographic, dynamic, and structural geology, with a brief introduction to historical geology. Lectures, laboratory work, field excursions, map study, and conferences. Emmons, Johnston, Broderick.

3. Laboratory Work. Supplements Course 1 with study of rocks and ores, topographic and geologic maps, and reference reading. Johnston, and Assistants.

4. Geology of Minnesota. The physical geography and geologic history of Minnesota. The relations of industrial development to geological features. The principles of pre-Cambrian geology as exemplified in Minnesota. Johnston.

5. Economic Geology. The mineral resources of the United States. The origin, occurrence, distribution, and uses of the more important minerals and mineral fuels of economic value. Lectures, map work, conferences and field excursions. Soper.

6. Historical Geology. The geological history of the North American continent; the more important types of fossils and their relations. Emmons, Sofer.

8. Historical Geology Laboratory Work. The interpretation of geologic maps and sections; structural relations; study of fossils and rock specimens. Johnston.

10. Elements of Paleontology. An introduction to the study of fossil organisms. Lectures and laboratory work supplemented by excursions. This course may be taken with Course 6. Stauffer.

11. Paleontology. Index fossils of North America; a study of fossils and their uses in correlation. A course intended primarily for mining geologists. Stauffer.

15a or 15b. Minerals and Rocks. An outline study of general principles of petrography; classification of minerals and rocks and practice in their identification. Not given in 1915-16. Grout.

21. Elements of Mineralogy. The crystal systems; morphological, physical, and chemical character of minerals; occurrence, genesis, and uses of minerals; classification and description of common minerals. Determinative work in laboratory, blowpipe analysis, sight identification. Open to students who have taken or are taking Chemistry. Broderick, Goldsberry.

22. Elements of Mineralogy. Continues Course 21. Special attention given to metalliferous and rock-forming minerals. Laboratory determinations and sight identification. The use of the goniometer and microscope. Laboratory work, reference reading, and field excursions. Broderick, Goldsberry.

27a or 27b. OUTLINES OF MINERALOGY. A course designed especially for teachers. Methods of identification of minerals, laboratory practice, conferences, reference reading. Not given in 1915-16. GROUT.

29. GENERAL PHYSIOGRAPHY. Principles of earth sculpture; physiographic changes in progress, and agencies causing them; hydrography and oceanography; planetary relations; climatology; laboratory conferences on interpretation of topographic maps; field excursions. POSEY.

31-32. PHYSICAL AND HUMAN GEOGRAPHY. First semester: physical features of the earth and agencies effecting changes in them; effects of various land forms on activities of man; elements of climatology and oceanography; topographic map interpretation; field excursions. POSEY.

Second semester: economic and political development in relation to nature; geographic and economic interpretations of history; economic progress as a phase of adaptation to environment. Textbook, lectures, and reports on special topics. HAYES.

Not open to those who have taken Course 29.

34. METEOROLOGY. The properties and phenomena of the atmosphere, including composition, temperature, pressure, and circulation; the work of the Weather Bureau; the major climatic divisions of the earth and their climates. POSEY.

36. GEOGRAPHY OF NORTH AMERICA. The regional geography of the United States and Canada; their physiography, climate, natural resources, and people. The utilization and conservation of natural resources emphasized. May be taken as a continuation of Course 29 above. POSEY.

*55. TEACHERS' COURSE IN GEOGRAPHY. A critical study of the materials and methods of teaching secondary school geography. The relation of human activities to environment will be emphasized. For teachers of high school geography. Six credits from the Department of Geology required as prerequisites; three from Courses 1, 29, 31; and three from Courses 36, 116, 118, 188. POSEY.

*57. PALEONTOLOGY. A study of fossil forms with special reference to those of geological importance. STAUFFER.

*58. PALEONTOLOGY. Faunas and their correlation. A continuation of Course 57. STAUFFER.

*61. PHYSICAL MINERALOGY. The form, optical and physical properties of minerals; expansion and conductivity; pyro-electricity; hardiness, percussion, and etch figures; cleavage and gliding planes. Not offered in 1915-16. GROUT.

*65. MORPHOLOGY OF MINERALS. Crystallography, embracing projection and the geometric relations of crystal planes; crystal nomenclature;

the relation of optical properties to morphology. A study of crystal models, crystal drawing, identification of minerals from crystal measurements, and mathematical calculation. GOLDSBERRY.

*104. CRYSTAL MEASUREMENT. The measurement of crystal angles with the two-circle goniometer; gnomonic projection and crystal drawing; the mathematical and graphic determination of crystallographic constants; the determination of minerals by means of crystal measurements. GOLDSBERRY.

*105a or 105b. ELEMENTS OF ROCK STUDY. The occurrence and genesis of igneous, sedimentary and metamorphic rocks; their mineral and chemical composition; their structure, texture, and alteration. The classification and methods of identification and description of rocks. Lectures, text, and laboratory work. Open to students who have had Course 1 and who have taken or are taking Course 22. BRODERICK.

106. PETROLOGY. The identification and study of minerals and rocks by optical methods; the study of igneous rocks, crystalline schists, and metamorphic rocks. The origin and classification of rocks. Laboratory work, lectures, and reference reading. BRODERICK, GOLDSBERRY.

*108. PALEONTOLOGIC PRACTICE. The collection, preparation, and study of materials with a view to gaining a working knowledge of groups of fossils and the use of literature. Largely individual work. Open to students who have taken Course 58. STAUFFER.

*109. ADVANCED PALEONTOLOGY. A systematic study of fossil organisms accompanied by an analytical study of faunas. Lectures and laboratory work. STAUFFER.

*110. ADVANCED PALEONTOLOGY. A continuation of Course 109.

*111. ORE DEPOSITS. The nature, distribution, and genesis of ore deposits of the United States; relations of ore deposits to geologic structure; the deformation and superficial alteration of ore deposits. EMMONS, SOPER.

*112. PROBLEMS IN ORE DEPOSITS. Field excursions, map work, lectures on field and laboratory methods. EMMONS, SOPER.

*115. ADVANCED PETROLOGY. The origin and alteration of rocks; their mineral and chemical composition; petrographic provinces, particularly those of the United States and Minnesota; advanced petrologic methods, microscopic, physical, and chemical. Not to be given in 1915-16. GROUT.

*116. GEOGRAPHY OF LATIN AMERICA. The regional geography of the Latin-American countries; their geology, topography, climate, natural resources, people, industries, and trade. The trade relations between Latin-American countries and the United States given special attention. Alternates with Course 118. Given in 1915-16. POSEY.

*118. GEOGRAPHY OF EURASIA. The regional geography of Eurasia; the geology, topography, climate, natural resources, people, industires, and trade of these countries. Attention given to the attitude of the major European coutries to the "new" lands of Asia. Alternates with Course 116. POSEY.

*124. STRUCTURAL AND METAMORPHIC GEOLOGY. The conditions, processes, and results of metamorphism; structural features resulting from deformation under varying conditions of load. JOHNSTON.

*136. ADVANCED MINERALOGY. Lectures on advanced mineralogic methods. The origin, occurrence, and association of minerals. Laboratory work continuing Course 22. Alternates with Course 138. Not offered in 1915-16. GROUT.

*138. TESTING ECONOMIC MINERALS. Methods of determining quality of mineral deposits, described and illustrated by laboratory tests of coals, oil, building stone, and metallic ores. Alternates with Course 136. Not offered in 1915-16. GROUT.

*144. CONSTRUCTION AND INTERPRETATION OF GEOLOGIC MAPS. Methods of geological examination; problems in construction and interpretation of geologic maps and sections, with special reference to underground mapping of metalliferous areas; field practice in plane table methods of topographic and geologic mapping. SOPER.

*151. ADVANCED GENERAL GEOLOGY. Geologic processes and their results; development of the North American continent. STAUFFER.

*152. ADVANCED GENERAL GEOLOGY. A continuation of Course 151.

*160. FIELD GEOLOGY. Six weeks in the field in the summer vacation period. Fields for 1916, the Mesabi and Vermilion ranges. Credits given only on completion of a satisfactory report. JOHNSTON.

*188. FIELD WORK IN GEOGRAPHY. A six weeks' course during the summer months. Systematic study in the field of the physical and industrial geography of selected areas in one or more western states. Arrangements made upon application to the department. LEHNERTS.

GERMAN

Professor CARL SCHLENKER; Assistant Professors OSCAR C. BURKHARD, WALTER R. MYERS; Instructors JAMES DAVIES, J. THEODORE GEISSENDOERFER, ARTHUR R. GRAVES, ALFRED E. KOENIG, ROBERT P. MORE, THEOPHILUS H. SCHROEDEL, HAROLD W. SOULE, RICHARD WISCHKAEMPER; Teaching Fellow ARNOLD W. SHUTTER.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits not including Course 1.
For a Major, twenty-four credits.

For B.A. with Honors, the general requirements (page 22). Students doing major work in German must complete the following requirements for the junior and senior years: fifteen credits during the junior year in courses numbered between 51 and 100, of which Courses 53-54 and 55-56 are required; eight credits during the senior year, including at least one course numbered between 101 and 200, and one course numbered above 200; and the special thesis, to be completed under the direction of the instructor in charge of the latter course.

Teacher's Certificate in German. For a *minor* recommendation, courses 29-30, 53-54, 55-56, 59-60; for a *major* recommendation, in addition to the foregoing courses at least four other credits obtained in starred courses. In either case the student must have an average standing of one and one-half honor points for each credit hour for all German courses taken.

For courses in Germanic Philology see the statement of the Department of Comparative Philology.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a or 1b.	Beginning	6†	All	None
2a or 2b.	Intermediate	6	All	1
3-4.	Intermediate	6†	All	1 or equivalent
5-6.	Prose and Poetry	6†	Fr., soph.	2 yrs. prep. German
7-8.	Drama	6†	Fr., soph., jr., sr.	3-4, or 5-6, or 4 yrs. prep. German
9-10.	Historical Prose	6†	Fr., soph., jr., sr.	3-4, or 5-6, or 4 yrs. prep. German
15-16.	Engineering Beginning	6†	Fr.	None
17-18.	Engineering Intermediate	6†	Soph.	15-16 or equivalent
21-22.	Scientific Intermediate	6†	Fr., soph.	1-2 or equivalent; but after 1915-16 2 yrs. prep. German
23-24.	Advanced Scientific	6†	Soph., jr.	21-22, or 3-4, or 5-6
27-28.	Elementary Conversation and Composition	4†	Fr., soph., jr.	See statement
29-30.	Advanced Conversation	2†	Soph., jr., sr.	See statement
31-32.	Intermediate Composition	2†	Soph., jr., sr.	See statement
*51.	Faust I	2	Soph., jr., sr.	7-8, or 9-10, or 23-24
*52.	Faust II	2	Soph., jr., sr.	51
*53.	Survey	3	Soph., jr., sr.	7-8, or 9-10, or 23-24
*54.	Survey	3	Soph., jr., sr.	53
*55-56.	Advanced Composition	2†	Jr., sr.	31-32
*57-58.	Oral Diction	4†	Jr., sr.	See statement
*59-60.	Teachers' Course	2†	Jr., sr.	29-30 and 53-54
*61.	Romantic School	2	Jr., sr.	7-8, or 9-10, or 23-24

No.	Title	Credits	Offered to	Prereq. courses
*62.	Drama of Last Thirty Years	2	Jr., sr.	2 credits in starred courses
*63.	Poetry of Classic Period (Schiller)	2	Jr., sr.	7-8, or 9-10, or 23-24
*64.	Poetry of Classic Period (Goethe)	2	Jr., sr.	7-8, or 9-10, or 23-24
*107-108.	Middle High German	4†	Jr., sr., grad.	4 credits in starred courses
*109-110.	History of German Language	4†	Sr., grad.	4 credits in starred courses
*111-112.	16th Century Literature	4†	Sr., grad.	4 credits in starred courses
*113-114.	Lessing	4†	Sr., grad.	4 credits in starred courses
*117-118.	Goethe	4†	Sr., grad.	4 credits in starred courses
*119-120.	Drama of Schiller	4†	Sr., grad.	4 credits in starred courses
*127-128.	18th and 19th Century Lyrics	4†	Sr., grad.	4 credits in starred courses
*129-130.	German Novel	4†	Sr., grad.	4 credits in starred courses
*131-132.	German Novelle	4†	Sr., grad.	4 credits in starred courses
*133-134.	English Influences	4†	Sr., grad.	4 credits in starred courses
*135-136.	Schiller's Aesthetic Theories	4†	Sr., grad.	4 credits in starred courses
*137-138.	Grillparzer	4†	Sr., grad.	4 credits in starred courses
*225-226.	Literary Problems Seminar	4†	Honors and grad.	
*231-232.	Faust Seminar	4†	Honors and grad.	

†Both semesters must be completed before credit is given for either semester.

1a or 1b. BEGINNING. Double course, given each semester as a 6-hour course. Pronunciation, grammar, conversation, and composition; selected readings in easy prose and verse. MYERS, DAVIES, GRAVES, KOENIG, SCHROEDEL, SOULE, SHUTTER.

2a or 2b. INTERMEDIATE. Double course, six hours a week. Selected texts in modern narrative and descriptive prose; selected lyrics and ballads; a drama of Lessing, Goethe, or Schiller. Assigned reading of texts outside of class. This course may be supplemented by Course 27-28. Credit will not be granted for both Course 2 (or 3-4) and Course 5-6 or Course 17-18 or Course 21-22. MYERS, DAVIES, GRAVES, KOENIG, SCHROEDEL, SOULE.

3-4. INTERMEDIATE. Is the same as Course 2, but given as a three-hour course throughout the year. This course will not be given after 1915-16. GRAVES, MORE, WISCHKAEMPER.

5-6. PROSE AND POETRY. Geography, history, and legend. Review of German grammar throughout the year. This course may be supplemented by Course 27-28. Not open to those who have obtained credit in Course 2 (or 3-4) or Course 17-18, or Course 21-22. BURKHARD, DAVIES, GEISSENDOERFER, MORE, SOULE, WISCHKAEMPER.

7-8. DRAMA. First semester: classic drama; plays of Lessing, Goethe, Schiller. Second semester: modern drama; plays of Hebbel, Hauptmann, Sudermann, and others. Assigned readings and reports throughout the year. This course may be supplemented by Course 27-28, or by either Course 29-30, or Course 31-32, or by both. Credit will not be granted for both Course 7-8 and Course 9-10 or Course 23-24. SCHLENKER, BURKHARD, DAVIES, KOENIG, SCHROEDEL.

9-10. HISTORICAL PROSE. Rapid reading course for students of history and the other social sciences. May be supplemented by Course 27-28, or either 29-30 or 31-32, or both. Credit will not be granted for both Course 9-10 and Course 7-8, or Course 23-24. GEISSENDOERFER.

15-16. ENGINEERING BEGINNING. Primarily for Engineering students. (Not given in 1915-16.)

17-18. ENGINEERING INTERMEDIATE. Primarily for Engineering students. Not open to those who have credit for Course 3-4 or Course 21-22. Not given in 1915-16.

21-22. SCIENTIFIC INTERMEDIATE. This course aims to give students a reading knowledge of German for use in scientific studies. It may be supplemented by Course 27-28. Not open to those who have obtained credit for either Course 3-4 or Course 17-18 or Course 5-6. GEISSENDOERFER.

23-24. SCIENTIFIC ADVANCED. Reading of monographs and periodicals. May be supplemented by Course 27-28 or Course 29-30. Not open to those who have obtained credit for Course 7-8 or Course 9-10. WISCHKAEMPER.

27-28. ELEMENTARY CONVERSATION AND COMPOSITION. Translation of short English selections; conversation on topics of everyday life; narrative and descriptive essays and letter writing. Supplementary to Courses 3-4, 5-6, 21-22, and open only to those who have taken or are taking one of these courses. No credit allowed to those who are taking or have taken any course numbered above 50. BURKHARD, GEISSENDOERFER, GRAVES, KOENIG, MORE, SOULE, WISCHKAEMPER.

29-30. ADVANCED CONVERSATION. Aims to develop ease and correctness of oral expression. Not a course in composition. Organized on the laboratory basis—one hour credit with two hours recitation and at least one hour of outside reading. Open only to those who are taking or have taken Course 7-8 or Course 9-10 or Course 23-24, or Course 31-32; recommended that it be preceded by Course 27-28. SCHLENKER, SCHROEDEL.

31-32. INTERMEDIATE COMPOSITION. Translation of English selections; essays on assigned subjects; the elements of German style. This is a supplementary course; open only to those who are taking or have taken Course 7-8, or Course 9-10, or Course 23-24, or Course 29-30. KOENIG, SCHROEDEL.

*51. GOETHE'S FAUST, PART I. Reading and interpretation of the text; study of its genesis; the Faust legends and the early Faust books; Marlow's *Faustus;* the most important criticisms of the drama. Not given in 1915-16.

*52. GOETHE'S FAUST, PART II. Reading and interpretation of the text; study of its genesis; the most important criticisms of the drama; the treatment of the Faust legend in European literature before and since Goethe. Not given in 1915-16.

*53. SURVEY OF GERMAN LITERATURE THROUGH THE CLASSIC PERIOD. Lectures, assigned readings, reports. BURKHARD, MYERS.

*54. SURVEY OF GERMAN LITERATURE SINCE THE CLASSIC PERIOD. Lectures, assigned readings, reports. BURKHARD, MYERS.

*55-56. ADVANCED COMPOSITION. A discussion of the more difficult principles of structure and style; criticism of essays on assigned subjects. Such a book as Lyon's *Handbuch der Deutschen Sprache II* will be made the basis of the work. MYERS.

*57-58. ORAL DICTION. Exercises based upon studies in German cultural life; critical analysis of various works of German literature; argumentation and debate. Prerequisites: Courses 29-30 and 31-32, and consultation with the instructor. Not given in 1915-16.

*59-60. TEACHERS' COURSE. Lectures, readings, and reports; observation of classes. SCHLENKER.

*61. THE ROMANTIC SCHOOL. Assigned readings, reports; occasional lectures. SCHLENKER.

*63. DRAMA OF THE LAST THIRTY YEARS. Assigned readings, reports, occasional lectures. SCHLENKER.

*63. POETRY OF THE CLASSIC PERIOD. Schiller's poems. Study of metrics and form. SCHLENKER.

*64. POETRY OF THE CLASSIC PERIOD. Goethe's poems. SCHLENKER.

*107-108. BEGINNING MIDDLE HIGH GERMAN. Phonology, accidence, and syntax of Middle High German with special reference to New High German. *Der Arme Heinrich, Nibelungenlied,* and selected poems of Walther. Lectures on the epic and on German life in the twelfth and thirteenth centuries. SCHLENKER, SCHROEDEL.

*109-110. HISTORY OF THE GERMAN LANGUAGE. Its development, with spe-

cial reference to modern German. Based on Behagel's *Deutsche Sprache*. Etymology, word formation, syntax, comparison of English and German, etc. Arranged to meet the needs of teachers. KLAEBER.

*111-112. SIXTEENTH CENTURY LITERATURE. A study of the literary movement of the period and of the principal authors. Lectures, assigned readings and reports. Not given in 1915-16.

*113-114. LESSING. His life and works. Assigned readings and reports. Not given in 1915-16.

*117-118. GOETHE. His life and works. Assigned readings and reports. Not given in 1915-16.

*119-120. THE DRAMA OF SCHILLER. The plays considered with reference to the development of the dramatic idea, from the expression of the Storm and Stress movement in the early plays to the classic form of his last works. Not given in 1915-16.

*127-128. LYRIC POETRY OF THE EIGHTEENTH AND NINETEENTH CENTURIES. Historical review of the best lyric poetry and the chief writers. DAVIES.

*129-130. THE GERMAN NOVEL. A study of the social forces and the foreign influences manifesting themselves in the German novel. Not given in 1915-16.

*131-132. THE GERMAN NOVELLE. A study of the technique and development. Assigned readings and reports. BURKHARD.

*133-134. ENGLISH INFLUENCE IN GERMAN LITERATURE. A study of the literary relations between England and Germany, with special reference to the effect upon German literature. The subject matter of the course will be varied from year to year. MYERS.

*135-136. SCHILLER'S AESTHETIC THEORIES AND LATER WORKS. A study of the development of Schiller's aesthetic theories will be followed by a consideration of his later works in the light of these theories. METZINGER.

*137-138. GRILLPARZER. His life and works. Assigned readings and reports. GEISSENDOERFER.

*225-226. LITERARY PROBLEMS SEMINAR. The subject to be investigated will be announced from year to year. Subject for 1915-16, The Social Drama. SCHLENKER.

*231-232. FAUST SEMINAR. Not given in 1915-16.

GREEK

Professors JOHN CORRIN HUTCHINSON, CHARLES ALBERT SAVAGE.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits (exclusive of Courses 59 to 64 inclusive).

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	First-Year Greek	10†	All	None
3-4.	History and Epic Poetry	6†	Soph., jr., sr.	1-2
7.	Dramatic Poetry	3	Soph., jr., sr.	3-4
*51.	Philosophy	3	Jr., sr.	3-4
*52.	Oratory	3	Jr., sr.	3-4
*53-54.	Composition	2	Sr.	51-52
*101.	Lyric Poetry	3	Sr., grad.	51 or 52
*102.	Tragedy	3	Sr., grad.	7 or 101
*103.	The Septuagint	3	Sr., grad.	51
*104.	The New Testament	3	Sr., grad.	51
	Courses open to all, no knowledge of Greek being required.			
61.	Greek Drama	1 or 2	Jr., sr.	None
62.	Greek Literature and Life	2	Jr., sr.	None
63-64.	Greek Mythology	2	Jr., sr.	None
59-60.	Greek Archaeology	1 or 2	Jr., sr.	None

†Both semesters must be completed before credit is given for the first semester.

1-2. First Year Greek. General principles, inflections, word-formation, syntax, elementary readings, composition. Hutchinson, Savage.

3-4. History and Epic Poetry. Selections from Xenophon's *Anabasis,* and from Homer's *Iliad.* Savage, Hutchinson.

7. Dramatic Poetry. Euripides' *Alcestis.* Introductory course in the drama. Savage.

*51. Philosophy. Plato's *Apology,* and selections from other dialogues of Plato. Hutchinson.

*52. Oratory. Selections from Lysias, Demosthenes, and Isocrates. Lectures on Greek oratory. Savage.

*53-54. Composition. An advanced course in syntax and style, chiefly for those who expect to teach Greek. Hutchinson.

*101. Lyric Poetry. Selections from the elegiac, iambic, lyric and bucolic poets. Hutchinson.

*102. Tragedy. Aeschylus or Sophocles. Special attention given to the development of the drama, and to the literary form and dramatic representation of the plays read. Savage.

*103. The Septuagint. Especially intended for those who are preparing for the ministry. Hutchinson.

*104. The New Testament. Especially intended for those who are preparing for the ministry, or for some other form of religious work. Hutchinson.

59-60. GREEK ARCHAEOLOGY. A study of the Greek spirit as manifested in architecture and sculpture. First semester, architecture; second semester, sculpture. HUTCHINSON.

61. GREEK DRAMA. An intensive course, consisting in the reading and interpretation of representative Greek plays, supplemented by lectures dealing with the origin, growth, character and influence of the Greek drama; stereopticon lectures, illustrative of Greek life, mythology and dramatic art. Students taking this course may not receive credit for Course 62. SAVAGE.

62. GREEK LITERATURE AND LIFE. Lectures, textbook, illustrative and assigned readings; special lectures illustrated by stereopticon views. Recommended to those who intend to teach Greek, Latin, English, or ancient history. SAVAGE.

3-64. GREEK MYTHOLOGY. Lectures, textbook, and assigned readings, supplemented by occasional stereopticon illustrations. Recommended to those specializing in languages or philosophy. SAVAGE.

HISTORY

Professors GUY STANTON FORD, WILLIAM STEARNS DAVIS, ALBERT BEEBE WHITE; Associate Professor WALLACE NOTESTEIN; Assistant Professors SOLON J. BUCK, AUGUST CHARLES KREY; Resident Lecturer, EDGAR E. ROBINSON; Teaching Fellows RUTH E. MARSHALL, ROY TOWNE.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

For B.A. with Honors, see general statement (page 22).

For a Teacher's Certificate, eighteen credits in History, including at least three credits in intensive courses. In addition the student must take History 54.

The Departments of History, Economics, Political Science, Sociology and Anthropology constitute a social science group. The subjects are closely inter-related, and are of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, and the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in any one of the departments of the social science group ought to be familiar with at least the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Medieval and Mod. History	6	All	None
1b.	European History to Reformation	3	All	None
3-4.	English History to 1783	6	All	2 yrs. prep. History (Am. Govt. may be inc.)
5-6.	American History	6	Soph., jr., sr.	6 credits
7.	English History, 1750-1915	3	Soph., jr., sr.	6 credits
9.	National Movements	3	Soph., jr., sr.	6 credits
10.	Nineteenth-Century Europe	3	Soph., jr., sr.	6 credits
13.	Medieval Civilization	3	Soph., jr., sr.	6 credits
14.	Renaissance and Reformation	3	Soph., jr., sr.	6 credits
*21.	Selected Topics in Greek History	3	Jr., sr.	9 credits
*23.	Selected Topics in Roman History	3	Jr., sr.	9 credits
*56-57.	Teachers' Course	3	Jr., sr.	See statement
*101.	Revolutionary and Napoleonic Era	3	Jr., sr., grad.	9 credits
*104.	The Near East	3	Jr., sr., grad.	9 credits
*121-122.	History of Greece	6	Jr., sr., grad.	See statement
*123-124.	History of Rome	6	Jr., sr., grad.	See statement
*126.	History of Old Orient	3	Jr., sr., grad.	9 credits
*133-134.	Ancient Civilization	6	Jr., sr., grad.	See statement
*143-144.	History of the Upper Mississippi and Minnesota.	6	Jr., sr., grad.	9 credits inc. 5-6
*145.	History of American Diplomacy	3	Jr., sr., grad.	9 credits or a major in Political Science
*146.	Civil War and Reconstruction	3	Jr., sr., grad.	9 credits
*141-142.	The West in American History	3	Jr., sr., grad.	9 credits inc. 5-6
*153-154.	Social and Economic History of United States	6	Sr., grad.	12 credits or a major in Economics
*161.	English Parliament	3	Jr., sr., grad.	See statement
*163.	English Judiciary	3	Jr., sr., grad.	See statement
*171-172.	Germany since 1640	6	Sr., grad.	See statement
*173.	Era of Reform in Prussian History	6	Sr., grad.	See statement
*181.	English Backgrounds of Colonial History	3	Jr., sr., grad.	9 credits inc. 3-4
*182.	English Colonization in America	3	Jr., sr., grad.	9 credits inc. 5-6 or 181.
*184.	Stuart Period	3	Sr., grad.	12 credits inc. 3-4

1-2. MEDIEVAL AND MODERN HISTORY. The growth of France, Germany and Italy from 800 A.D. to the French Revolution, with reference also to social and economic conditions, and to the Medieval Church. Designed as a background for later work in the history, literature, and politics of continental Europe. FORD, KREY, TOWNE.

1b. MEDIEVAL HISTORY TO THE REFORMATION. Repetition of first semester of History 1-2.

3-4. ENGLISH HISTORY TO 1783. The general political history of England from the earliest times to the close of the American Revolution, with special reference to the development of governmental institutions. Serves as an introduction to further work in English history, literature, and politics. WHITE, NOTESTEIN, MARSHALL.

GENERAL COURSES

5-6. AMERICAN HISTORY. A general survey of American history to the present time. Chief emphasis upon the National period. If possible, Political Science I should accompany or follow this course. ROBINSON.

7. ENGLISH HISTORY 1750-1915. Textbooks, assigned readings and lectures. Emphasis placed upon the industrial revolution, franchise reforms, relations with the United States and very recent history. Not offered in 1915-16. NOTESTEIN.

9. NATIONAL MOVEMENTS IN NINETEENTH CENTURY. Continental history since 1848 with chief emphasis upon Italy, Germany and France. Not open to those who have taken History 10. FORD.

10. EUROPE IN THE NINETEENTH CENTURY. The national movements of the nineteenth century and those European conditions which form the basis of modern world politics. Not offered in 1915-16. FORD.

13. MEDIEVAL CIVILIZATION. A study of the social and intellectual development of Europe from the period of the German migration to the end of the thirteenth century. KREY.

14. THE RENAISSANCE AND REFORMATION. The Renaissance and Reformation as general European movements with especial emphasis upon the work of individual men and upon ideas rather than upon politics and institutions; how the medieval world became the modern world. WHITE.

*21. SELECTED TOPICS IN GREEK HISTORY. Open to juniors and seniors eligible for Course 121-122, but desiring a shorter course. Alternates with Course 121-122. Not offered in 1915-16. DAVIS.

*23. ROMAN HISTORY (Short Course). Open to students eligible for Course 123-124, but desiring a shorter course. To alternate with Course 123-124. DAVIS.

*56-57. THE TEACHING OF HISTORY AND GOVERNMENT. Open only to students who have eighteen credits in History, including a starred course.

Deals chiefly with the practical problems of teaching history and government in the secondary schools. Students planning to teach government must have 9 credits in Political Science. KREY et al.

*101. THE FRENCH REVOLUTION AND THE NAPOLEONIC PERIOD. French conditions in the eighteenth century before 1774; the events between 1774 and 1789 which precipitated the revolution in France; the reform work of the early revolution; the Napoleonic regime in France and Europe. A reading knowledge of French desirable. Not given in 1915-16. FORD.

*104. THE NEAR EAST. Russia, Turkey and the Balkan States since 1453, with especial reference to causes of the war of 1914. DAVIS.

*121-122. HISTORY OF GREECE. The political and social development of the Greek states to the time of their incorporation into the Roman Empire, with special attention to the permanent influence of Greek civizilation. Prerequisites nine credits in History, or six credits and a major in Greek. Not open to those who have taken History 21. Alternates with Course 22. DAVIS.

*123-124. HISTORY OF ROME. Social and political development with considerable attention to cultural subjects. Prerequisites, nine credits in History, or six credits and a major in Latin. Alternates with Course 24. Not offered in 1915-16. DAVIS.

*126. HISTORY OF THE OLD ORIENT. The origins of the Egyptians, Babylonians, Assyrians and Persians, and the main features of their political history and civilization. The history of the Hebrews discussed so far as it bears upon general Oriental problems. Alternates with Course 104. Not offered in 1915-16. DAVIS.

*133-134. ANCIENT CIVILIZATION. First semester, Greece, second semester, Rome. Social and intellectual life of antiquity with special reference to those factors which have persisted to the present day. A working knowledge of the political history assumed. Prerequisites, twelve credits in History, or a major in Greek or Latin and six credits in History. DAVIS.

*141-142. THE WEST IN AMERICAN HISTORY. The westward movement of population and civilization; its political, economic and social aspects; and the results upon national development. Not offered in 1915-16. BUCK.

*143-144. HISTORY OF THE UPPER MISSISSIPPI AND GREAT LAKES REGION TO 1815. Exploration, occupation and struggles for control. History of Minnesota from 1815; the settlement and development, political, economic and social conditions of a typical American commonwealth. BUCK.

*145. HISTORY OF AMERICAN DIPLOMACY. A survey of the relations of the United States with foreign countries from the Declaration of Independence to the present day. ROBINSON.

*146. THE CIVIL WAR AND RECONSTRUCTION. A study of the causes of the war, the comparative resources of the two sections, political and military developments and the readjustment to normal conditions. ROBINSON.

ADVANCED OR INTENSIVE COURSES

*153-154. SOCIAL AND ECONOMIC HISTORY OF THE UNITED STATES. A sketch of social and economic conditions in the colonies, followed by a more intensive study with special emphasis on the period since the Civil War. ROBINSON.

*161. THE BEGINNINGS OF PARLIAMENT. Parliamentary beginnings from the Norman conquest to the reign of Edward I, based wholly on original sources. Prerequisites, twelve credits in history, including Courses 3-4, and the permission of the instructor; a knowledge of at least high-school Latin. Alternates with Course 163. WHITE.

*163. ORIGIN OF THE ENGLISH JUDICIAL SYSTEM. The origin and early development of the most distinctive features in England's present day courts and procedure. Prerequisites, same as Course 161 with which it alternates. Not offered in 1915-16. WHITE.

*171-172. GERMAN HISTORY. A general survey with special reference to the rise of Brandenburg-Prussia since 1640. Prerequisites, the permission of the instructor; twelve credits in History, or History 1-2 and a major in German. Not given in 1915-16. FORD.

*173. ERA OF REFORM IN PRUSSIAN HISTORY. An intensive study of the years 1806-1813 in Prussian and German History. Prerequisites the same as for History 171-172. FORD.

*181. ENGLISH BACKGROUNDS OF AMERICAN HISTORY. Alternates with Course 7. A survey of the poltical and social institutions of England in the reign of Charles I, with special emphasis upon the local institutions. NOTESTEIN.

*182. ENGLISH COLONIZATION IN AMERICA. Alternates with Course 184. A study of institutions in New England and Virginia. NOTESTEIN.

*184. STUART PERIOD. English 111-112 is strongly recommended as a desirable reinforcing subject. Alternates with Course 182. Not offered in 1915-16. NOTESTEIN.

HOME ECONOMICS

Professor JOSEPHINE T. BERRY; Assistant Professors MABEL B. TRILLING, MARION WELLER, LUCILE WHEELER, GRACE I. WILLIAMS; Instructors BESSIE E. BEMIS, HARRIET GOLDSTEIN, AMY P. MORSE, DOROTHY MOTL, ETHEL L. PHELPS; Lecturer MARTHA B. MOORHEAD.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, six credits in the Food Study group (Courses 21 and 22), together with Physiology 3 and Bacteriology 58.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a or 1b.	Textiles	2	Fr.	None
11a or 11b.	Garment Making.....	3	Fr.	None
13a or 13b.	Dressmaking	3	Jr.	1, 11
21a or 21b.	Foods and Cookery....	3	Soph.	Chem, 3, 7, or 21; along with Physiol. 3
22a or 22b.	Food Economics.....	3	Soph.	21
33.	Home Care of the Sick.	1	Jr.	Chem, 3, 7, or 21; Bacteriol. 58.
51a or 51b.	Drawing and Design....	3	Fr.	None
53a or 53b.	Historic Ornament and Advanced Design.....	3	Jr.	51

1a or 1b. TEXTILES. A study of the textile fibers and fabrics as to structure and properties, with application to the art and economic considerations involved in selection and purchase of fabrics for clothing and household furnishing. WELLER, TRILLING.

11a or 11b. GARMENT MAKING. Instruction and laboratory practice in hand sewing; in the reading and adaptation of commercial patterns; in the construction and use of the sewing machine; in designing, cutting, and making simple outer garments from washable materials. PHELPS.

13a or 13b. DRESSMAKING. Careful consideration of factors of quality, suitability, cost in selection of dress fabrics employed; analysis and adaptation of simple dress designs; instruction and practice in cutting, fitting, draping, and methods of construction involved in tailored dresses. TRILLING, ...

21a or 21b. FOODS AND COOKERY. (a) Production, manufacture, chemical composition of typical foods; their classification into food principles; changes in digestion; function in nutrition. (b) Fundamental science principles from chemistry, physics, biology, bacterilogy, and their application in typical cookery processes. WHEELER, WILLIAMS, BEMIS.

22a or 22b. FOOD ECONOMICS. Cost and nutritive value of typical foods; the study of dietaries; preparation and serving of meals, the cost bearing a definite relation to the family budget. WHEELER, WILLIAMS, BEMIS.

33. HOME CARE OF THE SICK. (a) First aid; communicable diseases, their transmission and prevention; hygiene of infancy, maidenhood, maturity. (b) The care of the sick room; observation and care of the patient; elementary symptomatology. MOORHEAD, MOTL.

51a or 51b. DRAWING AND DESIGN. Composition, perspective, color theory, and color harmonies applied to costume design and interiors; harmony, balance, rhythm, in line and area design. GOLDSTEIN.

53a or 53b. HISTORIC ORNAMENT AND ADVANCED DESIGN. Historic styles in art and architecture; pure design and applied design. GOLDSTEIN, MORSE.

HUMAN ANATOMY

Professors CLARENCE M. JACKSON, JOHN B. JOHNSTON, THOMAS G. LEE, RICHARD E. SCAMMON; Associate Professor CHARLES E. ERDMANN; Instructors WILLIAM F. ALLEN, JAY A. MYERS.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

Prerequisites in Animal Biology may be counted as a part of the work for a minor or major.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3-4.	Gross Human Anatomy.....	10	Soph., jr., sr.	An. Biol. 1-2
*51.	Human Histology	5	Jr., sr.	An. Biol. 7-8
*52.	Human Embryology.....	3	Jr., sr.	An. Biol. 7-8
*101.	Human Neurology.....	3	Sr., grad.	Anat. 51 and 52, or An. Biol. 7-8 or 19-20
*114.	Topographic Anatomy.....	3	Sr., grad.	3-4
*116.	Foetal Anatomy.....	3	Sr., grad.	3-4 and 52 or An. Biol. 137

3-4. GROSS HUMAN ANATOMY. Dissection, including osteology. Laboratory work, with lectures and quizzes. JACKSON, ERDMANN, and Assistants.

*51. HUMAN HISTOLOGY. Microscopic study of the various tissues and organs. Laboratory work, with lectures and quizzes. SCAMMON, ALLEN, and Assistant.

*52. HUMAN EMBRYOLOGY. The development of the human body. Laboratory work, with lectures and quizzes. LEE, SCAMMON, ALLEN.

*101. HUMAN NEUROLOGY. A study of the central nervous system and sense organs. Lectures, recitations and laboratory work. JOHNSTON, ALLEN, MYERS.

*114. TOPOGRAPHIC ANATOMY. A study of the position and relations of the various organs, based upon serial cross-sections of the human body. Laboratory work, with lectures and quizzes. JACKSON.

*116. FOETAL ANATOMY. Dissection of the human foetus, with comparison of earlier embryonic and later postnatal structure. Laboratory work, largely individual in character, with conferences and written reports. SCAMMON.

HUMAN PHYSIOLOGY

Professor ELIAS P. LYON; Associate Professors RICHARD O. BEARD, FREDERICK H. SCOTT; Assistant Professor M. RUSSEL WILCOX; Instructors FRANCIS B. KINGSBURY, J. F. MCCLENDON, C. J. V. PETTIBONE; Assistants ROY E. CRUZEN, LYLE J. ROBERTS.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, which may include Animal Biology 1-2.

For a Major, Animal Biology 1-2 and eighteen credits, including Physiology 52, 53 and 54. In these eighteen credits may be included Anatomy 51 and Animal Biology 15-16.

COURSES

No.	Title	Credits	Offered to	Prereq. Courses
3a or 3b.	Elem. Human Physiology.	3†	All	1 yr. Chem. ½ yr. Biol.
4.	Elementary Physiology and Physiologic Chemistry..	5†	All	Elem. Chem. and Biol. or Anat.
52.	Physiologic Chemistry....	4	Jr., sr.	Organ. Chem.
53.	Physiol. Muscle, etc.....	4	Jr., sr.	An. Biol. 1-2
54.	Physiol. Nerv. Sys., etc..	4	Jr., sr.	An. Biol. 1-2
101.	Urinalysis: Advanced Methods	2	Jr., sr.	Physiol. 52
103.	Metabolism	2	Jr., sr.	Physiol. 52
105-106.	Physical Chem. of Cells and Tissues	3 or 6	Jr., sr., grad.	Organ. Chem. and An. Biol. 1-2
115-116.	Advanced Physiologic Chemistry	Ar.	Jr., sr., grad.	Ph. 52
117-118.	Advanced Physiology.....	Ar.	Jr., sr., grad.	Physiol. 53
120.	Physiology of Development	2	Jr., sr.	An. Biol. 1-2 or Phy. 3
125.	Foods and Practical Dietetics	2	Jr., sr.	Gen'l Chem. and Qual. Anal. and Phy. 3 or 4
127.	Seminar	1	Sr., grad.	Physiol. 53, 54

†Students may not receive credit for both Courses 3 and 4.

For a full list of courses offered by the department, see the Bulletin of the Medical School.

INTRODUCTORY COURSES

3a or 3b. ELEMENTARY HUMAN PHYSIOLOGY. Primarily for Home Economics students; open to others. Lectures and laboratory work. LYON, BEARD, SCOTT, and Others.

4. ELEMENTARY PHYSIOLOGY AND PHYSIOLOGIC CHEMISTRY. Covers the essential facts. Lectures and laboratory work. Not offered in 1915-16. SCOTT, PETTIBONE, and Others.

ADVANCED COURSES

52. PHYSIOLOGIC CHEMISTRY. The chemistry of the components of the animal body; foods, digestion, and the excreta. Lectures and laboratory work. PETTIBONE, KINGSBURY, MCCLENDON.

53. PHYSIOLOGY OF MUSCLE, NERVE, BLOOD, CIRCULATION, RESPIRATION. Lectures and laboratory work. LYON, BEARD, SCOTT, PETTIBONE, McCLENDON, KINGSBURY, and Assistants.

54. PHYSIOLOGY OF THE NERVOUS SYSTEM AND SENSES, DIGESTION, METABOLISM, NUTRITION AND EXCRETION. Lectures and laboratory work. LYON, BEARD, SCOTT, WILCOX, and Assistants.

†101. URINALYSIS: Advanced Methods. PETTIBONE.

‡103. PHYSIOLOGY OF METABOLISM. Students are placed on known diets and the results studied chemically. PETTIBONE.

105-106. PHYSICAL CHEMISTRY OF CELLS AND BIOLOGICAL FLUIDS. Physical chemistry of colloids, hydrogen ion concentration, surface tension, osmotic pressure and electric conductivity, and their bearing on biochemical analysis, digestion, stimulation and anesthesia, muscular contraction and cell division. The first semester may be taken for credit without the second, if desired. McCLENDON.

115-116. ADVANCED COURSE IN PHYSIOLOGIC CHEMISTRY. Qualified students may arrange with instructors for special work. Either semester may be taken without the other. PETTIBONE, KINGSBURY.

117-118. ADVANCED COURSE IN PHYSIOLOGY. An opportunity for qualified students to arrange with instructors for special work in various problems of physiology. Either semester may be taken without the other. LYON, SCOTT, McCLENDON.

120. THE PHYSIOLOGY OF DEVELOPMENT. A study of the physiology of the ovum, the embryo, and the foetus; of birth, infancy, childhood, adolescence, menstruation, ovulation, pregnancy, parturition, maturity, and old age. BEARD.

125. FOODS AND PRACTICAL DIETETICS. A study of human foods; their composition; the principles of food selection; caloric indices; balanced dietetics. Exercises in practical dietetics covering the principles of food preparation with typical illustrations of the method. Limited to 12 students. BEARD AND THOMAS.

127. SEMINAR IN PHYSIOLOGY. LYON, and others.

†First eight weeks, first semester.
‡Second eight weeks, first semester.

LATIN

Professors JOSEPH B. PIKE, JOHN E. GRANRUD.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, Courses 5, 6, 57 and 58 for those entering with four years of Latin; Courses 1, 2, 5 and 6 for those entering with two or three years of Latin.

For a Major, eighteen credits for those entering with four years of Latin; twenty-four credits for all others.

For a Teacher's Certificate, Courses 5, 6, 57, 58, 101, and 102, with an average of at least one and one-half honor points per credit hour.

For B.A. with Honors. The general requirements (page 22) and a fair reading knowledge of German or French or Greek. Six credits in Latin a semester during the junior and senior years are to be selected from Courses 57 to 204. (Students who do not desire a recommendation for teaching Latin may, by selecting courses that are given in alternate years, secure enough work for the honors course without being obliged to take Courses 101 and 102.) Instead of taking all the work indicated above in Latin, the student may substitute six credits in Greek (third-year Greek or above), or six credits in Greek or Roman History, or six credits in ancient Philosophy.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Selections from Latin Authors	3†	All	2 or 3 yrs. Latin
2.	Selections from Latin Authors	3†	All	2 or 3 yrs. Latin
5.	Livy	3†	All	Courses 1 and 2 or 4 yrs. Latin
6.	Plautus and Terence	3†	All	Courses 1 and 2 or 4 yrs. Latin
*57.	Horace	3†	Soph., jr., sr.	6
*58.	Pliny	3†	Soph., jr., sr.	57
*101.	Adv. Caesar	3	Jr., sr.	58
*102.	Adv. Virgil	3	Jr., sr.	58
*104.	Latin Writing	2	Jr., sr., grad.	58
*105.	Roman Elegy	3	Jr., sr., grad.	58
*106.	The Roman Novel	3	Jr., sr., grad.	58
*107.	Letters of Cicero	3	Jr., sr., grad.	58
*108.	Tacitus	3	Jr., sr., grad.	58
*110.	Roman Satire	3	Jr., sr., grad.	58
9.	Roman Architecture	1	Jr., sr.	None
10.	Roman Art	1	Jr., sr.	None
*201-202.	Lucretius	3	Grad. and honor stud.	Consult dept.
*203-204.	Seneca	3	Grad. and honor stud.	Consult dept.

†Both semesters must be completed before credit is given for the first semester.

1. Selections from Latin Authors. An effort will be made to give a general view of Roman life and literature. (Students entering at mid-year with two or three years' preparation in Latin may take Course 2). Granrud.

2. Selections from Latin Authors. A continuation of Course 1. Granrud.

5. Livy. Selections. Review of principles of Latin Syntax. Pike, Granrud.

6. PLAUTUS AND TERENCE. Translation of selected plays with study of beginnings of Roman drama. (Students entering at mid-year with four years of Latin may enter Course 6.) PIKE, GRANRUD.

*57. HORACE. Selections from the odes, epodes, satires, and epistles, with a study of the life and literary art of Horace. PIKE.

*58. PLINY. Selected letters of Pliny the Younger. PIKE.

*101. ADVANCED COURSE IN CAESAR. (Teachers' Course). Selections from books five to seven of the Gallic War; the principles of indirect discourse; intermediate Latin composition; class drill and discussion of various problems connected with secondary school work in Latin. PIKE.

*102. ADVANCED COURSE IN VIRGIL. (Teachers' Course.) An interpretation of selections from books seven to twelve of the Aeneid; review of portions of books one to six; the quantitative method of pronouncing Latin verse; metrical rendering of selected passages; class drill. PIKE.

*104. LATIN WRITING. Study of Latin prose style. Alternates with Course 106. Not offered in 1915-16. PIKE.

*105. ROMAN ELEGY. Selections from Catullus, Tibullus, Propertius, and Ovid. The origin, development, and technique of Roman Elegy. GRANRUD.

*106. THE ROMAN NOVEL. The *Cupid and Psyche* of Apuleius and Trimalchio's *Dinner of Petronius*. A study of the ancient novel. PIKE.

*107. LETTERS OF CICERO. Selections from his correspondence. A study of his life and times, his literary art and methods. Alternates with Course 105. Not offered in 1915-16. GRANRUD.

*108. TACITUS. Selections from his works. A study of the development of Roman historical literature, and of the sources, methods, and literary characteristics of Tacitus. GRANRUD.

*110. ROMAN SATIRE. Selections from Juvenal. The beginnings, evolution, and distinctive qualities of Roman Satire; Juvenal as a literary artist and moralist. Alternates with Course 108. Not offered in 1915-16. GRANRUD.

9. ROMAN ARCHITECTURE AND LIFE. National characteristics, the Forum and its activities, the forums and palaces of the Caesars, Roman houses and furniture, theaters, amphitheaters, circuses, thermae, and triumphal arches. Illustrated lectures and quizzes. Not credited toward a major or minor. GRANRUD.

10. ROMAN AND ITALIAN ART. Roman portrait sculpture and historical reliefs. Pompeian wall decoration and painting. Italian scenery and

typical cathedrals, select masterpieces of Raphael and Michael Angelo. Illustrated lectures and quizzes. Not credited toward a major or minor. GRANRUD.

*201-202. LUCRETIUS (Graduate seminar but open to students who register for honors in Latin). Interpretation of the text of Lucretius with a study of his philosophy and its sources. PIKE.

*203-204. SENECA. (Graduate seminar but open to students who register for honors in Latin). Selections from the letters and essays of Seneca the philosopher. A study of Roman Stoicism. Alternates with Courses 201-202. Not offered in 1915-16.

MATHEMATICS

Professor GEORGE N. BAUER; Associate Professor WILLIAM H. BUSSEY; Assistant Professors ROYAL R. SHUMWAY, HERMON L. SLOBIN, A. L. UNDERHILL; Instructors LINCOLN K. ADKINS, JAMES S. MIKESH.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve or sixteen credits according as the freshman course taken is three or five hours a week.

For a Major, twenty-four credits.

For B.A. with Honors, the general requirements (page 22). In junior and senior years any courses above 50 may be presented, except Course 54. Astronomy 101-102, Physics 121-122, and, with the consent of the major department, other courses open only to juniors and seniors may be presented.

For a Teacher's Certificate, an average of at least one and one-half honor points per credit hour through Course 51; Course 54; and an average of at least one honor point per credit hour in all other courses taken in the department. Course 6 must be included if not offered for admission.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Higher Alg., Part I.	5	Fr., soph.	El. Alg.
2a or 2b.	Alg. (cont.) and Pl. Trig.	5	Fr., soph.	1 or prep. Higher Alg.
3a or 3b.	Higher Alg., Part II	3	Fr., soph.	Prep. Higher Algebra
4a or 4b.	Trigonometry	3	Fr., soph.	3
6.	Solid Geometry.....	2	Soph., jr., sr., who have not had solid geom.	1-2, or 3-4
7.	Plane Analyt. Geometry	3	Soph., jr., sr.	2 or 4
9a or 9b.	Pl. and Solid Analyt. Geometry	5	Fr., soph., jr., sr.	2 or 4

No.	Title	Credits	Offered to	Prereq. courses
11a or 11b.	Differential Calculus.	3	Soph., jr., sr.	7 or 9
21.	Spherical Trig. with Applications	3	Soph., jr., sr.	1 and 2 or 3 and 4, and Solid Geom.
*51a or 51b.	Integral Calculus....	3	Jr., sr.	11
*54a or 54b.	Teachers' Course....	2	Jr., sr.	11
*62.	Theory of Equations	3	Jr., sr.	11
*101.	Solid Anal. Geometry	3	Jr., sr., grad.	11
*102.	Advanced Plane Anal. Geometry...	3	Jr., sr., grad.	11
*104.	Modern Synthetic Geometry	3	Jr., sr., grad.	11
*106a or 106b.	Differential Equations	3	Sr., grad.	51
*107.	Adv. Differential Calculus	3	Jr., sr., grad.	51
*108.	Adv. Integral Calculus	3	Jr., sr., grad.	51 and 101
*119a or 119b.	Modern Higher Algebra	3	Sr., grad.	51
*125-126.	Differential Geometry	6	Sr., grad.	51
*127a or 127b.	Infinite Series.....	3	Sr., grad.	17 credits besides Alg. and Trig.
*140.	Method of Least Squares	2	Sr., grad.	51

Freshmen who have an entrance credit in First Part Higher Algebra and who intend to specialize in Mathematics should take Course 2a the first semester and Course 9b the second semester, rather than Courses 3 and 4.

1. HIGHER ALGEBRA, PART I. Rapid review of factoring, fractions and fractional equations, simultaneous linear equations with graphs, involution, evolution, theory of exponents, radicals, radical equations, quadratic equations, simultaneous quadratics with graphs. SHUMWAY, SLOBIN, UNDERHILL, ADKINS, MIKESH.

2a or 2b. ALGEBRA CONTINUED THROUGH LOGARITHMS AND PLANE TRIGONOMETRY. Progressions, mathematical induction, determinants, theory of equations, Trigonometry. Those who intend to specialize in Mathematics should take this course rather than Course 3. SHUMWAY, SLOBIN, UNDERHILL, ADKINS, MIKESH.

3a or 3b. HIGHER ALGEBRA, PART II. Rapid review of quadratics, equations in quadratic form, graphical solution of quadratics, simultaneous quadratics with graphs, mathematical induction, binomal theorem, permutations and combinations, determinants, theory of equations. BAUER, BUSSEY, SHUMWAY, SLOBIN, UNDERHILL, ADKINS, MIKESH.

4a or 4b. LOGARITHMS AND TRIGONOMETRY. Text, tables, and numerous problems. BAUER, BUSSEY, SHUMWAY, SLOBIN, UNDERHILL, ADKINS, MIKESH.

6. SOLID AND SPHERICAL GEOMETRY. This course is intended primarily for those who are preparing for high school teaching and who did not present Solid Geometry for entrance. Text and lectures. BUSSEY.

7. PLANE AND ANALYTICAL GEOMETRY. Rectilinear and polar coördinates, loci and their equations, transformation of coördinates, the straight line, conic sections, higher plane curves. BAUER, BUSSEY, SHUMWAY, SLOBIN, ADKINS, MIKESH.

9a or 9b. PLANE AND SOLID ANALYTICAL GEOMERTY. A more extended course in Plane Analytical Geometry than Course 7, and an introduction to Solid Analytical Geometry. For those who intend to specialize in Mathematics. Not open to those who have taken Course 7. BUSSEY, SHUMWAY, SLOBIN, UNDERHILL.

11a or 11b. DIFFERENTIAL CALCULUS. Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, subtangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes, and singular points. BAUER, BUSSEY, SHUMWAY, SLOBIN, UNDERHILL, MIKESH.

21. SPHERICAL TRIGONOMETRY WITH APPLICATIONS. Text, lectures, problems, geodetic and astronomical applications. BEAL.

51a or 51b. INTEGRAL CALCULUS. Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volumes. BAUER, UNDERHILL.

54a or 54b. TEACHERS' COURSE. Text and assigned readings. Special attention paid to the fundamental principles of Algebra and Geometry. SHUMWAY.

*62. THEORY OF EQUATIONS. Algebraic solution of cubic and quartic equations, properties of roots of an equation, symmetric functions, isolation of real roots of equations with real coefficients, solution of numerical equations, complex numbers, fundamental theorem of Algebra, determinants, discriminants, resultants. Text and lectures. SHUMWAY.

*101. SOLID ANALYTICAL GEOMETRY. Elementary theorems of projection, coördinates, the plane, the line in space, quadric surfaces, transformation of coördinates, tangents, poles and polars, the general equation of the second degree. Numerous examples assigned to illustrate the theory. BUSSEY.

*102. ADVANCED COURSE IN PLANE ANALYTICAL GEOMETRY. Supplements Course 7 and 9, treating more fully of the subjects of those courses and taking up additional topics. BUSSEY.

*104. MODERN SYNTHETIC GEOMETRY. Based upon the method of central projection without the use of coördinates. Not offered in 1915-16. BUSSEY.

*107. ADVANCED DIFFERENTIAL CALCULUS. Infinitesimals of different orders, partial and total derivatives, introduction to infinite series, Taylor's and Maclaurin's expansions with applications of the Calculus to plane curves. UNDERHILL.

*108. ADVANCED INTEGRAL CALCULUS. Deals with the definite integral as the limit of a sum, improper integrals, the Beta and Gamma functions, elliptic integrals, differentiation and integration under the sign of integration; numerous applications to geometry and mechanics. BAUER.

Any of the following courses for which a sufficient number of students apply will be given in 1915-16.

*106a or 106b. DIFFERENTIAL EQUATIONS. Text and lectures. SLOBIN.

*119a or 119b. MODERN HIGHER ALGEBRA. SHUMWAY.

*125-126. DIFFERENTIAL GEOMETRY. UNDERHILL.

*127a or 127b. INFINITE SERIES. BAUER.

*140. METHOD OF LEAST SQUARES. The combination and adjustment of observations and the discussion of their precision as applied especially to Engineering, Physics, and Astronomy. LEAVENWORTH.

MILITARY SCIENCE AND TACTICS

Professor and Commandant BERNARD LENTZ; Assistant Commandant and Brigade Adjutant WALTER F. RHINOW; Band Instructor BERT ROSE.

COURSES

No.	Drill	Credits	Offered to	Prereq. courses
1-2.	Military Drill.....	None	Fr.	None
3-4.	Military Drill.....	None	Soph.	1 yr. Drill
5-6.	Military Drill.....	3†	Jr., sr.	2 yrs. Drill
8.	Military Science	2‡	Jr., sr.	2 yrs. Drill

†No student may receive more than a total of six credits for elective work in both Physical Education and Military Drill.

‡If taken in connection with Course 5-6.

1-6. MILITARY DRILL. Required of all men in the freshman and sophomore classes. Students are cautioned to report for the first drill and inform themselves of the requirements of the department.

1-2. Freshman: Practical instruction in schools of the soldier, company, and battalion; signals, ceremonies; first aid.

3-4. Sophomore: Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

5-6. May be taken voluntarily by others outside of the freshman and sophomore classes. No credit will be allowed for such drill for less than one year.

8. MILITARY SCIENCE. Instruction in advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

MUSIC

Professor CARLYLE SCOTT; Instructor DONALD FERGUSON; Special Instructors MAXIMILIAN DICK, THADDEUS GIDDINGS, EDMOND KRAUS, GERTRUDE REEVES.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not including Courses 11-12 and 21-22.

A Major is offered only to those who take the four-year course in Arts and Music.

For the curriculum of the four-year course in Arts and Music, leading to the degree of Bachelor of Arts in Music, see page 24. The tabular statement and description of courses given below are for the guidance of other students in the College of Science, Literature, and the Arts who desire to elect Music.

Students entering the University for the purpose of studying Music, but not wishing to complete the course leading to a degree, must register for Courses 1-2 and two other three-hour subjects outside the Department of Music.

A Certificate of Proficiency in Music will be granted to students who, having completed the theoretical courses and two years of pianoforte, are able to play one of the standard concertos and, in addition, show marked musical ability.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Harmony	6	Jr., sr.	None
3-4.	Counterpoint	4	Jr., sr.	See statement
5-6.	Form and Composition	2	Jr., sr.	1-2, and 3
7-8.	Analysis	2	Jr., sr.	1-2
9-10.	History of Music	6	Jr., sr.	None
11-12.	Appreciation of Music	1	Jr., sr.	None
13-14.	Bach and Beethoven	4	Jr., sr.	None
15.	Acoustics	3	Jr., sr.	None
17-18.	Pianoforte	4 or 8	Jr., sr.	None
19-20.	Violin	4 or 8	Jr., sr.	None
21-22.	Voice	4	Jr., sr.	None
23-24.	Cello	4 or 8	Jr., sr.	None
25-26.	Other Orchestral Instruments	4 or 8	Jr., sr.	None
27-28.	Public School Music	6	Jr., sr.	See statement
29-30.	Normal Piano	4	Jr., sr.	2 yrs. of Piano
31-32.	Ensemble Playing	2	Jr., sr.	2 yrs. of Piano
33-34.	Chorus	2	Jr., sr.	None
35-36.	Orchestra	2	Jr., sr.	None

1-2. HARMONY. The study of chords, their construction, relations, and progressions. Written exercises on basses, the harmonization of given melodies. SCOTT.

3-4. COUNTERPOINT. The harmonization of melodies in two, three, and four voices in the different orders of counterpoint. Prerequisite, a thorough knowledge of harmony. FERGUSON.

5-6. MUSICAL FORM AND FREE COMPOSITION. For those specializing in Music and can be taken only with the consent of the instructor. At the close of the year a program of original composition will be given. FERGUSON.

7-8. ANALYSIS. The analysis of musical works as regards their formal construction: subdivision of themes into phrases, sections, and motives. Symphonies to be presented by the local orchestra are among the compositions used in this course. SCOTT.

9-10. HISTORY OF MUSIC. A literary course. Lectures given on the development of music from the time of Palestrina to the present day. FERGUSON.

11-12. APPRECIATION OF MUSIC. A non-technical course. No prerequisite. REEVES.

13-14. First semester: Bach and Beethoven. Second semester: Wagner and Brahms. Critical study of a selection from the master works of the four greatest composers. Collateral, biographical readings, topics, and analyses, designed to give a clear historical and literary background to culminative periods in composition. FERGUSON.

15. ACOUSTICS. A study of the fundamental principles of sound. ERIKSON.

17-18. PIANOFORTE. Open to juniors who have mastered technical difficulties of the degree of Czerny's *School of Velocity* and the easier Haydn and Mozart sonatas. The fee is thirty-two or sixty-four dollars a semester. SCOTT, FERGUSON, REEVES.

19-20. VIOLIN. Candidate must be able to play the first ten of Kreutzer's forty etudes, and the easier Handel and Mozart sonatas. DICK.

21-22. VOICE CULTURE. While the individual ability varies greatly, all students may learn to use their own voices rightly, through proper training in relaxation and breath control, the foundation of tone production. Great advantages are also offered to the advanced singer, in the study of the best in vocal literature, songs, oratorio, and opera. KRAUS. Fee, forty dollars per semester. *One period per week.*

23-24. VIOLONCELLO. Instructor provided if the work is called for.

25-26. OTHER ORCHESTRAL INSTRUMENTS.

27-28. PUBLIC SCHOOL MUSIC. This course is planned especially to prepare students for the positions of teachers and supervisors of music in public, high, and normal schools.

Entrance Requirements: Ability to play piano, sing well, and read readily. Four hours weekly in class, and one half day weekly spent in public school visiting. Practice-teaching is demanded. In addition, courses in piano, voice training, harmony, orchestra, history of music and appreciation of music are recommended. GIDDINGS.

29-30. NORMAL PIANO. Special course offered to students desiring to teach pianoforte as a profession. REEVES.

ENSEMBLE

31-32. Students sufficiently advanced will be given opportunity for ensemble practice, viz., piano, four and eight hands; string and piano and vocal trios, quartets, etc. SCOTT.

33-34. CHORUS. A popular course in choral practice for four-part mixed voices. Consent of the director required. May be taken a second year with credit. KRAUS.

35-36. ORCHESTRA. Practical study of orchestral literature: standard symphonies, overtures, concertos, etc., with public performance as frequently as practicable. May be taken a second year with credit. FERGUSON.

PHILOSOPHY AND PSYCHOLOGY

Professor NORMAN WILDE; Associate Professor DAVID F. SWENSON*; Assistant Professor HERBERT H. WOODROW; Professorial Lecturer JOSEPH PETERSON; Instructors J. F. DASHIELL, AUSTIN S. EDWARDS, CHESTER E. KELLOGG.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits, either in Philosophy or in Psychology. The following courses are classified under Philosophy: 9, 13, 51, 56, 65, 109, 121, 122, 124, 126, 127, 129-130, 134. A major in Philosophy must include Courses 9, 121, and 122, as well as a minimum of three, or a maximum of six, credits in the psychological group. The following courses are classified under Psychology: 1-2, 5, 17, 54, 56, 57, 101, 105, 106, 108, 109, 115-116; a major in Psychology must include Courses 1-2 and 101, as well as a minimum of three, or a maximum of six, credits from the philosophical group.

For B.A. with Honors, besides the general requirements (page 22), a major in either Philosophy or Psychology, and twenty-four credits in starred courses.

*Absent on leave, 1915-16

COURSES

Introductory Courses

No.	Title	Credits	Offered to	Prereq. courses
1-2.	General Psychology..	6	Soph., jr., sr.	None
5a or 5b.	Elements of Psychology	3	Soph., jr., sr.	None
9a or 9b.	Logic	3	Soph., jr., sr.	None

Continuation Courses

13.	Introduction to Philosophy	3	Jr., sr.	3 credits
17.	Methods of Study...	3	Jr., sr.	Course 5 or 1-2
*51a or 51b.	Ethics	3	Jr., sr.	6 credits
*54.	Psychology of Religion	3	Jr., sr.	6 credits inc. 5 or 1-2
*55.	Psychological Interpretation	3	Jr., sr.	6 credits inc. 5 or 1-2
*56.	Esthetics	3	Jr., sr.	6 credits
*57.	Social Psychology...	3	Jr., sr.	6 credits inc. 5 or 1-2
*65.	Philosophy of Religion	3	Jr., sr.	6 credits
*101a or 101b.	Experimental Psych.	3	Jr., sr., grad.	1-2
*105.	Mental Retardation..	2	Jr., sr., grad.	1-2
*106.	Child Development..	3	Jr., sr., grad.	1-2
*108.	Comparative Psychology	3	Jr., sr., grad.	101
*109.	Psychological Principles	3	Sr., grad.	12 credits inc. 9 and 1-2
*115-116.	Seminar in Psychology	6	Sr., grad.	12 credits in Psychology
*121.	Ancient Philosophy..	3	Jr., sr., grad.	6 credits
*122.	Modern Philosophy..	3	Jr., sr., grad.	6 credits
*124.	Nineteenth Century Philosophy	3	Sr., grad.	12 credits in Philosophy
*126.	Logic of Science....	3	Jr., sr., grad.	9 credits, inc. Course 9
*127.	Metaphysics	3	Sr., grad.	12 credts
*129-130.	Seminar in Philosophy	6	Sr., grad.	12 credits in Philosophy
*134.	Philosophy of Plato..	3	Sr., grad.	121 or 122 or 124

1-2. General Psychology. The aims and methods of psychology; the facts, laws and functions of mental life; development and learning in relation to training and instinct. Required for a teacher's certificate. Woodrow, Peterson, Edwards, Kellogg.

5a or 5b. Elements of Psychology. A brief outline for those who do not intend to take further work in psychology. Together with Course 9 a satisfactory introduction to the philosophical courses of the junior year. Dashiell, ...

9a or 9b. LOGIC. The nature of knowledge, the laws of reasoning, the principles and methods of scientific proof. Together with Course 5 a satisfactory introduction to the philosophical courses of the junior year. WILDE, DASHIELL, ...

13. INTRODUCTION TO PHILOSOPHY. The aim, method, and chief problems of philosophy. .....

17. METHODS OF STUDY. Some results of modern psychology in their application to the problems of the learner; ways of avoiding and overcoming obstacles in study. EDWARDS.

*51a or 51b. ETHICS. The principles of morals; sketch of the historical development of morality followed by an analysis of its meaning, and of its basis in human nature. WILDE.

*54. PSYCHOLOGY OF MORAL AND RELIGIOUS DEVELOPMENT. Not given in 1915-16.

*55. PSYCHOLOGICAL INTERPRETATION. Unusual and pathological phenomena; the psychological explanation of characters in history and literature; the sub-conscious, dreams, suggestibility, telepathy, nervous disorders, secondary personalities.

*56. ESTHETICS. An introduction to the history and theory of esthetics, psychological analysis of beauty, and a discussion of the arts. .....

*57. SOCIAL PSYCHOLOGY. The instinctive and acquired factors in the behavior of the individual toward society in its various forms and groupings, and in the growth of ideas of self and of social attitudes. PETERSON.

*65. PHILOSOPHY OF RELIGION. The development of the idea of God from its simplest beginnings, the changes undergone in Greek, Jewish, and Christian thought; its validity in view of modern scientific theories. WILDE.

*101a or 101b. EXPERIMENTAL PSYCHOLOGY. Laboratory experiments designed to demonstrate the fundamental facts and laws of mental life. WOODROW.

*105. MENTAL RETARDATION. The nature and causes of retarded and perverted development in children; tests for the detection of mental defects; remedial measures. WOODROW.

*109. PSYCHOLOGICAL PRINCIPLES. Not given in 1915-16.

*106. CHILD DEVELOPMENT. A study of the stages of development from infancy through adolescence for those interested in parenthood and education. .....

*108. COMPARATIVE PSYCHOLOGY. A comparative study of the various mental functions involved in human and animal behavior at different

levels, both individually and racially. Emphasis will be placed upon experimental studies of animal behavior. PETERSON.

*115-116. SEMINAR IN PSYCHOLOGY. Major or minor research in experimental, analytic, genetic, or comparative psychology. WOODROW.

*121. ANCIENT AND MEDIEVAL PHILOSOPHY. Such an outline of the history of thought as is desirable in a general education. Emphasis placed upon the human significance of philosophy rather than upon its purely technical aspect. WILDE.

*122. MODERN PHILOSOPHY. Continues Course 121. Lectures on the representative systems of modern philosophy from the Renaissance to the beginning of the nineteenth century; to prepare the student to understand the philosophical tendencies of the present. WILDE.

*124. NINETEENTH CENTURY PHILOSOPHY. Continues Course 122. Modern currents of thought from the idealism of Fichte and Hegel, to the philosophy of evolution, pragmatism, and the new realism. .....

*126. LOGIC OF SCIENCE. An introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relation of their fundamental principles. DASHIELL.

*127. METAPHYSICS. A critical and constructive study of the theories of knowledge and reality. DASHIELL.

*129-130. SEMINAR IN PHILOSOPHY. Individual investigation in the field of philosophy. The character of the work and the general topic for the year can be ascertained by consultation with the department. WILDE.

*134. THE PHILOSOPHY OF PLATO. Not given in 1915-16.

CLINIC IN MENTAL DEVELOPMENT

A free clinic for the study of irregular mental development has been organized by the department. Associate Professor J. P. Sedgwick, of the Medical School, has charge of the physical examinations. Besides the diagnosis of physical and mental condition, treatment is outlined and methods of training are suggested or carried out under the direction of a member of the department.

PHYSICAL EDUCATION

FOR MEN

Director LOUIS J. COOKE; Assistant Director WILLIAM K. FOSTER; Instructor JOHN C. WEST; Assistant N. W. JOHNSTON.

GENERAL STATEMENT

The purpose of the department is to provide all men of the University opportunity for exercise in order to maintain and build up their general health. It also provides special training for the correction of physical defects and functional derangements.

A physical examination is required of all new matriculants, and of all others using the department privileges, at the beginning of the year, and as often during their college course as their physical condition may indicate. Students taking the required work in physical education are examined also at the close of the year. A study of these records shows a marked improvement in the standard of health of the average student during his college course.

The gymnasium, swimming pool, and baths are open to all students of the University, who are free to use the apparatus and to pursue a course in physical training under the supervision of the director and his assistants.

Those students, taking the required course in physical education who can not swim, must make a reasonable effort, as determined by the department, to pass the swimming and life-saving requirements, and will be assigned special hours for instruction.

COURSES

No.	Title	Credits	Offered to	Prereq. course
1.	Personal Hygiene.....	None	All	None
3-4.	Gymnastics	None	Fr.	None
5-6.	Intermediate Gymnastics....	None	Fr.	See stateme
7-8.	Advanced Leaders.....	2†	Soph., jr., sr.	1, 3-4, 5-6
9-10.	Corrective Gymnastics.....	None	All	None
11-12.	Wrestling	None	Soph., jr., sr.	3-4
13-14.	Advanced Gymnastics.....	None	Soph., jr., sr.	3-4
15-16.	Intermediate Swimming.....	None	All	None
17-18.	Advanced Swimming.....	None	All	15-16

†Both semesters must be completed before credit is given for the fi semester.

1. PERSONAL HYGIENE. Two hours per week; first six wee of first semester. Examination at close of course. COOKE.

   A special lecture on sex hygiene is given sometime the first ten days of the autumn semester, with required atten the part of all freshmen.

3-4. GYMNASTICS. Two hours a week, from November 1 to e semester. Required qualifications in swimming, life vaulting, jumping, sprinting, running, and on heavy app TER, WEST.

5-6. INTERMEDIATE GYMNASTICS. Elective for freshmen sh tional ability in elementary apparatus work. FOSTER, W

7-8. CLASS LEADERS (ADVANCED). Three hours a week. (N receive more than a total of six credits for elective Physical Education and Military Drill.) FOSTER, WES

9-10. CORRECTIVE GYMNASTICS. Three hours a week. courses for students physically defective. JOHNSTONE.

11-12. WRESTLING. Course in competitive wrestling. Most candidates chosen to represent Minnesota at the Western Int giate Gymnastic and Wrestling Meet. (Optional.) FOSTER.

13-14. ADVANCED GYMNASTICS. Same as Course 11 and 12 except that it is in gymnastics instead of wrestling. Includes course in ground tumbling, horizontal bar, parallel bars, side horse, and flying rings. FOSTER, WEST.

15-16, 17-18. SWIMMING, INTERMEDIATE AND ADVANCED. Life saving, efficiency swimming, and fancy diving. Instruction is given in rescuing and restoring the apparently drowned and other useful swimming accomplishments. JOHNSTONE.

PHYSICAL EDUCATION

FOR WOMEN

Assistant Professor J. ANNA NORRIS; Instructors MAY S. KISSOCK, EDITH G. RAYNOR, VALERIA LADD.

INTRODUCTORY STATEMENT

This department aims to look after the health of the women students. It giv es physical examination and advice to all newly entering students; conduct s systematic yearly consultations with, and examines when necessary, all upper class students; gives courses in hygiene, organizes physical work to meet the various needs and physical tastes of students; coöperates closely w the Woman's Athletic Association in encouraging and organizing athl sports; investigates cases of illness in dormitory and boarding hous

Offic at regular hours to all students who desire consultation regardin physical condition.

W s department is required of all newly entering students (see C and 11), and of all students permitted, for reasons connected hysical condition, to carry less than the minimum number of Physical examinations or consultations required annually s.

ithout credit arranged in social dancing, gymnastic danc ncing, basket-ball, baseball, skating, etc. Students' stan in Registrar's office, but department takes responsibi m class such students as do not meet standards of fees are attached to courses in gymnastic dancing r elementary, $.50 for advanced) and to basket ba

9-10. CORRECTIVE GYMNASTICS. Three hours a week. Special individual courses for students physically defective. JOHNSTONE.

11-12. WRESTLING. Course in competitive wrestling. Most promising candidates chosen to represent Minnesota at the Western Intercollegiate Gymnastic and Wrestling Meet. (Optional.) FOSTER.

13-14. ADVANCED GYMNASTICS. Same as Course 11 and 12 except that it is in gymnastics instead of wrestling. Includes course in ground tumbling, horizontal bar, parallel bars, side horse, and flying rings. FOSTER, WEST.

15-16, 17-18. SWIMMING, INTERMEDIATE AND ADVANCED. Life saving, efficiency swimming, and fancy diving. Instruction is given in rescuing and restoring the apparently drowned and other useful swimming accomplishments. JOHNSTONE.

PHYSICAL EDUCATION

FOR WOMEN

Assistant Professor J. ANNA NORRIS; Instructors MAY S. KISSOCK, EDITH G. RAYNOR, VALERIA LADD.

INTRODUCTORY STATEMENT

This department aims to look after the health of the women students. It gives physical examination and advice to all newly entering students; conducts systematic yearly consultations with, and examines when necessary, all upper class students; gives courses in hygiene, organizes physical work to meet the various needs and physical tastes of students; coöperates closely with the Woman's Athletic Association in encouraging and organizing athletic sports; investigates cases of illness in dormitory and boarding houses.

Office open at regular hours to all students who desire consultation regarding their physical condition.

Work in this department is required of all newly entering students (see Courses 1-2 and 11), and of all students permitted, for reasons connected with their physical condition, to carry less than the minimum number of credit hours. Physical examinations or consultations required annually of all students.

Elective work without credit arranged in social dancing, gymnastic dancing, swimming, fencing, basket-ball, baseball, skating, etc. Students' standing not recorded in Registrar's office, but department takes responsibility of dropping from class such students as do not meet standards of class. Shower bath fees are attached to courses in gymnastic dancing ($1.00 per semester for elementary, $.50 for advanced) and to basket ball ($.50 for season).

GENERAL STATEMENT

The purpose of the department is to provide all men of the University opportunity for exercise in order to maintain and build up their general health. It also provides special training for the correction of physical defects and functional derangements.

A physical examination is required of all new matriculants, and of all others using the department privileges, at the beginning of the year, and as often during their college course as their physical condition may indicate. Students taking the required work in physical education are examined also at the close of the year. A study of these records shows a marked improvement in the standard of health of the average student during his college course.

The gymnasium, swimming pool, and baths are open to all students of the University, who are free to use the apparatus and to pursue a course in physical training under the supervision of the director and his assistants.

Those students, taking the required course in physical education who can not swim, must make a reasonable effort, as determined by the department, to pass the swimming and life-saving requirements, and will be assigned special hours for instruction.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Personal Hygiene.....	None	All	None
3-4.	Gymnastics	None	Fr.	None
5-6.	Intermediate Gymnastics....	None	Fr.	See statement
7-8.	Advanced Leaders.....	2†	Soph., jr., sr.	1, 3-4, 5-6
9-10.	Corrective Gymnastics.....	None	All	None
11-12.	Wrestling	None	Soph., jr., sr.	3-4
13-14.	Advanced Gymnastics.....	None	Soph., jr., sr.	3-4
15-16.	Intermediate Swimming.....	None	All	None
17-18.	Advanced Swimming.....	None	All	15-16

†Both semesters must be completed before credit is given for the first semester.

1. PERSONAL HYGIENE. Two hours per week; first six weeks of first semester. Examination at close of course. COOKE.

   A special lecture on sex hygiene is given sometime during the first ten days of the autumn semester, with required attendance on the part of all freshmen.

3-4. GYMNASTICS. Two hours a week, from November 1 to end of second semester. Required qualifications in swimming, life-saving, bar-vaulting, jumping, sprinting, running, and on heavy apparatus. FOSTER, WEST.

5-6. INTERMEDIATE GYMNASTICS. Elective for freshmen showing exceptional ability in elementary apparatus work. FOSTER, WEST.

7-8. CLASS LEADERS (ADVANCED). Three hours a week. (No student may receive more than a total of six credits for elective work in both Physical Education and Military Drill.) FOSTER, WEST.

A large, new, well-equipped gymnasium will be ready for use in the autumn of 1915.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Elementary Physical Training.	..	All. Required of all fr.	None
3-4.	Intermediate Physical Training	3	Soph., jr., sr.	Equivalent of 1-2
5-6.	Advanced Physical Training...	3	Jr., sr.	3-4
11.	Preliminary Hygiene.....	3	Required of all new students.	None
13.	Personal Hygiene.....	3	Soph., jr., sr.	An. Biol. 1-2
14.	Hygiene of the Family.....	3	Sr.	Course 13

*Six credits the maximum number that can be gained by taking courses in exercise (courses 3-4, 5-6); only one of these courses may be taken for credit in a semester.

1-2. Elementary Physical Training. The lighter and more elementary forms of gymnastics; gymnastic dances; indoor and outdoor games; swimming. Includes a study of the habits of daily living, for which purpose students keep regular records. Divided into three sections according to physical capacity: A, full work; B, limited; C, corrective. *Opportunity for learning to swim will be offered in eight-week courses. Girls who cannot swim at the end of the freshman year will receive the grade of Incomplete for the course, and will be required to register for one of the swimming courses in their sophomore year.* Shower bath fee, $1.50 per semester. Kissock, Raynor, Ladd.

3-4. Intermediate Physical Training. Advanced gymnastics, gymnastic dances, and organized team games. Includes a study of daily habits of living and a written abstract of one book each semester. If taken for no credit, no reading or written work will be required. Shower bath fee, $1.50 per semester. Kissock.

5-6. Advanced Physical Training. Advanced gymnastics and an election of dancing, fencing, or a sport. Includes a study of the daily habits of living and a written abstract of one book a semester. If taken for no credit no written work or reading will be required. Shower bath fee, $1.50 per semester. Ladd.

11. Preliminary Hygiene. Twelve lectures. The most essential aspects of the care of the body. Norris.

13. Personal Hygiene. The essential knowledge of the care of the body, including a brief consideration of its anatomy and a study of its physiology, the prevention of contagious diseases, and first aid to the injured. Norris.

14. Hygiene of the Family. A study of maternity and infancy and the essentials of home nursing. Norris.

PHYSICS

Professors HENRY A. ERIKSON, ANTHONY ZELENY;† Associate Professor ALOIS F. KOVARIK; Assistant Professor LOUIS W. MCKEEHAN; Instructors E. O. DIETERICH, ARTHUR F. GORTON, EARLE H. KENNARD, PAUL E. KLOPSTEG, OTTO J. ZOBEL.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

For B.A. with Honors, the general requirements (page 22); Courses 13 and 14; work chosen from any courses above 50, except 89-90; mathematics 106, 107, 108, 140, and any course in mathematics open only to juniors and seniors if approved by the department. Thesis in connection with any course in Physics above 150.

For a Teacher's Certificate, fifteen credits, including Courses 89 and 90.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Physics	3	Soph., jr., sr.	Math. 2 or 4, or registration in Math. 2 or 4
2.	General Physics	3	Soph., jr., sr.	1
3.	General Laboratory Practice	1	Soph., jr., sr.	See statement
4.	General Laboratory Practice	1	Soph., jr., sr.	See statement
7.	General Physics for Engineers	4	Soph., jr., sr.	Math. 2 or 4, see statement
8.	General Physics for Engineers	4	Soph., jr., sr.	7. See statement
9.	Gen. Lab. Practice for Engineers	1	Soph., jr., sr.	See statement
10.	Gen. Lab. Practice for Engineers	1	Soph., jr., sr.	See statement
*13.	Electrokinetics	3	Jr., sr.	(12) 1914-15
31.	Acoustics	3	Soph., jr., sr.	See statement
*52.	Light	3	Jr., sr.	4 or 10, and Math. 11
*81.	Physical Manipulation and Laboratory Technique	2	Jr., sr.	4, 10 or 14
*82.	Physical Instruments of Precision	2	Jr., sr.	81
*89-90.	Teachers' Course	2	Sr.	1-4, or 7-10, or 11-14
*121-122.	Dynamics	6	Jr., sr., grad.	2 or 10 or (12) and Math. 51

†Absent on leave, 1915-16.

No.	Title	Credits	Offered to	Prereq. courses
*155.	Spectrometry	3	Sr., grad.	52 and 82
*161.	Advanced Electricity and Magnetism	3	Jr., sr., grad.	13
*162.	Electrical Measurements	2	Jr., sr., grad.	13
*165.	Electrical Measurements of Precision	3	Sr., grad.	162
*177.	Radioactivity	3	Sr., grad.	13 and Math. 11
*178.	Radioactivity Measurements	3	Sr., grad.	177
*181.	Adv. Physical Measurements	3	Sr., grad.	82
*182.	Adv. Physical Measurements	3	Sr., grad.	181
*191.	Elementary Physical Investigation	3	Sr., grad.	82
*192.	Elementary Physical Investigation	3	Sr., grad.	191

1. General Physics. Mechanics of solids and fluids, sound, and heat. Treatment experimental rather than mathematical; the fundamental principles. The first part of a general course 1-2. Should be taken in conjunction with Course 3, but may be taken separately. Zeleny, Dieterich, Gorton, Klopsteg.

2. General Physics. Light, electricity, and magnetism. Treatment experimental; the fundamental principles, including those of radioactivity, ionization, X-radiation, and the electrical constitution of matter. The second part of a general course 1 and 2. Should be taken in conjunction with Course 4, but may be taken separately. Zeleny, Dieterich, Gorton, Klopsteg.

3. General Laboratory Practice. Physical measurements in the memechanics of solids and fluids, sound, and heat, giving the student a knowledge of experimental methods, and an acquaintance with the fundamental facts of the subject. Open to all who have completed or are taking Course 1. McKeehan, Dieterich, Gorton, Zobel.

4. General Laboratory Practice. Physical measurements in light, electricity and magnetism. Open to all who have completed or are taking Course 2, and have completed Course 3. McKeehan, Dieterich, Gorton, Zobel.

7. General Physics for Engineers. Mechanics of solids and fluids, sound, and heat; numerous problems to illustrate the principles. Must be taken in conjunction with Course 9. Open also to Academic students. The first part of a general course 7 and 8, 9 and 10. Kovarik, Kennard, Zobel.

8. General Physics for Engineers. Light, electricity and magnetism. Must be taken in conjunction with Course 10. Open also to Academic students. The second part of a general course 7 and 8, 9 and 10. Kovarik, Kennard, Zobel.

9. General Laboratory Practice for Engineers. Physical measurements in the mechanics of solids and fluids, sound, and heat. Must be taken in conjunction with Course 7. McKeehan, Gorton.

10. General Laboratory Practice for Engineers. Physical measurements in light, electricity and magnetism. Must be taken in conjunction with Course 8. McKeehan, Gorton.

*13. Electrokinetics. The phenomena accompanying the passage of electricity through solids, liquids, and gases. One lecture, one recitation, and one two-hour laboratory period a week. Erikson, Kennard, Klopsteg.

31. Acoustics. A study of the fundamental principles of sound. A course designed primarily to meet the needs of the students in the department of music. Open also to Academic students who have completed a general course in physics. Erikson.

*52. Light. An intermediate course. Erikson.

*81. Physical Manipulation and Laboratory Technique. A practical study of the processes essential in the upkeep of a physical laboratory. Selection, preparation, and purification or cleansing of materials; glass blowing; construction and repair of simple apparatus. McKeehan.

*82. Physical Instruments of Precision. A practical study of instruments of precision. The physical principles and mechanical devices employed in their construction. Methods of adjustment and standardization. McKeehan.

*89-90. Teachers' Course. Methods of presentation; selection of lecture and laboratory experiments; laboratory management. Open to seniors who have taken a general course in physics. Zeleny.

For the year 1915-16 this course is given only in the Department of Education.

*121-122. Dynamics. Some problems essential for advanced physics and chemistry. McKeehan.

*162. Electrical Measurements. Devoted mainly to the study and measurement of capacity, inductance, and magnetic induction. Zeleny, Klopsteg.

*165. Electrical Measurements of Precision. Making of standard cells, calibration of Wheatstone box bridge; adjustment of resistances, ammeters, and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance, and magnetic flux; measurement of temperatures by electrical methods. Not offered in 1915-16. Zeleny.

*177. RADIOACTIVITY. Lectures, experimental and descriptive; the various theories and methods of investigation. Detailed study of the radioactive elements. KOVARIK.

*178. RADIOACTIVITY MEASUREMENTS. Laboratory technique in radioactivity. KOVARIK.

*181. ADVANCED PHYSICAL MEASUREMENTS. Individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student; intended to introduce him to some of the more intricate physical measurements. ZELENY, ERIKSON, KOVARIK, MCKEEHAN.

*182. ADVANCED PHYSICAL MEASUREMENTS. Continuation of Course 181.

*191. ELEMENTARY PHYSICAL INVESTIGATION. The experimental or theoretical study of physical phenomena, the nature or laws of which are not yet understood. ZELENY, ERIKSON, KOVARIK, MCKEEHAN, KENNARD.

*192. ELEMENTARY PHYSICAL INVESTIGATION. Continuation of Course 191.

POLITICAL SCIENCE

Professors WILLIAM A. SCHAPER, JEREMIAH S. YOUNG; Associate Professor CEPHAS D. ALLIN; Assistant BENJAMIN W. PALMER.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

For B.A. with Honors, see general requirements (page 22).

For Teacher's Certificate in Government, nine credits in Political Science and eighteen credits in History.

The Departments of Economics, Political Science, History, and Sociology and Anthropology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one of the departments of the social science group ought to be familiar with at least the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others.

COURSES

Introductory Courses

No.	Title	Credits	Offered to	Prereq. courses
1a or 1b.	American Government....	3	Soph., jr., sr.	None

General Courses

No.	Title	Credits	Offered to	Prereq. courses
3.	Comparative Government.	3	Soph., jr., sr.	1
5.	European Municipal Administration	3	Soph., jr., sr.	1
6.	American Municipal Administration	3	Soph., jr., sr.	1
7a or 7b.	State and Local Government	3	Soph., jr., sr.	1
9.	Colonial Administration..	3	Soph., jr., sr.	1
*51.	Business Law, I.....	3	Jr., sr.	6 credits in Pol. Sci., or 6 in Econ., or 3 in each
*52.	Business Law, II.....	3	Jr., sr.	*51
*54.	Latin American Relations	3	Jr., sr.	6 credits

Special Courses

25.	American Gov't. (Engineers)	2	Sr.	None
26.	Commercial Law (Engineers)	2	Sr.	25
27.	American Gov't. (Agriculture)	3	Soph., jr., sr.	None
*56-57.	Teachers' Course.....	3	Jr., sr.	See statement

Advanced Courses

*101.	Constitutional Law.....	3	Jr., sr., grad.	6 credits
*102.	Modern Political Thought	3	Jr., sr., grad.	6 credits
*104.	Political Parties.....	3	Jr., sr., grad.	6 credits or 1 and History 5-6
*105.	Comparative Administration	3	Jr., sr., grad.	6 credits
*106.	Legislative Power and Methods	3	Jr., sr., grad.	6 credits
*108.	Police Power.....	3	Jr., sr., grad.	6 credits
*109.	Diplomacy	3	Jr., sr., grad.	6 credits or 1 and History 156
*110.	International Law.....	3	Jr., sr., grad.	1 and 3, or 109
*112.	Comparative Federal Gov't	3	Jr., sr., grad.	6 credits
*114.	Government of the British Empire	3	Jr., sr., grad.	6 credits, or 1 and History 7
*201-202.	Seminar		6	12 credits Sr., grad.

1a or 1b. AMERICAN GOVERNMENT. Organization and actual workings of the national government; nature and origin of the American governmental system. If possible, History 5-6 should accompany or follow this course. SCHAPER, YOUNG, ALLIN, PALMER.

3. COMPARATIVE GOVERNMENT. The organization and working of the governments of the great European powers of today. ALLIN.

5. EUROPEAN MUNICIPAL ADMINISTRATION. A study of French, German, Austrian and English cities; the forms of government, parties, and

elections; achievements in finance, police, sanitation, city planning and other public services undertaken. SCHAPER.

6. AMERICAN MUNICIPAL ADMINISTRATION. A study of the organization and chief functions of American cities; their growth, relation to the state, forms of charters, inefficiency and corruption, reform measures; and the administration of finance, police, health and other activities. SCHAPER.

7a or 7b. STATE AND LOCAL GOVERNMENT. Comparison of typical American state governments, special attention to Minnesota; relation of states to the United States and to local units of government; recent experiments such as the initiative and referendum, the recall and primaries; social and economic legislation. YOUNG, PALMER.

9. COLONIAL ADMINISTRATION. Not offered in 1915-16.

25. AMERICAN GOVERNMENT (ENGINEERS). ALLIN, PALMER.

26. COMMERCIAL LAW (ENGINEERS). PALMER.

27. AMERICAN GOVERNMENT (AGRICULTURAL). PALMER.

*51. BUSINESS LAW, PART I. Principles of law governing ordinary business transactions. So much of the law taught as an educated man ought to know for guidance in every-day business affairs. The general law of contracts, sales, mortgages, bankruptcy, and agency. YOUNG.

*52. BUSINESS LAW, PART II. The law of partnerships, corporations, and negotiable instruments. YOUNG.

*54. LATIN AMERICAN RELATIONS. A survey of the relations of the United States with the Latin American nations; a comparative study of the constitutions, governments, and recent progress of the leading Latin American Republics. SCHAPER.

*56-57. TEACHERS' COURSE. Lectures on teaching Government in the secondary schools, given in coöperation with the Department of History and credited as part of History 56-57. SCHAPER.

*101. CONSTITUTIONAL LAW. Constitutional law, its origin and nature; American constitutions, how made and amended; the courts and the development of the Constitution; Federal and State relations; the territories, their acquisition and government; citizenship. SCHAPER.

*102. MODERN POLITICAL THOUGHT. Nature and purpose of the modern state; sovereignty; the growth of democracy; the decline of individualism; increase of governmental activities; the great contributions to political thought from Hobbes, Locke and Rousseau to the present time. SCHAPER.

*104. POLITICAL PARTIES. Not offered in 1915-16.

*105. COMPARATIVE ADMINISTRATION. Administration as a science; origin and development; an analysis of the administrative systems of the United States, England, France and Germany, with special reference to the law of officers, the merit system, and special administrative tribunals. YOUNG.

*106. LEGISLATIVE POWER AND METHODS. Source and scope of the legislative power; methods used by legislative bodies; current public questions; formulation and defense of legislative bills. YOUNG.

*108. THE POLICE POWER. The nature and scope of the police power; the public welfare, including safety, order, morals and protection against business fraud and oppression; the fundamental rights under the police power. YOUNG.

*109. DIPLOMACY. The growth of international relations; the mode of conducting foreign affairs; diplomatic and consular service; the framing, interpretation and termination of treaties and compacts. ALLIN.

*110. INTERNATIONAL LAW. Nature, sources and sanction of international law; the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. ALLIN.

*112. COMPARATIVE FEDERAL GOVERNMENT. Ancient and modern federal unions, especially the constitution of the United States, Switzerland, Canada, and Australia, the South African Union, and the proposals for Imperial federation. ALLIN.

*114. THE GOVERNMENT AND POLITICS OF THE BRITISH EMPIRE. The origin, nature, and operation of the British constitution, political parties and principles in Great Britain and the Colonies. ALLIN.

*201-202. SEMINAR IN POLITICAL SCIENCE. Research in the field of political Science; the discussion of current problems in politics and administration. SCHAPER, ALLIN, YOUNG.

RHETORIC AND PUBLIC SPEAKING

Professors JOSEPH M. THOMAS, MARGARET SWEENEY; Assistant Professors DANIEL FORD, CHARLES W. NICHOLS, SIDNEY F. PATTISON, ANNA H. PHELAN, FRANK M. RARIG; Instructors OLIVE M. GILBREATH, HALDOR GISLASON, JAMES T. HILLHOUSE, CHARLES E. SKINNER, ARTHUR J. TIEJE, HOWARD T. VIETS, HELEN A. WHITNEY, ...

REQUIREMENTS OF THE DEPARTMENT

For a Major, twenty-four credits, which may include not more than six credits in Public Speaking.

For a Minor in Rhetoric, twelve credits in addition to Course 1-2, including Courses 11-12 or 15-16.

For a Minor in Public Speaking, twelve credits in Public Speaking.

For B.A. with Honors. The general requirements (page 22). A reading knowledge of either Latin, French, or German. At least fifteen credits in departmental starred courses, six of these credits to be in Course 119-120.

For a Teacher's Certificate, at least a minor in Rhetoric and a minor in English, with an average of one and one-half honor points for each credit hour.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Composition and Rhetoric	6	Fr.	None
1b.	Composition and Rhetoric	3	Fr.	None
2a.	Composition and Rhetoric	3	Fr.	None
3-4.	Composition for Engineers	6	Fr. Eng.	None
11-12.	Exposition, Description, Narration	6	Soph., jr., sr.	1-2
15-16.	Exposition and Argument	6	Soph., jr., sr.	1-2
31-32.	Technical Writing	4	Sr., Engineers	3-4
41-42.	Public Speaking	6	Soph., jr., sr.	1-2
45-46.	Argumentation and Debate	6	Soph., jr., sr.	See statement
47.	Advanced Debate	3		See statement
*81-82.	Interpretative Reading	6	Jr., sr.	1-2, 41-42
*83-84.	Advanced Public Speaking	6	Jr., sr.	1-2, 41-42
*102.	Versification	3	Jr., sr., grad.	1-2, 11-12 or 15-16
*103-104.	Studies in Structure and Style	6	Jr., sr., grad.	1-2, 11-12 or 15-16
*107.	Imitative Writing	3	Jr., sr., grad.	1-2, 11-12 or 15-16
*110.	Short-Story Writing	3	Jr., sr., grad.	1-2, 11-12 or 15-16
*111-112.	Essay Writing	6	Jr., sr., grad.	1-2, 11-12 or 15-16
*115-116.	Dramatic Technique	4	Sr., grad.	See statement
*119-120.	Seminar in Writing	4	Sr., grad.	See statement
*130.	Teachers' Course	3†	Jr., sr., grad.	See statement
*201-202.	Seminar in Rhetoric	6	Sr., grad.	See statement

†Carries credit only in the department of Education.

RHETORIC

‡1-2. Composition and Rhetoric. Practical training in the art of writing; the principles of structure and analysis of specimens of good prose. Thomas, Sweeney, Ford, Pattison, Phelan, Gilbreath, Hillhouse, Skinner, Tieje, Whitney.

‡1b. Composition and Rhetoric. Same as Course 1.

‡All students taking Rhetoric 1-2 shall be regarded as on probation during the first four weeks of the course. At the end of that period those who have shown their inability to do satisfactory work *because of lack of preparation* shall be dropped from the course with a record of *failed.* To be eligible to enter the course again the next semester, such students must make up their deficiency in preparation by devoting at least three hours each week to regular instruction in this subject outside the college and must pass an examination given by the department. Until this examination is passed such students will not be permitted to carry more than fourteen hours of college work.

2a. COMPOSITION AND RHETORIC. Same as Course 2.

3-4. COMPOSITION FOR ENGINEERS. In the College of Engineering. NICHOLS, VIETS.

11-12. EXPOSITION, DESCRIPTION, AND NARRATION. First semester; analysis of specimens of exposition; short themes and fortnightly essays, with emphasis on planning and amplification; second semester the same general plan applied to description and narration. Course 12 (Description and Narration) open to those who have had 15-16. Number in each section limited to twenty. GILBREATH, PATTISON, PHELAN, SKINNER, WHITNEY.

15-16. EXPOSITION AND ARGUMENT. First semester, exposition; second semester, argument. The study of a text and the analysis of specimens, accompanied by weekly essays, and shorter themes. Course 16 (Argument) open to those who have had 11-12. Number in each section limited to twenty. THOMAS, TIEJE.

31-32. TECHNICAL WRITING. In the College of Engineering. NICHOLS.

*102. VERSIFICATION. The nature of poetry and a detailed analysis of English meters and the various English verse forms. The theory accompanied by criticism of current poetry and practice in writing verse. SKINNER.

*103-104. STUDIES IN STRUCTURE AND STYLE. Theory of structure and style; rhetorical analysis of standard English prose; themes based on personal observation, current reading, and investigation; preparation of essays with particular classes of readers in view. FORD.

*107. IMITATIVE WRITING. The principles of structure, diction, and style, which underlie the work of leading English writers; application of these principles in both imitative and original compositions. THOMAS.

*110. SHORT-STORY WRITING. The technique of the short story accompanied by constructive work in story writing. THOMAS.

*111-112. ESSAY-WRITING. Practice in the writing of such forms of the essay as the didactic, the biographical, the critical, the informal; opportunity for extended composition. Two essays a semester. Individual aid given to the student in the gathering of material; the planning of each paper, and the criticism of each essay. Analysis of a considerable body of modern essays. PATTISON.

*115-116. DRAMATIC TECHNIQUE. A study of dramatic technique with emphasis on contemporary methods, and practice in dramatic composition. Open with special permission to seniors and graduate students who have completed Course 11-12, and who are taking or have taken English courses 55, or 59-60, or 113-114. SKINNER.

*119-120. SEMINAR IN WRITING. For a limited number of advanced students who write with facility, and who desire personal criticism and direction. Criticism of manuscripts submitted for inspection, with lectures upon the fundamental principles of English composition. Open with special permission to seniors and graduate students who have completed Courses 1-2, 11-12, or 15-16, and at least one other course. Required of Honors Course students. THOMAS.

*130. TEACHERS' COURSE. Methods of teaching English in the high schools. Discussion of course of study, textbooks, and equipment. Visits to Minneapolis and St. Paul high schools. Practical work in theme-correcting. Open to those who have completed, or are completing, a minor in Rhetoric and a minor in English and are qualifying for Practice Teaching. This course carries credit only in the department of Education. INGLIS.

*201-202. (Graduate seminar but open to seniors taking the Honors Course.) Lectures, reports, and theses on special problems of rhetorical theory. Prerequisites, Courses 1-2, 11-12, or 15-16, and at least one other course. For those who are specializing in Rhetoric and Composition. THOMAS.

PUBLIC SPEAKING

Honorable Mention in Public Speaking. Students who have won honors in debate or oratory, if the department deems them worthy, may receive honorable mention on the commencement program. To be eligible for such distinction a student must (1) have represented his class in the freshman-sophomore debate, or won a place in the freshman-sophomore oratorical contest; (2) have taken part in an inter-society debate; (3) have represented the University in an intercollegiate debate, or won a place in the Pillsbury oratorical contest.

41-42. A GENERAL COURSE IN PUBLIC SPEAKING. Fundamentals of effective speaking; breathing, voice-production, enunciation, and action; delivery of extracts from the works of well-known writers and speakers; principles underlying the making of the speech applied in both oral and written compositions. Number in each section limited to twenty-five. RARIG, GISLASON, ...

45-46. ARGUMENTATION AND DEBATING. Analysis, briefing, evidence, elementary research. Critical study of models, including Lincoln-Douglas debates. Principles governing persuasive speaking studied and applied in practice debates and forensics. Students in extension debating must register for this course to get credit for their work. GISLASON.

47. INTERCOLLEGIATE DEBATE AND ORATORY. The question for intercollegiate debate studied and briefed, and frequent practice debates held. Open to juniors and seniors who are awarded places on the intercollegiate debating squad. GISLASON, RARIG.

*81-82. INTERPRETATIVE READING. The interpretation and expression of the various forms of literature, such as the essay, the short story, lyric and narrative poetry, and the drama. The aim is intelligent and sympathetic reading. RARIG.

*83-84. ADVANCED PUBLIC SPEAKING. The distinctive characteristics of oratorical style; analysis of the styles of representative orators. Written and extemporaneous speeches. Individual criticism and direction. Those desiring to prepare for the Pillsbury contest should register for this course. RARIG.

ROMANCE LANGUAGES

Professors EVERETT WARD OLMSTED, COLBERT SEARLES; Assistant Professor JULES T. FRELIN; Instructors HARRY E. ATWOOD, NELSON F. COBURN, MARCEL MORAUD, CHARLES E. MULLER, RUTH S. PHELPS, EDWARD H. SIRICH; Teaching Fellows GEORGE S. BARNUM, EARL A. BARRETT.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits not including Course 1.

For a Major, twenty-four credits not including Courses 1 and 3.

For B.A. with Honors. General requirements (page 22); a reading knowledge of Latin or German, and two years' work in Spanish or Italian. In the junior year, Courses 55-56, 101-102, 51-52, 53-54; in the senior year, courses 103-104, 107-108, 111-112, 113-114. Substitutions for these courses may be granted by the department in special cases. Alternation of courses required in the junior and senior years is allowable.

For a Teacher's Certificate. In addition to course 5-6, which presupposes courses 1 and 3, two Conversation-Composition courses, two literary courses, and reinforcing work in Spanish as a minimum.

COURSES

No.	Title	Credits	Offered to	Prerequisites
1a or 1b.	Beginning French.....	6	Fr., soph., jr., sr.	None
3a or 3b.	Intermediate French....	6	Fr., soph., jr., sr.	1 or equivalent
5-6.	Gen. Survey Fr. Lit...	6	Fr., soph., jr., sr.	3 or equivalent
7-8.	Elementary Fr. Conver.	2	Fr., soph., jr., sr.	3 or equivalent
9-10.	Elementary Fr. Compos.	2	Fr., soph., jr., sr.	3 or equivalent
31a or 31b.	Beginning Spanish.....	6	Fr., soph., jr., sr.	None
33-34.	Beginning Spanish.....	6	Fr., soph., jr., sr.	None
35-36.	Intermediate Spanish...	6	Fr., soph., jr., sr.	31 or equivalent
37-38.	Elementary Span. Conver.	2	Fr., soph., jr., sr.	35-36 or equivalent
39-40.	Elementary Span. Compos.	2	Fr., soph., jr., sr.	35-36 or equivalent
41-42.	Beginning Italian.....	6	Fr., soph., jr., sr.	None
†43-44.	Intermediate Italian....	4	Soph., jr., sr.	41-42 or equivalent

No.	Title	Credits	Offered to	Prereq. courses
51-52.	Advanced French Conversation	2	Soph., jr., sr.	7-8 or equivalent
53-54.	Advanced French Composition	2	Soph., jr., sr.	9-10 or equivalent
55-56.	French Lit. Nineteenth Century	4	Soph., jr., sr.	5-6 or equivalent
*101-102.	French Lit. Eighteenth Century	6	Jr., sr., grad.	5-6 or equivalent
*103-104.	French Lit. Seventeenth Century	6	Jr., sr., grad.	5-6 or equivalent
†*105-106.	French Lit. Sixteenth Century	4	Jr., sr., grad.	101-102 or 103-104 or equivalent
*107-108.	French Lit. Classicism...	4	Jr., sr., grad.	103-104 or equivalent
*109-110.	Lectures in French.....	6	Jr., sr., grad.	5-6; 51-52 or equivalent
*111-112.	French Oral Diction....	4	Jr., sr., grad.	51-52 or equivalent
*113-114.	French Syntax and Composition	2	Jr., sr., grad.	52-54 or equivalent
*131-132.	Spanish Novel.....	4	Jr., sr., grad.	33-34 or equivalent
*141-142.	Dante, Petrarch, Boccaccio	4	Jr., sr., grad.	41-42 or equivalent

†Not offered in 1915-16

Note: Courses 7-8 and 9-10 must be taken together.

Courses 51-52 and 53-54 must be taken together.

Courses 1, 3 and 31 are double courses.

Students are advised to take Course 55-56 as a natural preparation for Courses 101-102 and 103-104.

Permission to register for Courses from 55-56 to 109-110 inclusive may be granted by the department in special cases.

Both semesters of any year-course must be completed before credit is allowed for the first semester.

INTRODUCTORY COURSES

French

1a or 1b. BEGINNING FRENCH. Double Course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar, drill, oral exercises and translation. ATWOOD, FRELIN, PHELPS, SIRICH.

3a or 3b. INTERMEDIATE FRENCH. Double Course. This course will complete in one semester the work heretofore done in two. Review of

grammar, composition, conversation and reading—representative authors of the Ninetenth Century. ATWOOD, FRELIN, MULLER, SEARLES.

5-6. GENERAL SURVEY OF FRENCH LITERATURE. This course will cover the whole period in historical outline and is a prerequisite for the century courses devoted to special periods. ATWOOD, MORAUD, SIRICH.

7-8. ELEMENTARY FRENCH CONVERSATION. A small amount of outside preparation will be required. The section meeting at nine o'clock on Monday, Wednesday and Friday is limited to students taking Course 5-6 and is based on the work of that course. FRELIN, MORAUD, MULLER.

9-10. ELEMENTARY FRENCH COMPOSITION. FRELIN, MORAUD, MULLER.

51-52. ADVANCED FRENCH CONVERSATION. The life and customs of modern France; accompanied by illustrative material. MORAUD, MULLER.

53-54. ADVANCED FRENCH COMPOSITION. Translation and original compositions. MORAUD, MULLER.

55-56. NINETEENTH CENTURY FRENCH LITERATURE. Romanticism, lectures, recitations and reports. OLMSTED.

Spanish

31a or 31b. BEGINNING SPANISH. Double course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar drill, oral exercises, and translation. COBURN.

33-34. BEGINNING SPANISH. This course is the same as Course 31 except that it is a year-course meeting three times a week. COBURN, OLMSTED.

35-36. INTERMEDIATE SPANISH. Review of grammar, composition, conversation, and reading. COBURN.

37-38. ELEMENTARY SPANISH CONVERSATION. A small amount of outside preparation required. The life and customs of modern Spain; accompanied by illustrative material. COBURN.

39-40. ELEMENTARY SPANISH COMPOSITION. Special attention given to social and commercial correspondence. COBURN.

Italian

41-42. BEGINNING ITALIAN. Pronunciation, grammar drill, oral exercises, and translation. PHELPS.

43-44. INTERMEDIATE ITALIAN. Review of grammar, composition, conversation and reading. Not given 1915-16. PHELPS.

ADVANCED COURSES

French

101-102. EIGHTEENTH-CENTURY FRENCH LITERATURE. Discussions based upon texts and collateral readings. SEARLES.

*103-104. SEVENTEENTH-CENTURY FRENCH LITERATURE. Discussions based upon texts and collateral readings. OLMSTED.

*105-106. SIXTEENTH-CENTURY FRENCH LITERATURE. Not given in 1915-16.

*107-108. FRENCH LITERATURE: CLASSICISM. Literary study of the classic French monuments. SEARLES.

*109-110. LECTURES IN FRENCH. L'évolution du roman au XIXe. siècle. MORAUD.

*111-112. FRENCH ORAL DICTION. Dissertations orales sur des sujets variés. MULLER.

*113-114. FRENCH SYNTAX AND COMPOSITION. Special studies in characteristic problems of French syntax. MULLER.

Spanish

*131-132. SPANISH NOVEL. A study of the development of Spanish fiction from the picaresque novel to that of the present day. OLMSTED.

Italian

*141-142. DANTE, PETRARCH, BOCCACCIO. An introduction to the works of these authors; reading in class, lectures, reports and collateral reading. PHELPS.

SCANDINAVIAN

Professors GISLE BOTHNE, ANDREW A. STOMBERG.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not including Courses 1-2 and 5-6.
For a Major, twenty-four credits.
For B.A. with Honors, the general requirements (page 22) and one year of Scandinavian in addition to what is required for a major.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Beginning Norwegian....	6	All	None
2.	Advanced Norwegian.....	6	Soph., jr., sr.	1
3-4.	Advanced Norwegian.....	6†	Soph., jr., sr.	1
5.	Beginning Swedish.....	6	All	None
6.	Advanced Swedish.....	6	Soph., jr., sr.	5
7-8.	Advanced Swedish.....	6†	Soph., jr., sr.	5
9.	Beginning Norwegian....	2	See statement	None
10.	Advanced Norwegian.....	2	See statement	9
*101-102.	Modern Norwegian Literature	6†	Jr., sr.	1-2 and 3-4
*103.	Earlier Norwegian Literature	3	Sr., grad.	101-102
*104.	Henrik Ibsen	2	Sr., grad.	101-102
*107-108.	Swedish Literature.....	6†	Jr., sr., grad.	5 and 6
*110.	Teachers' Course in Norwegian	2	Sr., grad.	1 and 2 or 5 and 6
*113-114.	Old Norse (Icelandic)...	4	Sr., grad.	See statement

†Both semesters must be completed before credit is given for the first semester.

1. Beginning Norwegian. Double course. Grammar, composition, select reading in easy prose and poetry. Bothne.

2. Advanced Norwegian. Double course. Grammar, composition, conversation, elementary history of literature, and select works of modern authors. Bothne.

3-4. Advanced Norwegian. Same as Course 2, but is a year-course.

5. Beginning Swedish. Double course. Grammar and composition; select reading in easy prose and verse. Stomberg.

6. Advanced Swedish. First semester; grammar, composition and conversation; prose texts. Second semester: an elementary study of the literature of Sweden and reading of Tegner's Fritiof's Saga. Stomberg.

7-8. Advanced Swedish. Same as Course 6, but is a year-course.

9. Beginning Norwegian. Grammar, composition, select reading in easy prose and poetry. This course is open to teachers and mature students. Bothne.

10. Advanced Norwegian. Grammar, composition, conversation, elementary history of literature, and select works of modern authors. Open to teachers and mature students. Bothne.

*101-102. Modern Norwegian Literature. Norwegian literature from 1814 to the present day. Bothne.

*103. Earlier Norwegian Literature. History of literature. Norwegian and Danish folk-songs, Holberg, Oplysningstiden. Bothne.

*104. Ibsen. Lectures, reading, and interpretation. Bothne.

*107-108. SWEDISH LITERATURE. History of Swedish literature from 1710 to the present time. History of the literature and study of modern authors, including Selma Lagerlöf, Giejerstam, Strindberg. STOMBERG.

*110. TEACHERS' COURSE IN NORWEGIAN. For students who expect to teach Norwegian in the high schools. BOTHNE.

*113-114. OLD NORSE (ICELANDIC). Grammar and reading. Gunnlaugs Saga Ormstungu. BOTHNE.

SOCIOLOGY AND ANTHROPOLOGY

Professors ALBERT ERNEST JENKS, ARTHUR J. TODD; Instructor PAUL I. NEERGAARD; Lecturers FRANK J. BRUNO, OTTO W. DAVIS, CHARLES C. STILLMAN, GEORGE EDGAR VINCENT; Superintendents of State Board of Control Institutions.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, twenty-four credits.

For B.A. with Honors, see general requirements (page 22).

For Recommendation for Teaching, credits in the following courses: 1, or 3, 5, 113, 114, 117.

For Recommendation for Social Work, credits in the following courses: 1, 9 or 10, 113, 114.

Modern university education is not complete unless the graduate has obtained the social point of view. To this end the Department offers elementary courses dealing with peoples, with social forces, institutions, and movements. Its more advanced courses are designed especially for students majoring in the Social Sciences; namely, Economics, History, Political Science, and Sociology and Anthropology.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a or 1b.	Introduction to Anthropology	3	Soph., jr., sr.	None
3a or 3b.	Introduction to Sociology.	3	Soph., jr., sr.	None
5.	Cultural Anthropology	3	Jr., sr.	None
	Special Courses			
7.	Studies in Social Psychology	None	Stud. in dept.	None
	General Courses			
9.	Poverty	2	Jr., sr.	1 or 3
10.	Poverty (continued)	2	Jr., sr.	1 or 3
11.	Housing Problems	2	Jr., sr.	1 or 3, and one other course
12.	Ethnology	3	Jr., sr.	1 and one other course
14.	Rural Sociology	3	Jr., sr.	1 or 3

Advanced Courses

No.	Title	Credits	Offered to	Prereq. courses
*102.	Social Theory.....	3	Jr., sr., grad.	1 or 3, 9 or 10, and one other course
104.	State Board of Control Institutions	2	Jr., sr., grad.	1 or 3, 9 or 10, and one other course
*108.	The Philippine People....	3	Jr., sr., grad.	1 and 5
*110.	Physical Anthropology....	3	Jr., sr., grad.	See statement
*112.	The American Negro.....	3	Jr., sr., grad.	1 or 3, 12 or 113
*113.	The American People.....	3	Jr., sr., grad.	1 or 3, and one other course
*114.	The American People (continued)	3	Jr., sr., grad.	1 or 3, 113, and one other course
*117.	Social Psychology.....	3	Jr., sr., grad.	See statement
*119.	Modern Social Institutions	3	Jr., sr., grad.	1 or 3, 9 or 10, and one other course
*121-122.	Seminar in Sociology....	3	Sr., grad.	For sr., four correlated courses
*123.	Seminar in Anthropology.	3	Sr., grad.	For sr., four correlated courses

INTRODUCTORY COURSES

1a or 1b. INTRODUCTION TO ANTHROPOLOGY. Characteristic activities, institutions, and elemental laws of primitive societies. Lectures, text-book, and essay. JENKS.

3a or 3b. INTRODUCTION TO SOCIOLOGY. Presentation of elemental social laws and theories. Lectures, text-book, and essay. TODD, NEERGAARD.

5. CULTURAL ANTHROPOLOGY. Origin and development of the most important activities and institutions which have had their beginning in primitive society. Text-book, lectures, readings, and essay. JENKS.

SPECIAL COURSES

7. STUDIES IN SOCIAL PSYCHOLOGY. During the first semester President George E. Vincent will deliver the following course of five public lectures to the students of the Department:

1. The Individual and the Group
2. Group Conflict and Rivalry
3. Group Coercion
4. Folkways and Mores
5. The Psychology of Leadership

Date and place of lectures will be announced later. VINCENT.

GENERAL COURSES

9. POVERTY. Attempts which have been made to understand poverty; various public and private efforts to relieve, control, and prevent it. Especial consideration is given to conditions in Minneapolis. Text-book, readings, and lectures. BRUNO.

10. POVERTY (Continued). Poverty as a social disease; its relation to certain vital social forces; outstanding types of dependence. Especial consideration is given to conditions in St. Paul. Text-book, readings, and lectures. STILLMAN.

11. HOUSING PROBLEMS. An examination of housing evils and their causes; the various movements for the prevention or improving of bad housing; town planting; garden cities. Lectures, readings, field work, and essay. DAVIS.

12. ETHNOLOGY. The different so-called races of men; their historical classifications; causes of origin and distribution, and their development; important ethnic problems. Text-book, lectures, assigned readings, and essay. Not offered in 1915-16. JENKS.

14. RURAL SOCIOLOGY. A study and exposition of rural social conditions; existing agencies for rural betterment; suggestions for solution of rural social problems. Text-book, lectures, readings, and essay. Given only at the University Farm. NEERGAARD.

ADVANCED COURSES

*102. SOCIAL THEORY. The foundations of sociology; the leading American, English, French, and German writers and their methods of approach to the science and the leading results they have secured. Text-books, readings, lectures, essay. TODD.

104. STATE BOARD-OF-CONTROL INSTITUTIONS. Organization, machinery, and function of such institutions as the State Hospitals, Asylums, Training Schools, Prison, Schools for the Feeble-minded, the Blind, and the Deaf. Lectures and readings. EXPERTS FROM THE INSTITUTIONS STUDIED.

*108. THE PHILIPPINE PEOPLE. Comparative study of the four large ethnic and cultural groups of people in the Philippine Islands; policy of the insular government as it affects American home interests in the Orient. Lectures, readings, and essay. Not offered in 1915-16. JENKS.

*110. PHYSICAL ANTHROPOLOGY. Theory of evolution as applied to natural and cultural man; theory of eugenics and its application. Prerequisites, Courses 1, 5, (or Course 1-2 in Animal Biology), and one other course in this Department. Lectures, readings, and essay. JENKS.

*112. THE AMERICAN NEGRO. The negro in Africa; development of the American negro; present characteristics, conditions, developing tendencies, and probable future of the American negro. Lectures, readings, and essay. Not offered in 1915-16. JENKS.

*113. THE AMERICAN PEOPLE. Dominant characteristics of the diverse foreign peoples now in the United States; their modification in America; the importance of these peoples to the American nation. Lectures, readings, and essay. JENKS.

*114. THE AMERICAN PEOPLE (Continued). A continuation of Course 113. Essential and unique historical Americanisms, and their value and virility for the future; facts and forces of amalgamation and assimilation in America; America's ethnic problems. Lectures, readings, and essay. JENKS.

*117. SOCIAL PSYCHOLOGY. An introduction to the study of the reciprocal influence of minds in society upon one another. (Same as Course 57 in the Department of Philosophy and Psychology.) Prerequisites: Course 3 and one other course, and Course 1-2 or 5 in the Department of Philosophy and Psychology. PETERSON.

*119. MODERN SOCIAL INSTITUTIONS. Fundamental social institutions in their relation to human progress. TODD.

*121-122. SEMINAR IN SOCIOLOGY. An advanced course of method and independent research. Topic for 1915-16, The Family. TODD.

*123. SEMINAR IN ANTHROPOLOGY. An advanced course of method and independent research. JENKS.

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1915-1916

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FEBRUARY

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MARCH

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APRIL

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MAY

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JUNE

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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CALENDAR

1915-1916

The university year covers a period of thirty-eight weeks, beginning on the Tuesday before the second Thursday in September. Commencement Day is always the second Thursday in June.

1915			
August	31	Tuesday	Registration closes except for new students
September	1-8	Week	Fees payable except for new students
September	7-14	Week	Examinations for the removal of conditions, entrance examinations, registration of new students, and payment of fees
September	15	Wednesday	First semester begins
October	7	Thursday	Senate meeting, 4:00 p.m.
November	24	Wednesday	Thanksgiving recess begins 9:00 p.m.
November	29	Monday	Thanksgiving recess ends 8:00 a.m.
December	2	Thursday	Senate meeting, 4:00 p.m.
December	17	Friday	Christmas vacation begins 9:00 p.m.
1916			
January	4	Tuesday	Christmas vacation ends 8:00 a.m.
January	18	Tuesday	Registration for second semester closes
January	24	Monday	Final examinations begin
January	25	Tuesday	Payment of fees for second semester closes
February	2	Wednesday	Second semester begins
February	3	Thursday	Senate meeting, 4:00 p.m.
February	12	Saturday	Lincoln's Birthday: a holiday
February	22	Tuesday	Washington's Birthday: a holiday
April	19	Wednesday	Easter recess begins 9:00 p.m.
April	27	Thursday	Easter recess ends 8:00 a.m.
April	28-May 3	Week	Condition examinations
May	4	Thursday	Senate meeting, 4:00 p.m.
May	26	Friday	Final examinations begin
May	30	Tuesday	Memorial Day: a holiday
June	1-8	Week	Military Encampment, Fort Snelling
June	3	Saturday	Second semester closes
June	4	Sunday	Baccalaureate service
June	5	Monday	Senior class day exercises
June	7	Wednesday	Alumni Day
June	8	Thursday	Forty-fourth Annual Commencement
June	9	Friday	Summer vacation begins
June	12	Monday	Summer Session begins

The university year for 1916-17 will begin Tuesday, September 12.

Schedule of Condition Examinations for Students of the College of Engineering

September 1915				April, May 1916	
Tuesday,	7th,	a.m.	Physics	a.m.	Friday, April 28th
		p.m.	Chemistry, Geology, Metallography	p.m.	
Wednesday,	8th,	a.m.	Mathematics and Mechanics	a.m.	Saturday, 29th
		p.m.	Drawing and Descriptive Geometry	p.m.	
Thursday,	9th,	a.m.	Civil Engineering.....	a.m.	Monday, May 1st
		p.m.	Experimental Engineering	p.m.	
Friday,	10th,	a.m.	Mechanical Engineering, Shop, Astronomy	a.m.	Tuesday, 2nd
		p.m.	Electrical Engineering, Architecture	p.m.	
Saturday,	11th,	a.m.	Rhetoric, Language.....	a.m.	Wednesday, 3rd

Morning examinations are at nine o'clock, afternoon examinations at two o'clock.

Condition examinations are ordinarily held in the classrooms of the respective departments. Students purposing to take such examinations are to notify the department concerned in advance, and make all arrangements with the particular instructor. Where conflicts occur in examination periods, arrangements should be made with the instructors concerned for a new schedule of time.

Certificates authorizing condition examinations are secured in advance from the Registrar; the fee is one dollar. Condition examinations at times other than those scheduled require faculty authorization as Special Examinations, and involve a fee of five dollars.

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

FACULTY

GEORGE EDGAR VINCENT, Ph.D., LL.D., President 1005 5th St. S. E.

CYRUS NORTHROP, LL.D., President Emeritus 519 10th Ave. S. E.

FRANCIS CLINTON SHENEHON, C.E., Dean and Professor of Civil Engineering 2109 Blaisdell Ave.

HENRY T. EDDY, C.E., Ph.D., LL.D., D.Sc., Professor of Mathematics and Mechanics, Emeritus 916 6th St. S. E.

CEPHAS DANIEL ALLIN, M.A., LL.B., Associate Professor of Political Science 721 7th St. S. E.

FREDERIC H. BASS, B.S., Professor of Municipal and Sanitary Engineering 429 Union St. S. E.

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HANS H. DALAKER, B.A., Assistant Professor of Mathematics 523 Walnut St. S. E.

HENRY A. ERIKSON, B.E.E., Ph.D., Professor of Physics 424 Harvard St. S. E.

JOHN J. FLATHER, Ph.B., M.M.E., Professor of Mechanical Engineering 315 11th Ave. S. E.

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JULES T. FRELIN, B.A., Assistant Professor of French 112 Church St. S. E.

EVERHART P. HARDING, Ph.D., Associate Professor of Chemistry 1316 7th St. S. E.

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ALOIS F. KOVARIK, Ph.D., Associate Professor of Physics 604 11th Ave. S. E.

FRANCIS P. LEAVENWORTH, M.A., Professor of Astronomy 317 17th Ave. S. E.

BERNARD LENTZ, First Lieutenant, 21st U. S. Infantry, Professor of Military Science
LOUIS W. MCKEEHAN, Ph.D., Assistant Professor of Physics 1512 Brook Ave. S. E.
FRANKLIN R. MCMILLAN, C.E., Assistant Professor of Structural Engineering 524 8th Ave. S. E.
FREDERICK M. MANN, C.E., M.S., in Arch., Professor of Architecture 202 Ridgewood Ave.
JOHN V. MARTENIS, M.E., Assistant Professor of Mechanical Engineering 206 Harvard St. S. E.
ADOLPH FREDERICK MEYER, C.E., Associate Professor of Hydraulics 1467 Ashland Ave., St. Paul
BURT L. NEWKIRK, Ph.D., Assistant Professor of Mathematics and Mechanics 519 Essex St. S. E.
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EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry 914 7th St. S. E.
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S. CARL SHIPLEY, M.E., Assistant Professor of Machine Construction 1517 E. River Road
CHARLES F. SHOOP, B.S., Assistant Professor of Experimental Engineering 811 Fulton St. S. E.
CHARLES F. SIDENER, B.S., Professor of Chemistry 1320 5th St. S. E.
FRANK W. SPRINGER, E.E., Professor of Electrical Engineering 826 Delaware St. S. E.
JOSEPH M. THOMAS, Ph.D., Professor of Rhetoric
*ANTHONY ZELENY, Ph.D., Professor of Physics 613 Fulton St. S. E.
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JOHN O. CEDERBERG, Lecturer in Architecture 404 Endicott Bldg., St. Paul
F. K. COWLEY, Instructor in Architecture 505 15th Ave. S. E.
LYALL DECKER, M.E., Instructor in Drawing 1515 University Ave. S. E.
ROBERT W. FRENCH, B.S., Instructor in Drawing 1018 16th Ave. S. E.

*On leave of absence 1915-16.

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828 University Ave. S. E.
PAUL E. KLOPSTEG, M.A., Instructor in Physics 410 17th Ave. S. E.
WALLACE H. MARTIN, M.E., Instructor in Mechanical Engineering
1475 Cleveland Ave., St. Paul
GEORGE C. PRIESTER, B.E., Instructor in Mathematics 814 Fulton St. S. E.
EDWARD QUIGLEY, Instructor in Forge Work 2923 Chicago Ave.
WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Work
1423 W. 27th St.
BERT A. ROSE, Instructor of Cadet Band 710 7th St. S. E.
WOLDEMAR M. STERNBERG, B.S. Chem. Eng., Instructor in Chemistry
3345 University Ave. S. E.
HUBERT M. TURNER, M.S., Instructor in Electrical Engineering
719 Erie St. S. E.
HOWARD T. VIETS, M.A., Instructor in Rhetoric
401 University Ave. S. E.
LEWIS B. WALTON, B.S. in Arch., Instructor in Architecture
436 Harvard St. S. E.
HARRY W. DIXON, Engineer, Assistant in Power Plant Operation
1800 4th St. S. E.
MAURICE B. LAGAARD, Assistant in Experimental Engineering
3302 19th Ave. S.

SPECIAL LECTURERS IN ELECTRICAL ENGINEERING

R. A. LUNDQUIST, Consulting Engineer
"Preliminary Engineering and Materials of Construction for Transmission Lines"
"Methods of Construction of Transmission Lines"
FRED DUSTIN, Former Electrical Inspector, City of Minneapolis
"Practical Operation of the Rules for Safe Electrical Construction"
J. W. DIETZ, Western Electric Company of Chicago
"The Development of the Telephone Industry"

GENERAL INFORMATION

THE PURPOSES OF THE COLLEGE

The College of Engineering and the Mechanic Arts was founded in accordance with the laws of the State of Minnesota and of the Federal Government, its object being "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It offers courses of study, of five years each, in Civil, Mechanical, and Electrical Engineering, and Architecture, leading to the degrees of Civil, Mechanical, Electrical Engineer, and Architect. The degrees of Bachelor of Science in Engineering and Bachelor of Science in Architecture are conferred at the end of the fourth year. This college also offers work in the Graduate School leading to the degree of Master of Science.

ENGINEERING AS A BUSINESS COURSE

The four-year course in General Engineering, leading to the Bachelor's degree in Engineering, is an excellent preparation for a business career. The course deals with Mathematics, Mechanics, and Physics, includes work in Rhetoric and Economics, and contains those elements which will serve well the purposes of young men who are to engage in manufacturing or mercantile pursuits. The training leads to close, hard, accurate thinking. It is well known that many engineers work into high administrative positions in manufacture and commerce.

EXTENSION WORK

Extension Courses are offered in Architecture and Engineering. For definite information regarding Extension Work attention is directed to the Bulletin of the General Extension Division of the University.

ENTRANCE REQUIREMENTS

The entrance requirements of the College of Engineering are given in detail beginning page 10 of this Bulletin.

UNCLASSED STUDENTS

In exceptional cases applicants are admitted to the college to pursue, under the direction of the Faculty, one or two lines of study, selected from some regular course. Such students must be of mature years, and shall give satisfactory evidence of ability to do with credit the work applied for. Admission to the college of students of this class requires in each specific case a vote of the Faculty.

ADVANCED STANDING

Students who have pursued courses of study in other colleges of recognized standing may receive advanced credit under the rules of the University and of the college.

CREDIT HOUR

A *credit hour* refers to a unit of time as part of a week's work. One credit hour means three actual hours of work each week. If a one credit hour subject is presented in a recitation period, it is assumed that the student will give two hours to the preparation of this hour of class room work. Where the subject is given in laboratory, shop or drafting room, the time spent by the student in class is three actual hours for each credit hour.

A *semester credit hour* is one credit hour a week extending through a semester.

A *year credit hour* is one credit hour a week extending through the college year.

FEES AND EXPENSES

The annual fee for students in this college is fifty dollars. See Bulletin of General Information, page 37, for details. For statements of the cost of living, see page 40.

SCHOLARSHIPS AND PRIZES

For scholarships and prizes in this college, see page 42 of the Bulletin of General Information.

THESES

Every candidate for the degree of Engineer or Architect is required to prepare a thesis on some subject particularly relating to his course. The thesis must embody the result of some research made by him, a special design, or an original report upon some engineering or architectural problem. It must be creditable from a literary, as well as from a technical, point of view.

The subject of the thesis and the character of the work to be done will be suggested in a large measure by the course of study pursued by the student. Great emphasis is laid upon the careful and accurate preparation of a thesis, because, more than any other work the student does, this certifies to his ability to undertake the difficult and responsible duties involved in the direction of engineering, architectural, and industrial interests.

CHANGES IN BULLETIN

The Faculty of the College of Engineering reserves the right to cancel or change without notice, any course printed in this Bulletin. The Bulletin is a statement of present conditions, and is subject to modification in any particular by faculty action.

ENTRANCE REQUIREMENTS

1. English .....Three units
2. Mathematics .....Three units
3. Chemistry .....One unit
4. Enough additional work to make in all fifteen units, of which not more than three may be in Group F.

Substitutions in the list of subjects to the extent of one unit may be authorized by the Enrollment Committee. Applicants who are allowed to substitute for chemistry must take General Chemistry, and the resulting deficiency must be made up in the Summer School. Applicants who are allowed to substitute for mathematics may be required to take the course Mathematics 69-70. Unless a candidate offers two units from Group B he may be required to take language in course. Students looking forward to the study of Architecture will find it to their advantage to take freehand drawing in the high school, to elect French as a language, and to cover the field of general history as far as possible.

LIST OF ENTRANCE SUBJECTS

Only those subjects included in the following groups may be counted toward admission.

The term *unit* means not less than five recitations of forty minutes each per week for a period of thirty-six weeks. In manual subjects and kindred courses, it means the equivalent of ten recitation periods per week for thirty-six weeks.

GROUP A. ENGLISH, three or four units.

GROUP B. LANGUAGES: Latin, Greek, German, French, Spanish, Scandinavian, one to four units each.

GROUP C. HISTORY AND SOCIAL SCIENCES: Ancient and Modern History, one unit each; English and Senior American History, one-half unit each; American Government, Economics, Economic History of England, and Economic History of the United States, one-half unit each; Commercial Geography, and History of Commerce, one-half or one unit each.

GROUP D. MATHEMATICS: Elementary Algebra and Plane Geometry, one unit each; Higher Algebra, Solid Geometry, and Trigonometry, one-half unit each.

GROUP E. NATURAL SCIENCES: Physics and Chemistry, one unit each; Botany and Zoology, one-half or one unit each; Physiology, Astronomy, Geology, and Physiography, one-half unit each.

GROUP F. VOCATIONAL SUBJECTS: Business Law and Business Arithmetic, one-half unit each; Elementary and Advanced Bookkeeping, one unit each; Stenography and Typewriting, one or two units. Freehand Drawing, Mechanical Drawing, and Shopwork, one or two units each. Agriculture, one to four units. Normal Training subjects, one to three units, provided the applicant has had one year of subsequent teaching experience.

DEFICIENCIES

Students found deficient in Algebra at the end of the first four weeks are separated from the regular freshman mathematics class and given a special course in Algebra, Trigonometry and Analytics, extending throughout the year, and equivalent to the first semester freshman mathematics.

Students entering with substitution for Solid Geometry are required to make up this subject before the beginning of the second semester. Students who are deficient in Solid Geometry or who have failed in Mathmatics 69 or both are required to remove such deficiency and failure before entering any work of the sophomore year. Solid Geometry and Higher Algebra are given in the Summer School.

COURSES OF STUDY

CIVIL, MECHANICAL, ELECTRICAL AND GENERAL ENGINEERING

The freshman year is the same for all Engineering and General or Business Courses. The freshman year for Architecture is given on page 22.

FRESHMAN YEAR

First Semester

Mathematics 71a, Algebra and Trigonometry, 5
Drawing 1, 3, Engineering Drawing and Descriptive Geometry, 3
Rhetoric 3, Rhetoric and Composition, 3
Chemistry 25, Chemistry for Engineers, 3
Mechanical Engineering 1, Elementary Shop Practice, 2
Technology, 1
Military Drill, 1

Second Semester

Mathematics 72, Analytical Geometry, 5
Drawing 2, 4, Engineering Drawing and Descriptive Geometry, 3
Rhetoric 4, Rhetoric and Composition, 3
Chemistry 26, Chemistry for Engineers, 3
Mechanical Engineering 2, Elementary Shop Practice, 2
Technology, 1
Military Drill, 1

All students pursuing the above courses register for Engineering Mathematics 71a in the first semester. At the end of two weeks' trial those who, by reason of inadequate preparation or undeveloped mathematical insight, are judged unable to carry the work successfully, are re-registered in Engineering Mathematics 69-70, in which the intensive work of Engineering Mathematics 71a is expanded into a course covering the full year. The resulting deficiency in Engineering Mathematics 72 must be made up in the Summer School.

CIVIL ENGINEERING

SOPHOMORE YEAR

First Semester

Engineering Mathematics 73a, Differential Calculus, 5
Physics 7, Solids, Fluids, Sound, Heat, 4
Physics 9, Laboratory, 1
Drawing 5, Drafting, 2
Civil Engineering 1, Surveying, 3
Approved Electives, 3
Military Drill, 1

Second Semester

Engineering Mathematics 74, Integral Calculus, 5
Physics 8, Light, Electricity and Magnetism, 4
Physics 10, Laboratory, 1
Drawing 6, Drafting, 2
Civil Engineering 2, Surveying, 3
Approved Electives, 3
Military Drill, 1

JUNIOR YEAR

First Semester

Engineering Mathematics 75, Technical Mechanics, Statics, 3
Engineering Mathematics 151, Mechanics of Materials, 3
Experimental Engineering 101, Materials, 2
Civil Engineering 151-152, Theory of Structures, 3
Civil Engineering 101, Highways and Pavements, 2
Civil Engineering 3, Surveying, 2
Approved Electives, 3*

Second Semester

Engineering Mathematics 76, Technical Mechanics, Dynamics, 3
Engineering Mathematics 152, Hydraulics, 3
Experimental Engineering 102, Hydraulics and Steam, 2
Civil Engineering 151-152, Theory of Structures, 2
Civil Engineering 102, Municipal Engineering, 3
Civil Engineering 3, Surveying, 2
Approved Electives, 3
Civil Engineering 6, Summer Camp in Surveying, 4†

*For the junior class of the College Year 1915-16 the subject Physics 13, Electrokinetics, will be substituted for the first semester elective.

†Summer Camp in Surveying is held during the vacation period following the junior year, and is in session five weeks.

CIVIL ENGINEERING

SENIOR YEAR

First Semester

Civil Engineering 121, Hydrology, 3
Civil Engineering 105, Sanitary Engineering, 3
Civil Engineering 111, Railway Engineering, 3
Civil Engineering 53, Theory of Structures, 3
Civil Engineering 157, Reinforced Concrete, 3
Approved Elective, 3

Second Semester

Civil Engineering 122, Water Power, 3
Civil Engineering 104, Water Supply, 3
Electrical Engineering 152, Electric Power, 3
Civil Engineering 54, Theory of Structures, 3
Approved Technical Elective, 3
Approved Elective, 3

POST-SENIOR YEAR

Both Semesters Same

Thesis required, and additional work each semester to aggregate eighteen credit hours. The electives of the post-senior year must be selected in advance in an approved logical order of grouping which will develop intensively the specialized fields of Engineering studied. The thesis also should bear on the general field covered by the electives, and extends through the year.

SENIOR YEAR, 1915-16

First Semester

Engineering Mathematics 151, Mechanics of Materials, 3
Civil Engineering 151, Stresses, 3
Civil Engineering 111, Railways, 3
Civil Engineering 153, Structural Design, 3
Civil Engineering 121, Hydrology, 3
Political Science 25, American Government, 2
Experimental Engineering 101, Materials Testing, 2

Second Semester

Engineering Mathematics 152, Hydraulics, 3
Civil Engineering 152, Stresses, 3
Civil Engineering 112, Railways, 3
Civil Engineering 104, Water Supply, 3
Civil Engineering 122, Water Power, 3
Experimental Engineering 122, Hydraulics, 3
Political Science 26, Commercial Law, 2

POST-SENIOR YEAR, 1915-16

First Semester

Civil Engineering 155, Structural Design, 3
Civil Engineering 157, Reinforced Concrete, 3
Electrical Engineering 155, Electric Power, 3
Thesis, 5
Approved Electives, 6

Second Semester

Civil Engineering 106, Sanitary Engineering, 3
Civil Engineering, Thesis, 5
Approved Electives, 10

The electives of the post-senior year must be selected in advance in an approved logical order of grouping which will develop intensively the specialized fields of Engineering studied. The thesis also should bear on the general field covered by the electives, and extends through the year.

MECHANICAL ENGINEERING

For freshman year, see page 12

SOPHOMORE YEAR

First Semester

Engineering Mathematics 73a, Differential Calculus, 5
Physics 7, Solids, Fluids, Sound, Heat, 4
Physics 9, Laboratory, 1
Drawing 7, Drafting, 2
Mechanical Engineering 19, Gas Engines, 3
Mechanical Engineering 3, Shop, 3
Military Drill, 1

Second Semester

Engineering Mathematics 74, Integral Calculus, 5
Physics 8, Light, Electricity and Magnetism, 4
Physics 10, Laboratory, 1
Drawing 8, Drafting, 2
Chemistry 38, Fuel and Gas Analysis, 3
Mechanical Engineering 4, Shop, 3
Military Drill, 1
Mechanical Engineering 5, Summer Advanced Shop Practice, 4†

†The Summer Course in Advanced Shop Practice is held during the vacation period following the sophomore year, and is in session for five weeks.

JUNIOR YEAR

First Semester

Engineering Mathematics 75, Technical Mechanics, Statics, 3
Engineering Mathematics 151, Mechanics of Materials, 3
Experimental Engineering 101, Materials, 2
Mechanical Engineering 15, Mechanism and Kinematics, 4
Approved Technical Elective*, 3
Approved Elective, 3

Second Semester

Engineering Mathematics 76, Technical Mechanics, Dynamics, 3
Engineering Mathematics 152, Hydraulics, 3
Experimental Engineering 102, Hydraulics and Steam, 2
Civil Engineering 52, Theory of Structures, 3
Mechanical Engineering 130, Steam Engines and Boilers, 4
Approved Elective*, 3

SENIOR YEAR

First Semester

Mathematics and Mechanics 153, Thermodynamics, 3
Experimental Engineering 103, Steam and Power, 4
Electrical Engineering 157, Electric Power, 3
Mechanical Engineering 117, Machine Design, 3
Metallurgy 157, Metallography, 2
Approved Elective, 3

Second Semester

Mathematics and Mechanics 154, Turbines, 3
Experimental Engineering 104, Power and Gas Engines, 3
Electrical Engineering 158, Electric Power, 3
Mechanical Engineering 118, Machine Design, 3
Civil Engineering 158, Reinforced Concrete, 2
Mechanical Engineering 138, Specifications, 1
Approved Elective, 3

POST-SENIOR YEAR

Thesis required and additional work each semester to aggregate eighteen credit hours.

The electives of the post-senior year must be selected in advance in an approved logical order of grouping which will develop intensively the specialized fields of Engineering studied. The thesis also should bear on the general field covered by the electives, and extends through the year.

*For the junior class of the College Year 1915-16 the subject Physics 13, Electrokinetics, will be substituted for the first semester elective; Mechanism and Kinematics will be administered as a three hour course; and two hour courses in Gas Engines and Autor mobiles, and in Advanced Machine Shop practice, will replace the technical electives In the second semester Fuel and Gas Analysis will be substituted for the elective.

SENIOR YEAR, 1915-16

First Semester

Engineering Mathematics 151, Mechanics of Materials, 3
Political Science 25, American Government, 2
Mechanical Engineering 115, Machine Design, 5
Mechanical Engineering 119, Steam Boilers, 1
Electrical Engineering 157, Electric Power, 3
Civil Engineering 149, Structures, 3
Experimental Engineering 101, Materials Testing, 2

Second Semester

Engineering Mathematics 152, Hydraulics, 3
Political Science 26, Commercial Law, 2
Mechanical Engineering 118, Machine Design, 3
Mechanical Engineering 122, Steam Engines, 3
Mechanical Engineering 124, Gas Engines and Producers, 2
Electrical Engineering 158, Electric Power, 3
Experimental Engineering 124, Hydraulics and Steam, 3

POST-SENIOR YEAR, 1915-16

First Semester

Engineering Mathematics 153, Thermodynamics, 3
Mechanical Engineering 131, Measurement of Power, 2
Mechanical Engineering 121 or 123, Steam Engine Design, 4
or
Mechanical Engineering 141, Railway Design, 4
Mechanical Engineering 133, Heating and Ventilating, 3
or
Mechanical Engineering 139, Railway Technology, 2
Experimental Engineering 127, Steam and Power, 3
Mechanical Engineering, Elective, 2
Approved Elective, 3
Thesis

Second Semester

Engineering Mathematics 154, Turbines, 3
or
Economics, Railway Administration, 3
Mechanical Engineering 138, Specifications, 1
Mechanical Engineering 126, Advanced Machine Design, 4
or
Mechanical Engineering 142, Railway Design, 4
Mechanical Engineering 132, Compressed Air, 2
or
Mechanical Engineering 144, Locomotive Construction, 2
Experimental Engineering 128, Gas Engines, 3
Thesis

ELECTRICAL ENGINEERING

For freshman year, see page 12.

SOPHOMORE YEAR

First Semester

Engineering Mathematics 73a, Differential Calculus, 5
Physics 7, Solids, Fluids, Sound, Heat, 4
Physics 9, Laboratory, 1
Drawing 7, Drafting, 2
Mechanical Engineering, Shop, 3
Electrical Engineering 51, Applied Electricity, 3
Military Drill, 1

Second Semester

Engineering Mathematics 74, Integral Calculus, 5
Physics 8, Light, Electricity and Magnetism, 4
Physics 10, Laboratory, 1
Drawing 8, Drafting, 2
Electrical Engineering 52, Applied Electricity, 3
Mechanical Engineering, Shop, 3
Military Drill, 1

JUNIOR YEAR

First Semester

Engineering Mathematics 75, Technical Mechanics, Statics, 3
Engineering Mathematics 151, Mechanics of Materials, 3
Experimental Engineering 101, Materials, 2
Electrical Engineering 101, Electrical Machinery, 3
Electrical Engineering 103, Electrical Laboratory, 2
Physics 161*, Electrical Measurements, 2
Approved Elective*, 3

Second Semester

Engineering Mathematics 76, Technical Mechanics, Dynamics, 3
Engineering Mathematics 152, Hydraulics, 3
Experimental Engineering 102, Hydraulics and Steam, 2
Electrical Engineering 102, Electrical Machinery, 3
Electrical Engineering 104, Electrical Laboratory, 2
Mechanical Engineering 16, Mechanism and Kinematics, 2
Approved Elective*, 3

*For the junior class of the college year 1915-16 the subject Physics 13, will be substituted for the first semester elective; Shop Work will be substituted for Physics 161; and Physics 162, Electrical Measurements will be substituted for the second semester elective.

SENIOR YEAR

First Semester

Electrical Engineering 105, Alternating Currents, 3
Electrical Engineering 201, Electrical Design, 2
Electrical Engineering 107, Electrical Laboratory, 2
Mechanical Engineering 117, Machine Design, 3
Mechanical Engineering 129, Steam Engine and Boilers, 2
Economics, Elements of Economics, 3
Approved Elective, 3

Second Semester

Electrical Engineering 106, Alternating Currents, 3
Electrical Engineering 202, Electrical Design, 2
Electrical Engineering 108, Electrical Laboratory, 2
Mechanical Engineering 118, Machine Design, 3
Experimental Engineering 106, Steam Engines and Boilers, 2
Economics, 3
Approved Elective, 3

POST-SENIOR YEAR

Thesis required and additional work each semester to aggregate eighteen credit hours.

The electives of the post-senior year must be selected in advance in an approved logical order of grouping which will develop intensively the specialized fields of Engineering studied. The thesis also should bear on the general field covered by the electives, and extends through the year.

SENIOR YEAR, 1915-16

First Semester

Engineering Mathematics 151, Mechanics of Materials, 3
Political Science 25, American Government, 2
Electrical Engineering 101, Electrical Machinery, 3
Electrical Engineering 103, Laboratory, 3
Experimental Engineering 101, Materials Testing, 2
Mechanical Engineering 115, Machine Design, 5
Mechanical Engineering 119, Steam Boilers, 1

Second Semester

Engineering Mathematics 152, Hydraulics, 3
Political Science 26, Commercial Law, 2
Civil Engineering 149b, Structures, 3
Mechanical Engineering 122, Steam Engine, 3
Electrical Engineering 102, Electrical Machinery, 3
Electrical Engineering 104, Laboratory, 3
Experimental Engineering 102, Hydraulics and Steam, 2

POST-SENIOR YEAR, 1915-16

First Semester

Electrical Engineering 105, Alternating Currents, 2
Engineering Mathematics 153, Thermodynamics, 3
Electrical Engineering, Elective, 2
Electrical Engineering 107, Laboratory, 3
Electrical Engineering 201, Design, 3
Experimental Engineering 105, Steam and Power, 2
Electrical Engineering 203, Thesis, 2
Approved Elective, 3

Second Semester

Electrical Engineering 106, Alternating Currents, 3
Electrical Engineering, Elective, 2
Electrical Engineering 108, Laboratory, 3
Electrical Engineering 202, Design, 3
Electrical Engineering 204, Thesis, 3
Approved Elective, 5

Students desiring to specialize in Electrochemistry may be permitted to make certain substitutions in the senior and post-senior years if approved by the Faculty.

GENERAL COURSE IN ENGINEERING

For freshman year, see page 12.

SOPHOMORE YEAR

First Semester

Engineering Mathematics 73a, Differential Calculus, 5
Physics 7, Solids, Fluids, Sound, Heat, 4
Physics 9, Laboratory, 1
Drawing 5 or 7, 2
Approved Technical Elective, 3
Approved Elective, 3
Military Drill, 1

Second Semester

Engineering Mathematics 74, 5
Physics 8, Light, Electricity and Magnetism, 4
Physics 10, Laboratory, 1
Drawing 6 or 8, 2
Approved Technical Elective, 3
Approved Elective, 3
Military Drill, 1

JUNIOR YEAR

First Semester

Engineering Mathematics 75, Technical Mechanics, Statics, 3
Engineering Mathematics 151, Mechanics of Materials, 3
Experimental Engineering 101, Materials, 2
Approved Technical Electives, 5
Approved Electives, 5

Second Semester

Engineering Mathematics 76, Technical Mechanics, Dynamics, 3
Engineering Mathematics 152, Hydraulics, 3
Experimental Engineering 102, Hydraulics, 2
Approved Technical Electives, 5
Approved Electives, 5

SENIOR YEAR

Each Semester

Approved Technical Electives, 9
Approved Electives, 9

Students pursuing the course in General Engineering are required at the end of the sophomore year to submit to the Dean of the College a list of proposed electives for the junior and senior years.

ARCHITECTURE

FRESHMAN YEAR

First Semester

Mathematics 71a, Algebra and Trigonometry, 5
Drawing 9, Graphics, 2
Rhetoric 3, Rhetoric and Composition, 3
French 1 or 3, 3
Architecture 21, Freehand Drawing, 2
Architecture 31, Elements of Architecture, 3
Military Drill, 1

Second Semester

Mathematics 72, Analytical Geometry, 5
Drawing 10, Graphics, 2
Rhetoric 4, Rhetoric and Composition, 3
French 2 or 4, 3
Architecture 22, Freehand Drawing, 2
Architecture 32, Elements of Architecture, 3
Military Drill, 1

All students pursuing the above courses register for Mathematics 71a in the first semester. At the end of two weeks trial those who by reason of inadequate preparation or undeveloped mathematical insight, are judged unable to successfully carry the work, are re-registered in Engineering Mathematics 69-70, in which the intensive work of Mathematics 71a is expanded into a course covering the full year. The resulting deficiency in Mathematics 72 must be made up in the Summer School.

SOPHOMORE YEAR

First Semester

Mathematics and Mechanics 91, Mechanics, 4
Physics 7, Solids, Fluids, Sound, Heat, 4
Architecture 23, Freehand Drawing, 2
Architecture 33, Elementary Design, 4
Architecture 43, Specifications and Working Drawings, 3
Military Drill, 1

Second Semester

Mathematics and Mechanics 92, Strength of Materials, 4
Physics 8, Light, Electricity and Magnetism, 4
Architecture 24, Freehand Drawing, 2
Architecture 34, Elementary Design, 4
Architecture 44, Specifications and Working Drawings, 3
Military Drill, 1

JUNIOR YEAR

First Semester

Architecture 15, Architectural History, Ancient, 2
Architecture 25, Freehand and Water-Color Drawing, 3
Architecture 35, Architectural Design, 6
Architecture 65, Theory of Architecture, 1
Civil Engineering 141, Graphical Statics, 3
Approved Electives, 3

Second Semester

Architecture 16, Architectural History, Renaissance, 2
Architecture 26, Freehand and Water-Color Drawing, 3
Architecture 36, Architectural Design, 6
Architecture 66, Theory of Architecture, 1
Civil Engineering 142, Structural Design, 3
Approved Electives, 3

SENIOR YEAR

First Semester

Architecture 17, Architectural History, Medieval, 2
Architecture 27, Life Drawing, 2
Architecture 57, Decorative Composition, 2
Architecture 37, Architectural Design, 8
Architecture 67, History of Sculpture and Painting, 2
Civil Engineering 21, Building Sanitation, 2

Second Semester

Architecture 18, Architectural History, Modern, 2
Architecture 28, Life Drawing, 2
Architecture 58, Decorative Composition, 2
Architecture 38, Architectural Design, 8
Architectural Practice, 2
Mechanical Engineering 134, Heating and Ventilation, 2

Work in the post-senior year will not be offered in 1915-16.

DEPARTMENTAL STATEMENTS*

ARCHITECTURE

Professors FREDERICK M. MANN; Assistant Professor ROY C. JONES; Instructors F. K. COWLEY, LEWIS B. WALTON; Special Lecturer JOHN O. CEDERBERG.

COURSES

No.	Title	Credits	Required of	Prereq. courses
15.	Architectural History	2	Jr. Arch.	31, 32
16.	Architectural History	2	Jr. Arch.	31, 32
17.	Architectural History	2	Sr. Arch.	15
18.	Architectural History	2	Sr. Arch.	16
21.	Elementary Freehand Drawing	2	Fr. Arch.	..
22.	Elementary Freehand Drawing	2	Fr. Arch.	21
23.	Freehand Drawing	2	Soph. Arch.	22
24.	Freehand Drawing	2	Soph. Arch.	23
25.	Freehand and Water-Color Drawing	3	Jr. Arch.	24
26.	Freehand and Water-Color Drawing	3	Jr. Arch.	25
27.	Life Drawing	2	Sr. Arch.	26
28.	Life Drawing	2	Sr. Arch.	27
31.	Elements of Architecture	3	Fr. Arch.	..
32.	Elements of Architecture	3	Fr. Arch.	31
33.	Architectural Design, Elementary.	4	Soph. Arch.	32
34.	Architectural Design, Elementary.	4	Soph. Arch.	33
35.	Architectural Design, Intermediate	6	Jr. Arch.	34
36.	Architectural Design, Intermediate	6	Jr. Arch.	35
37.	Architectural Design, Advanced	8	Sr. Arch.	36
38.	Architectural Design, Advanced	8	Sr. Arch.	37
43.	Specifications and Working Drawings	3	Soph. Arch.	31, 32
44.	Specifications and Working Drawings	3	Soph. Arch.	43
57.	Decorative Composition	2	Sr. Arch.	36
58.	Decorative Composition	2	Sr. Arch.	57
65.	Theory of Architecture	1	Jr. Arch.	34
66.	Theory of Architecture	1	Jr. Arch.	65
67.	History of Sculpture and Painting	2	Jr. Arch.	15, 16
68.	Architectural Practice	2	Sr. Arch.	Senior Standing

15. ARCHITECTURAL HISTORY. Technical study of the architecture of ancient countries particularly Greece and Rome. MANN.

16. ARCHITECTURAL HISTORY. Technical study of the architecture of the Renaissance period, mainly in Italy and France. MANN.

***In the statements of the curriculum which follow, the scheme numbering of the courses indicates the semester in which it is given. First semester courses have odd numbers, second semester courses even numbers. A figure following a specific subject indicates the number of credit hours of work required.**

17. ARCHITECTURAL HISTORY. Technical study of European architecture from the downfall of the Roman Empire to the beginning of the Renaissance. MANN.

18. ARCHITECTURAL HISTORY. Technical study of later Renaissance architecture in France and the modern movements in Europe and the United States. MANN.

21. ELEMENTARY FREEHAND DRAWING. Charcoal drawing from the cast, details of the figure, and architectural ornament. COWLEY.

22. ELEMENTARY FREEHAND DRAWING. A continuation of Course 21.

23. FREEHAND DRAWING. Continuation of Courses 21 and 22. COWLEY.

24. FREEHAND DRAWING. A continuation of Course 23.

25. FREEHAND AND WATER-COLOR DRAWING. Drawing and sketching in charcoal and pencil. Still-life studies in oil and water color. COWLEY.

26. FREEHAND AND WATER-COLOR DRAWING. A continuation of Course 25.

27. LIFE DRAWING. Drawing from life. Given at the Minneapolis Art Institute.

28. LIFE DRAWING. Continuation of the above.

31. ELEMENTS OF ARCHITECTURE. Introductory lectures on architecture. Practice with instruments, pen, pencil, and brush; architectural lettering; study of elementary forms; walls, doors, windows, mouldings. WALTON.

32. ELEMENTS OF ARCHITECTURE. Classic orders and simple composition of architectural fragments. Theory and practice of wash rendering. WALTON.

33. ARCHITECTURAL DESIGN. Rendered order problems and sketch problems involving elementary principles of composition. Library research in the elements of composition. JONES.

34. ARCHITECTURAL DESIGN. Order problems, sketch problems, simple elements of plan. Library research in elements of composition. JONES.

35. ARCHITECTURAL DESIGN. Original problems of intermediate grade in composition of plan, exterior and section. Rendered and sketch problems and library research. JONES.

36. ARCHITECTURAL DESIGN. Continuation of above.*

*By special arrangement for the year 1915-16 in coöperation with the Minnesota Chapter of the American Institute of Architects, each junior architect, who has had less than two years of practical office experience, will be assigned to practical work in an architect's office either in Minneapolis or St. Paul. This work will extend over not less than eighteen hours of each week during either the first or second semester and will take the place of one of the junior design courses, either Architecture 35, or Architecture 36, and will carry six semester credit hours.

37. ARCHITECTURAL DESIGN. Original problems of advanced grade. Rendered and sketch problems. JONES.

38. ARCHITECTURAL DESIGN. Continuation of the above. JONES.

43. SPECIFICATIONS AND WORKING DRAWINGS. Wood in construction; properties; details of floors, roofs, doors, windows, cornices; stairs, wainscoting, cupboards, and other interior finish. Office drawings. Design of frame house; plans and detailed working drawings. Sketches and reports from buildings under construction. CEDERBERG.

44. SPECIFICATIONS AND WORKING DRAWINGS: MASONRY CONSTRUCTION. Materials and their properties; details of masonry construction; the design of a simple masonry building with scale plans and elevations, sections, and detail working drawings. Reports from buildings under construction. CEDERBERG.

57. DECORATIVE COMPOSITION. Study of historic ornament, decorative and pictorial composition. JONES.

58. DECORATIVE COMPOSITION. Continuation of the above. JONES.

65. THEORY OF ARCHITECTURE. A study of the guiding principles of architectural expression. Program analysis. JONES.

66. THEORY OF ARCHITECTURE. Continuation of the above. JONES.

67. HISTORY OF SCULPTURE AND PAINTING. Historical study of ancient and modern sculpture and of the modern schools of painting.

68. ARCHITECTURAL PRACTICE. Relations of the architect, owner and builder; professional ethics, office administration, etc. MANN.

CHEMISTRY

Professors GEORGE B. FRANKFORTER, CHARLES F. SIDENER; Associate Professor EVERHART P. HARDING; Assistant Professor EDWARD E. NICHOLSON; Instructors FRANK W. BLISS, EARL PETTIJOHN, WOLDEMAR M. STERNBERG.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
23.	General Chem. and Qual. Analysis	5	Fr.	None
25.	Chemistry for Engineers.....	3	Fr.	One yr. prep. Gen. Chem.
26.	Chemistry for Engineers.....	3	Fr.	23 or 25
38.	Gas and Fuel Analysis.....	3	Soph., jr., sr., M. E.	26
109.	Water Analysis.....	3	Elective p. sr. C. E.	26

23. GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Designed for those who have had no high school chemistry, in preparation for Course 26. See statement under 25. FRANKFORTER, BLISS, and Assistants.

25. CHEMISTRY FOR ENGINEERS. An advanced course for engineers; general chemistry, with an introduction to analytical chemistry and chemical theories. FRANKFORTER, BLISS, and Assistants.

26. CHEMISTRY FOR ENGINEERS. A continuation of Course 25. FRANKFORTER, BLISS, and Assistants.

38. GAS AND FUEL ANALYSIS. Methods of sampling and analyzing the most important gases, liquid fuels, and coals; and methods for determining their calorific value for purposes of control work and for learning their heat efficiencies. Lectures and laboratory work. HARDING and Assistants.

109. WATER ANALYSIS. This course includes an exhaustive discussion of the chemical and sanitary properties of water. FRANKFORTER and Assistants.

CIVIL ENGINEERING

Professors FRANCIS C. SHENEHON, FREDERIC H. BASS; Associate Professors ADOLPH FREDERICK MEYER, JOHN I. PARCEL; Assistant Professors ALVIN S. CUTLER, FRANKLIN R. MCMILLAN, OTTO S. ZELNER; Instructor GEORGE A. MANEY.

COURSES

No.	Title	Credits	Required of	Prereq. courses
1.	Surveying	3	Soph. C. E.	..
2.	Surveying	3	Soph. C. E.	1
3.	Surveying	2	Jr. C. E.	2
4.	Surveying	2	Jr. C. E.	3
6.	Summer Camp	4	Jr. C. E.	4
10.	Surveying	1	Elective E. E. & M. E.	..
101.	Highways and Pavements	2	Jr. C. E.	3
102.	Municipal Engineering	3	Jr. C. E.	101
104.	Water Supply	3	Sr. C. E.	102
105-6.	Sanitary Engineering	3	P. sr. C. E.	102
21.	Buildinsg Sanitation	2 or 3	.....	..
107-8.	Geodey	3	Elective	4, 6
111.	Railway Engineering	3	Sr. C. E.	3
112.	Railway Engineering	3	Sr. C. E.	111
113.	Railway Engineering	3	Elective p. sr. C. E.	112
114.	Railway Engineering	3	Elective p. sr. C. E.	112
121.	Hydrology	3	Sr. C. E.	Eng. Math. 152
122.	Water Power	3	Sr. C. E.	121
123.	Hydraulic Design	3	Sr. C. E. Elective p. sr.	122
124.	Hydraulic Design	3	Elective p. sr.	123
126.	Hydrology and Water Power	3	Elective	Eng. Math. 152
132.	Rivers, Harbors and Canals	3	Elective p. sr.	..
51.	Theory of Structures, etc.	3	Jr. C. E.	With Eng. Math. 75
52.	Theory of Structures	3	Jr. C. E.	51
53.	Theory of Structures	3	Sr. C. E.	52
54.	Theory of Structures	3	Sr. C. E.	53

No.	Title	Credits	Required of	Prereq. courses
149a.	Structures	3	Sr. E. E. and M. E.	With Eng. Math. 151
149b.	Structures	3	Sr. E. E. and M. E.	Eng. Math. 151
151.	Stresses	3	Sr. C. E.	With Eng. Math. 151
152.	Stresses	3	Sr. C. E	Eng. Math. 151
153.	Structural Design	3	Sr. C. E.	With 151
155.	Structural Design	3	P. sr. C. E.	153
156.	Structural Design	3	Elective	155
157.	Reinforced Concrete	3	P. sr. (1915-16), sr. C. E.	151-2
158.	Reinforced Concrete	2	Sr. M. E.	..
159.	Indeterminate Structures	3	Elective	153
160.	Indeterminate Structures	3	Elective	159
201.	Indeterminate Structures	3	Elective	155
202.	Indeterminate Structures	3	Elective	201

1. SURVEYING. Field problems; use of chain, compass, transit and level. Computation and platting of all surveys made in the field. Determination of area—D.M.D.; and methods of platting. Surveys of the U.S. public lands. CUTLER, ZELNER.

2. SURVEYING. Lectures, drawing room and field work, including a study of topographic maps and signs; principles of the stadia, barometers; leveling, platting of profiles and grades. CUTLER, ZELNER.

3. SURVEYING. A complete topographical survey, stadia method, is made and platted. CUTLER, ZELNER.

4. SURVEYING. Elements of hydrographic, municipal and railroad surveying. Use of current meters, plane table, sextant, theodolite. Meridian by solar observations. Computing and staking railroad curves. Preparatory to the more advanced work carried on in Summer Camp. CUTLER, ZELNER.

6. SUMMER CAMP. Five weeks. Continuation of Course 4, including extended railroad, topographic, hydrographic, and triangulation surveys. CUTLER, ZELNER.

10. SURVEYING. A short course in the use, care, and adjustment of surveying instruments. ZELNER.

101. HIGHWAYS AND PAVEMENTS. Lectures, recitations, laboratory work, and field inspection, relating to the economics, location, construction, and maintenance of highways and pavements. BASS.

102. MUNICIPAL ENGINEERING. Development of municipal public works. City planning, transportation, and housing. The principles of public health and sanitation. Public water supplies, sewerage and sewage disposal, refuse collection and disposal, the sanitation of buildings. BASS.

103. WATER SUPPLY ENGINEERING. Sources of water supply; quality of

water. Laboratory methods of testing water; wells, surface water intakes, conduits and pipe lines, distribution systems, and purification plants. Selection of pumping machinery and motive power. BASS.

105-6. SANITARY ENGINEERING. Quantities of sewage and storm water; heavy precipitation and run off. Sanitary sewer system for a small community; storm water system for a city district. Stream pollution and sewage disposal. BASS.

21. BUILDING SANITATION. The location and orientation of buildings; lighting, ventilation, water supply, plumbing, sewage, and refuse disposal. BASS.

107-8. GEODESY. Methods of conducting a geodetic survey, lectures and assigned readings. ZELNER.

111. RAILWAY ENGINEERING. The mathematics of curves and earthwork; their application to location and construction; switches and crossovers; methods of computing earthwork and haul. Completion of maps and profiles of summer camp work, field and office work. CUTLER.

112. RAILWAY ENGINEERING. Design and construction of railroad buildings and structures; culverts, wooden trestles, switches, crossovers, crossing frogs. The student is familiarized with the principal structures coming under the supervision of the maintenance-of-way department of a modern railroad. CUTLER.

113. RAILWAY ENGINEERING. Train resistance, ruling and momentum grades, curvature, distance, rise and fall, as factors in location and operation of railroads. Train loading, acceleration, retardation; locomotives and equipment. Operating costs governing grade revision. CUTLER.

114. RAILWAY ENGINEERING. Lectures, office work and field inspection. Design and operations of various types of yards and terminals, and terminal facilities, including the hump, engine house, coal and water station. Signalling and interlocking. CUTLER.

121. HYDROLOGY. Rainfall, evaporation, transpiration, percolation, runoff, Flood and low water flows of streams. Storage for use in water supply, water power, irrigation, and navigation. Mass curves and frequency curves. MEYER.

122. WATER POWER. Types of low, medium, and high head developments. Details of developments, spillway dams; hollow reinforced concrete dams, arch dams, high masonry dams; movable crests. Turbine settings and characteristics. MEYER.

123. HYDRAULIC DESIGN. Detailed design of hollow reinforced concrete, arch and high masonry dams. Design of power house from forebay to tailrace for typical developments. Pipe lines, reservoirs, surge tanks. MEYER.

124. HYDRAULIC DESIGN. Study of special hydraulic problems in laboratory, drafting room, and field. MEYER.

126. ELEMENTS OF HYDROLOGY AND WATER POWER DEVELOPMENT. A course of lectures, designed primarily for Electrical and Mechanical Engineers, covering the same field as Courses 121 and 122. MEYER.

132. RIVERS, HARBORS AND CANALS. Applications of Hydraulics and Hydrography to problems of navigable streams and waterways. Precise stream measurement. Characteristics of great bodies of water. Submarine excavation; canal prisms, revetments, ship-locks, docks, breakwaters. Maintenance of regimen. SHENEHON.

51. THEORY OF STRUCTURES. Fundamentals of structural mechanics; elements of design. Theory of beams; analysis of frames, the framed bent, bridge and roof trusses. Theory of tension and compression members, riveted joints, and the plate girder. PARCEL.

52. THEORY OF STRUCTURES. Continuation of Course 51. PARCEL.

53. THEORY OF STRUCTURES. Bridges, roofs, and buildings. Pratt, Baltimore and Petit trusses under moving uniform loads and wheel loads. Analysis of mill building bents, viaduct towers and office buildings. Problems in design. MANEY.

54. THEORY OF STRUCTURES. Continuation of Course 53. MANEY.

149a. STRUCTURES. Stress computation, proportioning of sections and detail design for students in mechanical and electrical engineering. Algebraic and graphic analysis of roof trusses, cranes, and framed bent. Detail designs of roof trusses and plate girders. MANEY.

149b. STRUCTURES. Repetition of Course 149a. MANEY.

151. STRESSES. Analysis of framed structures and girders by graphic and algebraic methods. Reactions and stresses in bridge and roof trusses under fixed loads; analysis for moving loads including the method of the influence line. MANEY.

152. STRESSES. Continuation of Course 151. Analysis of stresses in railroad bridge trusses under engine loading. Special structures; viaduct towers, mill building bents, steel framework for office building. MANEY.

153. STRUCTURAL DESIGN. Fundamental principles of design. Proportioning of parts; beams, tension and compression members, riveted joints. Some time is given to a study of the detail design of the plate girder and of a typical roof truss. MANEY.

155. STRUCTURAL DESIGN. The complete detail design of a pin-connected steel railway bridge truss, with a study of specifications, office designing methods. PARCEL.

156. STRUCTURAL DESIGN. A study of some of the more important features in the design of cantilever and arch bridges, large steel frame buildings. PARCEL.

157. REINFORCED CONCRETE. Theory and design of reinforced concrete beams, slabs, and columns; application of reinforced concrete to buildings, dams, retaining walls, and arches. Lectures, problems, and design. McMILLAN.

158. REINFORCED CONCRETE. A short course embracing the principal features of Course 157.

159. INDETERMINATE STRUCTURES. An elementary study of the theory of deflection and the general method of attack in the analysis of indeterminate frames. The theory is supplemented by numerous problems. PARCEL.

160. INDETERMINATE STRUCTURES. A continuation of 159, with especial attention to the application of the general methods of analysis to the continuous girder, the swing bridge and the arch. PARCEL.

201. THEORY OF STATICALLY INDETERMINATE STRUCTURES. A detailed critical study of the fundemental theory and a comparison of the different methods of attack. PARCEL, MANEY.

202. STATICALLY INDETERMINATE STRUCTURES. Arches, suspension bridges, secondary stresses, and certain special problems in indeterminate frames. PARCEL, MANEY.

DRAWING AND DESCRIPTIVE GEOMETRY

Professor WILLIAM H. KIRCHNER; Assistant Professor FRANK B. ROWLEY, OTTO S. ZELNER; Instructors ROBERT W. FRENCH, LYALL DECKER.

COURSES

No.	Title	Credits	Required of	Prereq. courses
1-2.	Engineering Drawing	3	Fr.	See statement
3-4.	Descriptive Geometry	3	Fr.	See statemeht
5.	Drafting	2	Soph. C. E.	1-2, 3-4
6.	Drafting	2	Soph. C. E.	5
7.	Drafting	2	Soph. M. E. & E. E.	1-2, 3-4
8.	Drafting	2	Soph. M. E. & E. E.	7
9.	Graphics	2	Fr. Arch.	See statement
10.	Graphics	2	Fr. Arch.	See statement
11.	Lettering	1	Elective.	

1-2. ENGINEERING DRAWING. The elements of drafting. Drawing as a language. Lines, views, sections, dimensions, standards, signs, abbreviations, and explanatory notes. Sketching, lettering, tracing, and blue printing. Details of machines and structures; interpretation of working drawings. FRENCH, DECKER, and Assistants.

3. DESCRIPTIVE GEOMETRY. Introductive course in descriptive geometry. Systems of representation, methods, loci, and constructive geometry.

Recitations and drawing room exercises. Taken concurrently with Course 1. Open to students in Mathematics 71, or equivalent. KIRCHNER, ROWLEY, and Assistants.

4. DESCRIPTIVE GEOMETRY. Central projection and special cases. Representations of lines, planes, and solids, and of their relations; tangencies, intersections and development. Recitations, lectures, and the solution of problems. Taken concurrently with Course 2. Open to students who have had Solid Geometry. KIRCHNER, ROWLEY, and Assistants.

5. DRAFTING. General problems. Application of descriptive geometry. Structural drawing, details, assembly drawings, bills of material. Drafting room methods and systems. FRENCH, DECKER, and Assistants.

6. DRAFTING. A continuation of Course 5. FRENCH, DECKER, and Assistants.

7. DRAFTING. Graphics. Working drawings of machinery. Assembly drawings, outline drawings, diagrammatic drawings, layout drawings, and detail drawings. Instruction in drafting room methods and systems. ROWLEY and Assistants.

8. DRAFTING. A continuation of Course 7. ROWLEY and Assistants.

9. GRAPHICS. Lectures and exercises in constructive and descriptive geometry with applications. Shades and shadows. Perspective. KIRCHNER.

10. GRAPHICS. A continuation of Course 9. KIRCHNER.

11. LETTERING. A course in freehand lettering. ZELNER.

ECONOMICS

Professors JOHN H. GRAY, E. DANA DURAND; Assistant Professors ROY G. BLAKEY, J. FRANKLIN EBERSOLE, THOMAS W. MITCHELL; Instructors LLOYD M. CROSGRAVE, H. G. HAYES, A. C. JAMES, ROBERT J. MCFALL.

COURSES

No.	Title	Credits	Required of	Prereq. courses
3a.	Elements of Economics	3	Elective	None
3b.	Elements of Economics	3	Elective	None
34.	Business Organization	3	Elective	3
35-36.	Accounting Principles	6†	Elective	None
131.	Cost Accounting	3	Elective	3, 35-36
73.	Railway Problems	3	Elective	3 credits inc. 3

†Both semesters must be completed before credit is given for the first semester.

3a. ELEMENTS OF ECONOMICS. Elements of economic theory, with special reference to present-day economic and social problems. Marshall,

Wright and Field's *Materials* and a textbook, supplemented by lectures. CROSGRAVE, HAYES, JAMES and Assistants.

3b. ELEMENTS OF ECONOMICS. Repetition of Course 3a.

34. BUSINESS ORGANIZATION. The principles of efficiency in business operation and forms of organization to apply them, the typical departments of a business: their functions, office organization and administration. Textbook, assigned readings, and lectures. MITCHELL.

35-36. PRINCIPLES OF ACCOUNTING. Purposes of accounts; principles of account classification; capital and revenue; accruals; principles of valuation; depreciation; preparation and interpretation of balance sheets, income accounts and other business statements; corporation accounts. A laboratory course with supplementary lectures. MITCHELL.

131. COST ACCOUNTING. Elements and classification of production cost; methods of recording materials, labor and machine costs and apportioning indirect expenses; relation of cost to general accounts; use of cost data to enforce efficiency of operation. MITCHELL.

73. RAILWAY PROBLEMS. Methods of railway organization and operation; statistics of operation and finance; economic principles of rate making and of government regulation; railroad discriminations; competition, pooling, and combinations. Foreign railways. Lectures, assigned readings, and special topics. MCFALL.

ELECTRICAL ENGINEERING

Professors GEORGE D. SHEPARDSON, FRANK W. SPRINGER; Assistant Professor WILLIAM T. RYAN; Instructor HUBERT M. TURNER.

COURSES

No.	Title	Credits	Required of	Prereq. courses
152.	Electric Lighting	1	Elective Arch.	Physics 1-4
155.	Electric Power	3	Sr.	Physics 12-13
157.	Electric Power	3	Sr. M. E.	Physics 12-13
158.	Electric Power	3	Sr. M. E.	Physics 12-13
51.	Applied Electricity	3	Soph. E. E.	Physics 12-13
52.	Applied Electricity	3	Soph. E. E.	Physics 12-13
101.	Electric Machinery	3	Jr. E. E.	Physics 12-13
102.	Electric Machinery	3	Jr. E. E.	Physics 12-13
103.	Electric Laboratory	2	Jr. E. E.	Physics 12-13
104.	Electric Laboratory	2	Jr. E. E.	Physics 12-13
105.	Alternating Currents	2	P. sr. E. E.	101-104
106.	Alternating Currents	3	P. sr. E. E.	101-104
107.	Electric Laboratory	3	P. sr. E. E.	101-104
108.	Electric Laboratory	3	P. sr. E. E.	101-104
109a.	Power Plant Operation	1	Elective p. sr.	101-104
109b.	Power Plant Operation	1	Elective p. sr.	101-104
111.	Electric Lighting	2	Elective p. sr.	102 or 158
113.	Electric Railways	2	Elective p. sr.	105, 155 or 158
114.	Electric Railways	2	Elective p. sr.	105, 155 or 158

No.	Title	Credits	Required of	Prereq. courses
115.	Journal Reading	1	Elective p. sr.	105
116.	Journal Reading	1	Elective p. sr.	105
201.	Electrical Design	3	P. sr. E. E.	105-106
202.	Electrical Design	3	P. sr. E. E.	105-106
203.	Thesis	2	P. sr. E. E.	105-106
204.	Thesis	3	P. sr. E. E.	105-106
205.	Central Stations	2	Elective p. sr.	105 or 158
206.	Electric Transmission	2	Elertive p. sr.	106 or 158
208.	Batteries and Elec. Vehicles	1	Elective p. sr.	102 or 158
210.	Elect. Equipment of Bldgs	1	Elective p. sr.	106 or 158
211.	Transient-Time Elect. Phenomena	2	Elective p. sr.	106
214.	Transient-Space Elect. Phenomena	2	Elective p. sr.	106
215.	Radio-Signalling Apparatus	2	Elective p. sr.	106
218.	Radio Transmission	3	Elective p. sr.	106
219.	Telegraph and Telephone Apparatus	2	Elective p. sr.	106
220.	Telegraph and Telephone Circuits	2	Elective p. sr.	106
221.	Precise Elect. Measurements	1	Elective p. sr.	108
222.	Precise Elect. Measurements	1	Elective p. sr.	108
223.	Electrochemical Engineering	2	Elective p. sr.	106 or 158
226.	Illuminating Engineering	2	Elective p. sr.	111
228.	Steam Railroad Electrification	2	Elective p. sr.	114
229.	Laboratory Special Problems	2	Elective p. sr.	108
230.	Laboratory Special Problems	2	Elective p. sr.	108
232.	Design Special Problems	2	Elective p. sr.	202
234.	Valuation of Elect. Properties	1	Elective p. sr.	205

152. ELECTRIC LIGHTING. Comparison of different sources of light, elements of measurement of light, distribution of light, choice of reflectors, elements of calculation of illumination. RYAN.

155. ELECTRIC POWER. Elements of theory and practice of electrical measurements, wiring, dynamos, motors, and electric lighting. Lectures and laboratory. RYAN.

157. ELECTRIC POWER. An elementary study of the problems involved in the generation, distribution, measurement, and utilization of electric power. Lectures, recitations, and laboratory work, supplemented by numerous problems. RYAN.

158. ELECTRIC POWER. A continuation of Course 157. RYAN.

51. APPLIED ELECTRICITY. Discovery of electrical phenomena. Wire tables, methods and calculation of wiring; National Electrical Code. Laboratory practice in making and insulating joints; names and relation of parts of electrical machinery and instruments; forces and power of dynamo electric machines. SHEPARDSON, SPRINGER, TURNER.

52. APPLIED ELECTRICITY. A continuation of Course 51. SHEPARDSON, SPRINGER, TURNER.

101. ELECTRICAL MACHINERY. Electrical engineering measuring instruments and their use, units, theory of dynamo-electric machinery, methods of regulation, construction and operation of generators and motors, methods of testing. SPRINGER.

102. ELECTRICAL MACHINERY. A continuation of Course 101. SPRINGER.

103. ELECTRICAL LABORATORY. To be taken with Course 101-102. Electrical engineering measurements, calibration of instruments, operation and characteristic curves of generator and motor. Lectures and practice. SPRINGER, TURNER.

104. ELECTRICAL LABORATORY. A continuation of Course 103. SPRINGER, TURNER.

105. ALTERNATING CURRENTS. Phenomena, measurement, and use of alternating currents, theory of line, transformer, generator and motor, types of apparatus. SHEPARDSON.

106. ALTERNATING CURRENTS. A continuation of Course 105. SHEPARDSON.

107. ELECTRICAL LABORATORY. To be taken with Course 105-106. Experimental study of alternating currents, regulation and efficiency tests of alternators, transformers, motors, and rotaries. SPRINGER, TURNER.

108. ELECTRICAL LABORATORY. A continuation of Course 107. SPRINGER, TURNER.

109a. POWER PLANT OPERATION. Practice in operation and care of gas producer, gas engine, boilers, engines, turbine, dynamos, battery, switch-boards, and auxiliary apparatus of the University Lighting Plant. RYAN, MARTENIS, DIXON.

109b. POWER PLANT OPERATION. Repetition of Course 109a. RYAN, MARTENIS, DIXON.

111. ELECTRIC LIGHTING. Principles of vision, photometers and measurement of light, methods and calculations of illumination, various sources of light, development of electric illuminants, distribution systems. Lectures, problems, and laboratory practice. SHEPARDSON.

113. RAILWAY ELECTRICAL ENGINEERING. History, economics, and application of electric power to railways, principles of mechanics applied to train movement, electric locomotives and motor cars, generation, transmission, and conversion of electric power, and application to railway motors.

114. RAILWAY ELECTRICAL ENGINEERING. Lectures and technical reports on the physical advantages of electric traction for train service, economies of electrification, choice and cost of equipment, physical valuations of electric roads, operating data, study of financial results.

115. JOURNAL READING. Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of American Institute of Electrical Engineers. SHEPARDSON.

116. JOURNAL READING. A continuation of Course 115. SHEPARDSON.

201. Electrical Design. The design of direct current generators and motors, and alternating current transformers, complete working drawings and specifications to accompany each design. Ryan.

202. Electrical Design. The design of alternating current generators and motors and switch-boards. Ryan.

203. Thesis. An investigation of some approved problem in electrical engineering. Shepardson, Springer, Ryan, Turner.

204. Thesis. A continuation of Course 203.

205. Central Stations. Design, construction and operation of electric power generating stations; choice of electrical systems, load diagrams; selection of prime movers and units; storage batteries; cost of electrical energy; methods of charging; maintenance of plants, emergencies. Ryan.

206. Electrical Transmission. Considerations involved in the selection of conductors in actual practice, Kelvin's law and its limitations, the transmission line as a mechanical structure, lightning arresters, study of particular high-tension lines. Ryan.

208. Batteries and Electric Vehicles. Theory of the storage battery as used in electric trucks and automobiles; electric automobile equipment; electrical accessories for gasoline automobiles; charging devices, such as mercury arc and vibrating rectifiers and special synchronous converters. Ryan.

210. Electrical Equipment of Buildings. Lectures on electrical equipment of modern office and factory buildings. Detailed study of plans and specifications. Inspection and reports on jobs under construction, and after completion. Special lecturers.

211. Transient-Time Electric Phenomena. A study of the transient phenomena accompanying a change of circuit conditions, with their differential equations. Abnormal currents, voltages, and frequencies produced by starting currents of transformers, short circuits of alternators, switching, and arcing grounds. Shepardson, Turner.

214. Transient-Space Electric Phenomena. Continuation of Course 211. Distributed capacity and inductance, distribution of current in conductors, flux in iron, standing waves, traveling waves, free oscillation, phenomena at transition points of complex circuits, power and energy of complex circuits. Shepardson, Turner.

215. Radio-Signalling Apparatus. Maxwell's electromagnetic theory, experimental work of Hertz, phenomena of electric oscillations in simple and coupled circuits, production of electromagnetic waves and their propagation through space, detectors, measuring instruments. Turner.

218. Radio Transmission. Syntony of transmitting and receiving stations, persistent and non-persistent oscillators, wave distortion, interference, absorption by obstacles, effect of curvature of the earth, attenuation of waves with distance, limiting factors in wireless transmission, types of antenna. Turner.

219. Telegraph and Telephone Apparatus. Theoretical and experimental study of apparatus used for signalling, telegraphy and telephony. Lectures and laboratory. Shepardson.

220. Telegraph and Telephone Circuits. Theoretical and experimental study of telephone circuits and the phenomena of telephonic transmission, applications of hyperbolic functions to line phenomena. Shepardson.

221. Precise Electrical Engineering Measurements. Lectures and laboratory work. Precise measurements of resistance, voltage, current, self-induction, and capacity, standardization of measuring instruments. Springer.

222. Precise Electrical Engineering Measurements. A continuation of Course 221. Springer.

223. Electrochemical Engineering. Theoretical and experimental study of the engineering problems of electrolytic and electro-thermal processes. Shepardson.

226. Illuminating Engineering. Lectures and laboratory work, investigation of performance of electric and gas lamps, reflectors and diffusers, luminous efficiency, distribution, color characteristics, physiological phenomena, methods of determining location, kind, and quality of lights for obtaining desired illumination. Shepardson.

228. Steam Railroad Electrification. American and European railroad electrification, engineering practice, detailed cost, equipment, electric power generation, purchased power contracts, studies of operating and financial results, technical reports on new projects. Studies of railroad electrification. Estimates and valuations.

229. Electrical Laboratory. Efficiency tests and special problems. Shepardson, Springer.

230. Electrical Laboratory. A continuation of Course 229. Shepardson, Springer.

232. Electrical Design. Special problems. Ryan.

234. Valuation of Electrical Properties. Cost of organizing and securing capital, discounts on bonds, fees; franchise values. Depreciation and obsolescence, deferred maintenance. Public utilities, fair rates and returns, regulation of natural monopolies. Special lecturers.

EXPERIMENTAL ENGINEERING

Professor WILLIAM H. KAVANAUGH; Associate Professor ADOLPH F. MEYER; Assistant Professors CHARLES F. SHOOP, FRANKLIN R. McMILLAN and Assistants.

COURSES

No.	Title	Credits	Taken by	Prereq. courses
101.	Materials Testing Laboratory....	2	Jr., sr. engrs.	Math. 151
102.	Hydraulic and Steam Laboratory.	2	Jr., sr. engrs.	Math. 152
103.	Steam and Power Laboratory....	4	Sr. M. E.	M. E. 130
104.	Advanced Power and Gas Engine Laboratory.....	3	Sr. M. E.	103
105.	Steam and Power Laboratory....	2	P. sr. E. E.	M. E. 122
106.	Steam and Power Laboratory....	2	Sr. E. E.	M. E. 129
107.	Steam Laboratory.....	2	Jr. E. M. & Met. E.	..
108.	Advanced Hydraulic Laboratory..	1	Elective	102
110.	Materials Testing Laboratory....	2	Jr. E. M. & Met. E.	..
112.	Experimental Laboratory.....	2	Sr. E. M. & Met. E.	107
113.	Concrete Laboratory.....	3	Elective	101
114.	Structural and Concrete Laboratory.....	3	Elective	101
116.	Experimental Laboratory.....	3	Elective	103 or 113
118.	Advanced Hydraulic Laboratory..	3	Elective	With 108 and C. E. 124
122.	Hydraulic Laboratory.....	3	Sr. C. E.	With Math. 152
124.	Steam and Hydraulic Laboratory.	3	Sr. M. E.	With Math. 152 and M. E. 122
127.	Steam and Power Laboratory....	3	P. sr. M. E.	124
128.	Gas Engine Laboratory.....	3	P. sr. M. E.	127

101. MATERIALS TESTING LABORATORY. Investigation of strength and physical properties of various metals and engineering materials, including wood, cement, concrete, ropes, cables, belting and chains. Supplemented by lectures on the various materials of construction and standard methods of testing. KAVANAUGH, SHOOP, McMILLAN.

102. HYDRAULIC AND STEAM LABORATORY. Hydraulic measurements. Calibration of weirs, nozzles, orifices, and meters. Tests of water motors, rams; pulsometers; valve setting, indicator practice, calorimetry, study of lubricants, and introductory steam experiments. KAVANAUGH, SHOOP, McMILLAN.

103. STEAM AND POWER LABORATORY. Calibration of dynamometers and measurement of power. Tests of injectors, ejectors, steam and power pumps, steam turbines, steam engines and boilers. KAVANAUGH.

104. ADVANCED POWER AND GAS ENGINE LABORATORY. Continuation of Course 103. Tests of complete power and lighting plants. Tests of gas, gasoline, and hot air engines, gas producers, air compressors. Automobile and locomotive testing. KAVANAUGH.

105. STEAM AND POWER LABORATORY. Tests of steam and power pumps. Measurement of power, tests of gas and steam engines, boilers and complete power and lighting plants. KAVANAUGH.

106. STEAM AND POWER LABORATORY. Abbreviated course. Special modification of Course 103. KAVANAUGH.

107. STEAM LABORATORY. Valve setting, indicator practice, calibration of gauges, calorimetry, efficiency tests of screws, hoists and other machines. SHOOP.

108. ADVANCED HYDRAULIC LABORATORY. Consisting of experimental and demonstration work with centrifugal pumps, reaction turbines, impulse wheels and spillways. MEYER.

110. MATERIALS TESTING LABORATORY. Abbreviated course, twelve weeks. Special modification of Course 101. SHOOP, McMILLAN.

112. EXPERIMENTAL LABORATORY. (Twelve weeks' course.) Hydraulic measurements. Tests of water motors, rams, steam pumps, steam engines and boilers. KAVANAUGH.

113. CONCRETE LABORATORY. Aggregates, proportioning, field and laboratory methods of determining choice of materials and mixtures. Tests of plain and reinforced concrete members to determine quality of materials. McMILLAN.

114. STRUCTURAL AND CONCRETE LABORATORY. Tests of structural elements of steel and reinforced concrete. Beams, columns, joints and frame structures. Building and bridge tests. McMILLAN.

116. EXPERIMENTAL LABORATORY. Special research work and commercial tests. KAVANAUGH, SHOOP, McMILLAN.

118. ADVANCED HYDRAULIC LABORATORY. Continuation of Course 108. Study of special hydraulic problems in the field and laboratory. MEYER.

122. HYDRAULIC LABORATORY. Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps. SHOOP, McMILLAN.

124. STEAM AND HYDRAULIC LABORATORY. Special modification of Courses 102 and 122. SHOOP.

127. STEAM AND POWER LABORATORY. Calibration of dynamometers, and measurement of power, study of lubricants. Tests of injectors, ejectors, steam turbines, steam engines and boilers, and complete power and lighting plants. KAVANAUGH.

128. GAS ENGINE LABORATORY. Continuation of Course 127, also tests of gas, gasoline and hot air engines, gas producers, air compressors. Automobile and locomotive testing. KAVANAUGH.

FRENCH

Professor EVERETT W. OLMSTED; Assistant Professor JULES T. FRELIN.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Beginning French	3	Fr. Architects	None
2.	Beginning French	3	Fr. Architects	1
3.	Intermediate French	3	Fr. Architects	1-2, or 2 yrs. preparation
4.	Intermediate French	3	Fr. Architects	3

1. BEGINNING FRENCH. Stress on accurate pronunciation, reading vocabulary, and the essentials of grammar. Daily oral and written exercises (dictation and reproduction in French).

2. BEGINNING FRENCH. A continuation of Course 1.

3. INTERMEDIATE FRENCH. Grammar, composition and reading, increased use of French in the classroom. Selections from modern prose and poetry. FRELIN.

4. INTERMEDIATE FRENCH. A continuation of Course 3. FRELIN.

GEOLOGY AND MINERALOGY

Professor WILLIAM H. EMMONS; Instructor EDGAR K. SOPER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Geology	3	Elective	None

1. GENERAL GEOLOGY. The earth and geologic processes. Application of geology to engineering problems. Physiographic, dynamic, and structural geology, with a brief introduction to economic geology of structural materials. Lectures, map study, field excursions, and conferences. SOPER.

MATHEMATICS AND MECHANICS

Professor WILLIAM E. BROOKE; Assistant Professors HANS H. DALAKER, WILLIAM F. HOLMAN, BURT L. NEWKIRK; Instructor GEORGE C. PRIESTER.

COURSES

No.	Title	Credits	Required of	Prereq. courses
69-70.	Special Course in Alg. and Trig.	5	Fr. not in 71a	..
71a.	Algebra and Trigonometry	5	Fr.	..
71b.	Algebra and Trigonometry	5	Fr.	..
72.	Analytic Geometry	5	Fr.	71
73a.	Differential Calculus	5	Soph.	72
73b.	Differential Calculus	5	Soph.	72
74.	Integral Calculus	5	Soph.	73
75.	Technical Mechanics—Statics	3	Jr.	74 and Phys. 7 and 8

No.	Title	Credits	Required of	Prerqe. courses
76.	Technical Mechanics—Dynamics.	3	Jr.	75
91.	Mechanics.....	4	Soph. Arch.	72
92.	Strength of Materials.....	4	Soph. Arch.	91
151.	Mechanics of Materials.....	3	Jr., sr.	75 or with 75
152.	Hydraulics.....	3	Jr., sr.	76 or with 76
153.	Thermodynamics.....	3	Sr. M. E.	152
154.	Steam and Water Turbines.....	3	Elective, sr. M. E.	153

69-70. SPECIAL COURSE IN ALGEBRA AND TRIGONOMETRY. Fundamental rules, fractions, linear simultaneous equations, graphs, theory of exponents, surds, imaginaries, quadratic equations, binomial theorem, graphical solution of numerical equations of higher degree, logarithms, use of slide-rule. Trigonometric functions. DALAKER, PRIESTER.

71a. ALGEBRA AND TRIGONOMETRY. Graphical solution of numerical equations of higher degree, logarithms, use of slide rule. Trigonometric functions and tables, addition theorem and relations, plane triangles and their solution by tables and slide-rule. Applications to surveying and statics. DALAKER, PRIESTER.

71b. ALGEBRA AND TRIGONOMETRY. Repetition of Course 71a. DALAKER, PRIESTER.

72. ANALYTIC GEOMETRY. Rectilinear and polar coördinates, the straight line and circle, transformation of coördinates, conic sections and other loci, slopes, tangents, derivatives, empirical curves, the elements of geometry of three dimensions. DALAKER, PRIESTER.

73a. DIFFERENTIAL CALCULUS. Derivatives, maxima and minima, expansion of functions, curvature; with applications to mechanical and physical problems. DALAKER, HOLMAN, PRIESTER.

73b. DIFFERENTIAL CALCULUS. Repetition of Course 73a. DALAKER, HOLMAN, PRIESTER.

74. INTEGRAL CALCULUS. Integration of standard forms. Integration as a summation. Application to length of curves, areas, volumes. Approximate integration, Simpson's rule. Solution of some differential equations. Application to engneering problems. DALAKER, HOLMAN, PRIESTER.

75. TECHNICAL MECHANICS. Statics. Resolution of forces, moments, conditions of equilibrium, free body method, center of gravity, moment of inertia, stresses in framed structures and in machines. NEWKIRK, HOLMAN, PRIESTER.

76. TECHNICAL MECHANICS. Dynamics. Dynamics of a particle, including Newton's laws of motion and kinematics of circular, harmonic, and curvilinear motion in general. Theorems of work and energy, impulse and momentum, and d'Alembert's principle. Elementary dynamics of rigid bodies. NEWKIRK, HOLMAN, PRIESTER.

91. MECHANICS FOR ARCHITECTS. (Designed for those who have not taken Calculus.) Laws of motion, energy, work, resolution of forces, conditions of equilibrium, center of gravity, moment of inertia of plane sections, stresses in framed structures. HOLMAN.

92. STRENGTH OF MATERIALS. (Designed for those who have not taken Calculus.) Mechanical and elastic properties of materials of construction, design of riveted joints, beam theory, columns. HOLMAN.

151. MECHANICS OF MATERIALS. Mechanical and elastic properties of materials of construction, beams, shafts, columns, combined stresses, hollow cylinders and spheres, rollers, plates, true stresses, theory of internal stress. BROOKE, NEWKIRK, HOLMAN.

152. HYDRAULICS. Laws of equilibrium of fluids, flow through orifices and over weirs, pressure and flow through tubes and pipes, flow in conduits and rivers. Dynamic pressure of water, elementary principles of turbines and pumps. BROOKE, NEWKIRK, HOLMAN.

153. THERMODYNAMICS. The mechanical theory of heat as applied to steam, oil, gas and hot-air engines and to compressors, including use of steam tables and entropy diagrams. BROOKE.

154. STEAM AND WATER TURBINES. Various types of steam turbines; velocity, impulse, and reaction. Nozzles, vanes, discs, bearings, governors. Thermodynamic analysis and efficiency. Theory of the operation, construction, and regulation of water turbines. Selection of turbine for given conditions. BROOKE.

MECHANICAL ENGINEERING

Professors JOHN J. FLATHER; Assistant Professors JOHN V. MARTENIS, S. CARL SHIPLEY, FRANK B. ROWLEY; Instructors WALLACE H. MARTIN, EDWARD QUIGLEY, WILLIAM H. RICHARDS.

COURSES

No.	Title	Credits	Taken by	Prereq. courses
1, 2.	Elementary Shop Practice	4	Fr. Engrs.	..
3a.	Pattern Making and Foundry Practice	3	Soph. M. E. & E. E.	1-2
3b.	Pattern Making and Foundry Practice	3		1-2
4a.	Machine Shop Practice	3	Soph. M. E. & E. E.	3
4b.	Machine Shop Practice	3		3
5.	Advanced Machine Shop Practice.	4	Jr. M. E.	4
15.	Mechanism and Kinematics	3 or 4	Jr. M. E.	Math. 74
16.	Mechanism and Kinematics	2	Jr. E. E.	Math. 74
19.	Gas Engines and Automobiles	2 or 3	Jr. or Soph. M. E.	..
111a.	Industrial Management	2	Sr. Elective	..
111b.	Industrial Management	2	Sr. Elective	..
113a.	Power Plant Operation	1	P. sr. Elective	..
113b.	Power Plant Operation	1	P. sr. Elective	..
115.	Machine Design	5	Sr. M. E. & E. E.	Math. 76
117.	Machine Design	3	Sr. M. E. & E. E.	Math. 76

No.	Title	Credits	Required of	Prereq. courses
118.	Machine Design	3	Sr. M. E. & E. E.	115 or 117
119.	Steam Boilers	1	Sr. M. E. & E. E.	..
121.	Steam Engine Design	4	P. sr. Elective	..
122.	Steam Engine	3	Sr. M. E. & E. E.	Math. 151
123.	Gas-Engine Design	4	P. sr. Elective	19
124.	Gas Engines and Producers	2	Sr. M. E.	Chem. 38
125a.	Tool Design	2	P. sr. Elective	9, 117
125b.	Tool Design	2	P. sr. Elective	9, 117
126.	Adv. Machine Design	4	P. sr. M. E.	115
127a.	Power Plant Design	3	P. sr. Elective	117, 130, Math. 152
127b.	Power Plant Design	3	P. sr. Elective	117, 130, Math. 152
129.	Steam Engines and Boilers	2	Sr. E. E.	Math. 151
130.	Steam Engines and Boilers	4	Jr. M. E.	Math. 151
131.	Measurement of Power	2	P. sr. Elective	Math. 152
132.	Compressed Air	2	P. sr. Elective	Math. 153
133.	Heating and Ventilating	3	P. sr. Elective	Math. 153
134.	Heating and Ventilating	2	Sr. Arch.	Physics 8
136.	Refrigerating Machinery	2		Math. 153
138.	Specifications	1	P. sr. M. E.	..
139.	Railway Technology	2	P. sr. Elective	..
141.	Railway Design	4	P. sr. Elective	..
142.	Railway Design	4	P. sr. Elective	..
144.	Locomotive Construction	2	P. sr. Elective.	..
146.	Shop Layout (Design)	1	Sr. or P. Sr.	..
147a.	Mechanical Equipment of Bldgs.	3	Sr. or P. sr. Elective	Physics 8
147b.	Mechanical Equipment of Bldgs.	3	Sr. or P. sr. Elective	Physics 8
149.	Seminar	1	P. sr. Elective	..
150.	Seminar	1	P. sr. Elective	..

1. ELEMENTARY SHOP PRACTICE. A general course in shop work, which includes pattern making, foundry, forge, and machine work. QUIGLEY, RICHARDS, SHIPLEY.

2. ELEMENTARY SHOP PRACTICE. Continuation of Course 1.

3a. PATTERN MAKING AND FOUNDRY PRACTICE. Patterns for parts of steam and gas engines, machine tools, and special machinery; molding, core making, mixing for the casting of machine parts in iron, brass, bronze and aluminum. Machine molding and special processes. QUIGLEY, RICHARDS, SHIPLEY.

3b. Repetition of Course 3a.

4a. MACHINE SHOP PRACTICE. Machine operations. Manufacturing methods. Time studies. Lectures and recitations. SHIPLEY and Assistants.

4b. Repetition of Course 4a.

5. ADVANCED MACHINE SHOP PRACTICE. Machine and tool construction, jigs, fixtures and special problems. Summer course of five weeks, during the vacation period following the sophomore year. SHIPLEY and Assistants.

15. MECHANISM AND KINEMATICS. Transmission of motion. Levers, gearing, linkwork, belts, screws, epicyclic trains, parallel motions, quick-return movements. The paths, speeds, and accelerations of important mechanisms; centroids, analysis of mechanisms; cams; roulettes, tooth profiles; kinematic pairs; machine parts. MARTENIS.

16. MECHANISM AND KINEMATICS. The transmission of motion without consideration of the strength of parts. Levers, gearing, linkwork, kinematic pairs; machine parts, construction of tooth profiles. MARTENIS.

19. GAS ENGINES AND AUTOMOBILES. Principles of two and four cycle operation. Mechanism of stationary, automobile, and tractor engines. Carburetion, ignition, governing, cooling, lubrication and types of transmission. Power gas producer, types and principles of operation. SHIPLEY, MARTIN.

111a. INDUSTRIAL MANAGEMENT. Shop and factory organization and management; cost and wage systems. Depreciation of equipment. Machine burden. Time studies. FLATHER.

111b. INDUSTRIAL MANAGEMENT. Repetition of Course 111a.

113a. POWER PLANT OPERATION. Operation and maintenance of boilers, engines, gas producers, gas engines, steam turbines, and accessory apparatus. Smoke prevention. MARTENIS, RYAN and Assistants.

113b. POWER PLANT OPERATION. Repetition of Course 113a.

115. MACHINE DESIGN. Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys, spur gearing, bevel gears, spiral gears, and rope driving. Recitations, lectures and drawing room practice. FLATHER, MARTENIS and Assistants.

117. MACHINE DESIGN. A course covering part of the ground of 115. FLATHER, MARTENIS and Assistants.

118. MACHINE DESIGN. Continuation of Course 115 or 117.

119. STEAM BOILERS. Application of theory and practice in the design and construction of steam boilers, settings, and accessories, chimneys, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy. MARTIN.

121. STEAM ENGINE DESIGN. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details. FLATHER, MARTIN.

122. STEAM ENGINE. Mechanics. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism; the slide valve, link motions, and other reversing gear automatic cut-off gears, and the Zeuner diagram. Steam engine indicator. FLATHER.

123. Gas Engine Design. Calculations and working drawings for a single cylinder stationary gas engine. Theoretical diagrams and details of parts. Flather, Martin.

124. Gas Engines and Producers. Two-cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition, and cooling. Indicator and indicator diagrams. Power-gas producers. Construction and operation of the generator and accessory apparatus. Martin.

125a. Tool Design. Design of tools for manufacturing interchangeable parts; jigs and milling fixtures. Flather.

125b. Tool Design. Repetition of Course 125a.

126. Advanced Machine Design. Original design, including machinery for changing size and form, cranes, pumping, transmission machinery and engineering appliances. Lectures, problems and drawing room practice. Flather, Martin.

127a. Power Plant Design. Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer gas plants, choice of engines and boilers; pumps, shafting, piping and accessories. Flather.

127b. Power Plant Design. Same as Course 127.

129. Steam Engines and Boilers. Steam boilers, settings, furnaces, stokers, smoke prevention, chimneys, evaporation. Mechanics of steam engine; work in cylinder; reciprocating parts; steam distribution. Mechanism of steam engine; slide valve, Zeuner diagram, Corliss valves; governors; indicator cards; compounding. Flather, Martin.

130. Steam Engine and Boilers. Course 129 extended. Flather, Martin.

131. Measurement of Power. A study of the methods employed in measuring power. Dynamometers. Prony brakes, power required to drive machine tools and shafting. Flather.

132. Compressed Air. Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures. Martenis.

133. Heating and Ventilating. Principles of heating and ventilating. Construction and operating of heating apparatus. Steam, hot water, exhaust, vacuum, and fan systems. Lectures, recitations and designs. Martenis.

134. Heating and Ventilation. A course for architects. Martenis.

136. Refrigerating Machinery. Principles of refrigeration. A study

of the various types of refrigerating machines, refrigerants, and applications to ice making, cold storage, cooling of air, liquids, and solids. Lectures and recitations. MARTENIS.

138. SPECIFICATIONS. A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications. FLATHER.

139. RAILWAY TECHNOLOGY. The practical details of construction of locomotives. A systematic course of visits to the various railroad shops in the vicinity; lectures and recitations. MARTENIS.

141. RAILWAY DESIGN. Of link and valve motions. (Continuation of Course 118, with special application of the Stephenson and Walschaert gears.) Of locomotives and car details; of the locomotive boiler, of assembled parts. MARTENIS.

142. RAILWAY DESIGN. Continuation of Course 141.

144. LOCOMOTIVE CONSTRUCTION. Design and construction of locomotives. The carriage; frames, springs, equalizing arrangements, running gear, brakes, trucks, lubrications. Boilers; proportions, grates, flues, smoke-box, stacks; riveted joints, bracing, staying. Engine details; heat insulation, cylinder proportions. FLATHER.

146. SHOP LAYOUT. Problems in machine manufacture. A study of approved methods, arrangement of shop departments with respect to each other, selection of machines and tools and their location. Power drives; shop production. Lectures and design. FLATHER, SHIPLEY.

147a. MECHANICAL EQUIPMENT OF BUILDINGS. Appliances used; heating, ventilating, plumbing systems; piping for fire protection, compressed air, gas and vacuum cleaning; elevators. Choice of systems. Theory and practice of designing and detailing layouts. Equipment designs for various types of buildings. MARTENIS, ROWLEY.

147b. MECHANICAL EQUIPMENT OF BUILDINGS. Repetition of Course 147a.

149. SEMINAR. FLATHER, MARTENIS, MARTIN.

150. SEMINAR. FLATHER, MARTENIS, MARTIN.

METALLURGY

Professor WILLIAM R. APPLEBY; Assistant Professor SAMUEL L. HOYT.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
158.	Metallography for Engineers.....	3	Elective sr. or P. sr.	..
159.	Metallography for Engineers.....	2	Sr. M. E.	..
162.	Advanced Metallography.....	3	Elective	158 or 159

158. METALLOGRAPHY FOR ENGINEERS. Metallurgy of iron and steel. Mi-

croscopic and thermal analysis of steel and cast iron; heat and mechanical treatment. The properties of iron and steel as affected by composition and treatment. Laboratory work. HOYT.

159. METALLOGRAPHY FOR ENGINEERS. Same as above but more condensed. HOYT.

162. ADVANCED METALLOGRAPHY. Metallography applied to engineering practice; machine design, structural engineering, electrical engineering. Engineering specifications involving the use of metals and alloys. HOYT.

MILITARY SCIENCE AND TACTICS

Professor and Commandant BERNARD LENTZ; Assistant Commandant and Brigade Adjutant WALTER F. RHINOW; Band Instructor BERT L. ROSE.

1. MILITARY DRILL.

Freshman: Instruction in schools of the soldier, company, and battalion; signals, ceremonies; school of the cannoneer and battery.

Sophomore: Instruction in schools of the company and battalion; advance and rear guard drill; instruction in guard duty. Gallery practice. Target practice. Ceremonies.

NOTE: Military drill may be taken as an approved elective by others outside of the freshman and sophomore classes; a year's drill counts as a three-hour credit for one semester. Students who register for drill beyond the required amount must register for the entire year and will be subject to the same regulations as other cadets. No credit will be allowed for such drill for less than one year.

8. MILITARY SCIENCE. Instruction in advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records. LENTZ.

PHYSICS

Professors ANTHONY ZELENY*, HENRY A. ERIKSON; Associate Professor ALOIS F. KOVARIK; Assistant Professors LOUIS W. MCKEEHAN; Instructors E. O. DIETERICH, ARTHUR F. GORTON, EARLE H. KENNARD, PAUL E. KLOPSTEG, OTTO J. ZOBEL.

COURSES

No.	Title	Credits	Required of	Prereq. courses
7.	Physics for Engineers	4	Soph.	Math. 72
8.	Physics for Engineers	4	Soph.	Physics 7
9.	Physics Laboratory	1	Soph. Engrs.	With Physics 7
10.	Physics Laboratory	1	Soph. Engrs.	Physics 7
13.	Electrokinetics	3	Jr., sr.	Physics 9, 10
162.	Electrical Measurements	2	Jr. E. E.	Physics 13

*Absent on leave, 1915-16.

7. General Physics for Engineers and Architects. Mechanics of solids and fluids, sound and heat; numerous problems to illustrate the principles. Kovarik, McKeehan, Zobel.

8. General Physics for Engineers and Architects. Light, electricity and magnetism.

9. General Laboratory Practice for Engineers. Physical measurements in the mechanics of solids and fluids, sound, and heat. Gorton, Zobel.

10. General Laboratory Practice for Engineers. Physical measurements in light, electricity and magnetism. Gorton, Zobel.

13. Electrokinetics. The phenomena accompanying the passage of electricity through solids, liquids, and gases. Erikson, Kennard, Klopsteg.

162. Electrical Measurements. The study and measurement of capacity, inductance, and magnetic induction. Zeleny, Klopsteg.

For Electives in the Department of Physics see Bulletin of the College of Science, Literature, and the Arts.

POLITICAL SCIENCE

Professor William A. Schaper; Associate Professors Cephas D. Allin, Jeremiah S. Young.

COURSES

No.	Title	Credits	Required of	Prereq. courses
25.	American Government	2	All sr.	None
26.	Commercial Law	2	All sr.	25

25. American Government. An introductory course in Political Science. It includes a study of the organization and present workings of our national, state, and local governments, and serves as an introduction to Course 26. Allin.

26. Commercial Law. Elements of law; system of federal and state courts, jury system, law of contracts, corporations, partnership and limited partnerships, administrative law, rights and duties of citizenship, real and personal property, riparian rights. Young.

RHETORIC AND PUBLIC SPEAKING

Professor Joseph M. Thomas; Assistant Professors Frank M. Rarig, Charles W. Nichols; Instructor Howard T. Viets.

COURSES

No.	Title	Credits	Required of	Prereq. courses
3.	Rhetoric and Composition	3	Fr.	None
4.	Rhetoric and Composition	3	Fr.	3
31.	Technical Writing	2	Elective	..
32.	Technical Writing	2	Elective	..

3. RHETORIC AND COMPOSITION. Training in writing; study of the work of writers who have handled scientific subjects with clearness and power; outside reading. NICHOLS, VIETS.

4. RHETORIC AND COMPOSITION. A continuation of Course 3. NICHOLS, VIETS.

31. TECHNICAL WRITING. A course in technical writing, planned to meet the professional needs of engineering students. Not offered in 1914-15. NICHOLS.

32. TECHNICAL WRITING. A continuation of Course 31. Not offered in 1914-15. NICHOLS.

TECHNOLOGY

Professors: The Faculty of the College of Engineering and others.

COURSES

No.	Title	Credits	Required of	Prereq. courses
1-2.	Technology	2	Fr. Eng.	..

1-2. TECHNOLOGY. Lectures covering the various fields of engineering, efficiency in study, hygiene, and on the conduct of life. Visits to factories, machine shops, power plants, and existing engineering works and those under construction. Reports.

Bulletin of The University of Minnesota

THE COLLEGE OF AGRICULTURE

1915-1916

VOL. XVIII. NO. 6. JUNE 1915

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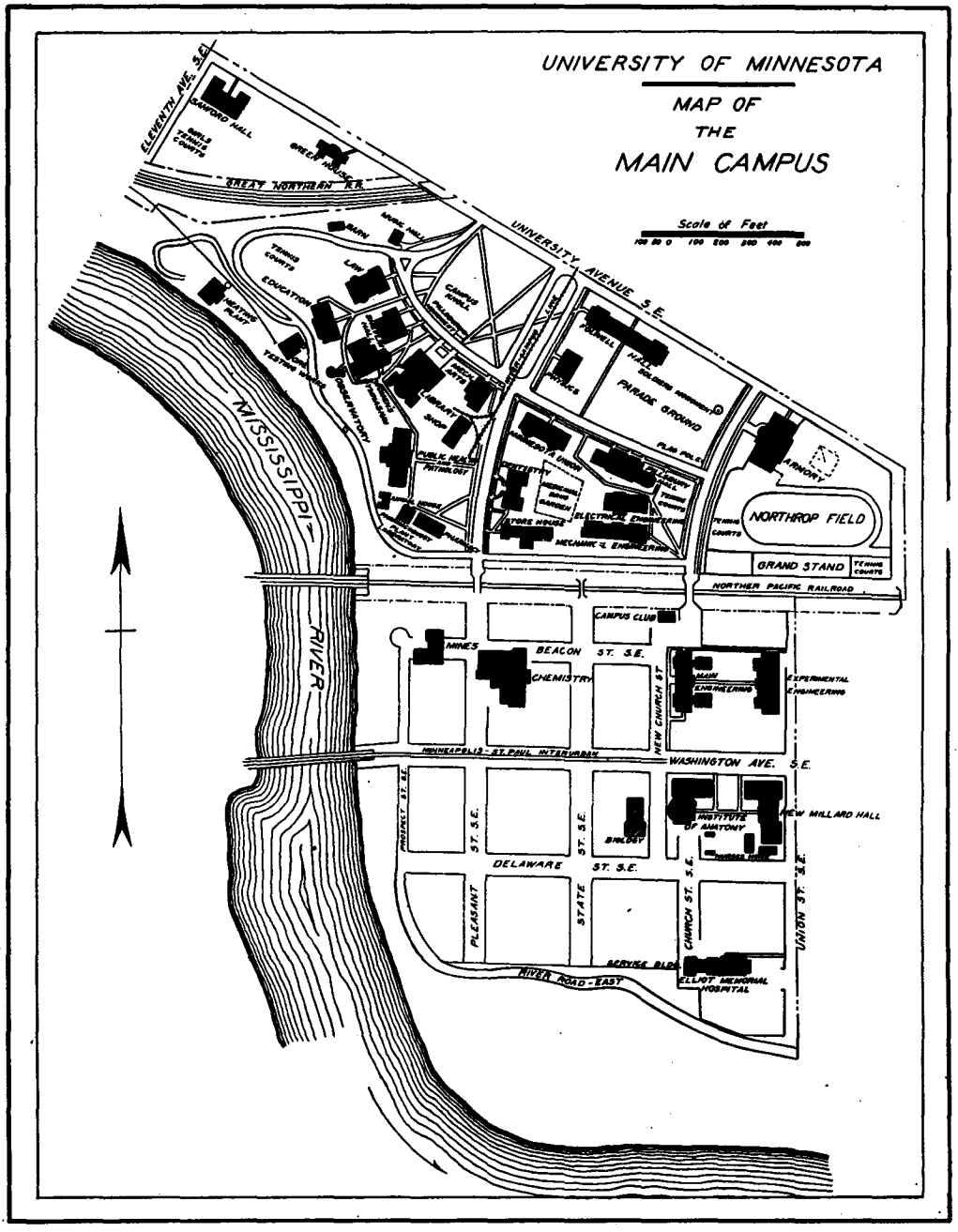
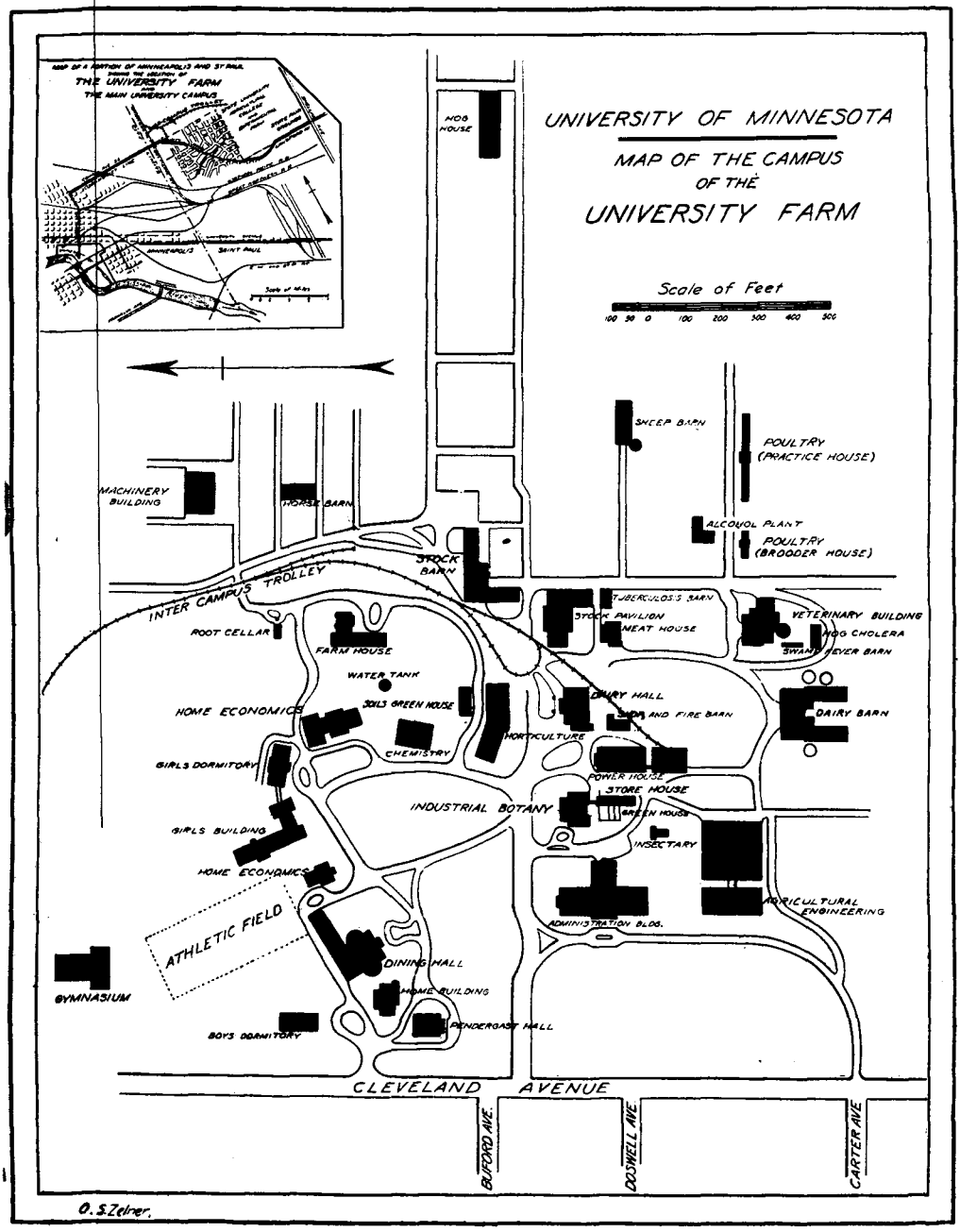


Area of Main Campus, 108.5 acres



Area of University Farm, 422.56 acres

1915

JULY

Su	Mo	Tu	W	Th	Fr	Sa
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

AUGUST

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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

SEPTEMBER

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12	13	14	**15**	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

OCTOBER

..	..	..	..	..	1	2
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

NOVEMBER

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	**25**	**26**	**27**
28	29	30	..	..	..	..
..	..	..	..	..	..	..

DECEMBER

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12	13	14	15	16	17	**18**
19	**20**	**21**	**22**	**23**	**24**	**25**
26	**27**	**28**	**29**	**30**	**31**	..
..	..	..	..	..	..	..

1916

JANUARY

Su	Mo	Tu	W	Th	Fr	Sa
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	**31**	..	..	..	..	..

FEBRUARY

..	..	**1**	2	3	4	5
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27	28	29	..	..	..	..
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MARCH

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APRIL

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16	17	18	19	**20**	**21**	**22**
23	**24**	**25**	**26**	27	28	29
30	..	..	..	..	..	..

MAY

..	1	2	3	4	5	6
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14	15	16	17	18	19	20
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28	29	**30**	31	..	..	..
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JUNE

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JULY

Su	Mo	Tu	W	Th	Fr	Sa
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23	24	25	26	27	28	29
30	31	..	..	..	..	..

AUGUST

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20	21	22	23	24	25	26
27	28	29	30	31	..	..
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SEPTEMBER

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24	25	26	27	28	29	30
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OCTOBER

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29	30	31	..	..	..	..
..	..	..	..	..	..	..

NOVEMBER

..	..	..	1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
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DECEMBER

..	..	..	..	..	1	2
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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

CALENDAR

COLLEGE OF AGRICULTURE

1915-16

The College year covers a period of thirty-eight weeks, beginning on the second Tuesday in September. Commencement Day is always the second Thursday in June.

The School of Agriculture year covers a period of twenty-four weeks beginning on the first Monday in October. Commencement Day is the last Thursday in March.

Numerous short courses are held of from one to five weeks' duration.

Starred dates are uniform with other colleges of the University.

1915			
*August	31	Tuesday	Registration closes except for new students
*September	7-14	Week	Entrance examinations, registration of new students, payment of fees
*September	15	Wednesday	First Semester begins
September	27	Monday	Practical examination in farm experience
*October	9	Saturday	Last day for removal of second semester incompletes
October	15	Friday	Half holiday. Annual freshman-sophomore contest
November	8	Monday	Dairy School opens
*November	24	Wednesday	Thanksgiving recess begins 9:00 p.m.
*November	29	Monday	Thanksgiving recess ends 8:00 a.m.
Nov. 29-Dec.	4	Week	Examinations for the removal of second semester conditions
December	11	Saturday	Dairy School closes
*December	17	Friday	Christmas vacation begins 9:00 p.m.
1916			
*January	4	Tuesday	Christmas vacation ends 8:00 a.m.
January	3-8	Week	Farmers' Week
*January	18	Tuesday	Registration for the second semester closes except for new students.
January	24	Monday	Short course for veterinarians opens
*January	24	Monday	Final examinations begin
January	28	Friday	Short course for veterinarians closes
*February	1	Tuesday	Registration and payment of fees for second semester closes. All grades for first semester due in Registrar's office

*February	2	Wednesday	Second semester begins
*February	12	Saturday	Lincoln's Birthday: a holiday
*February	22	Tuesday	Washington's Birthday: a holiday
*February	26	Saturday	Last day for removal of first semester incompletes
April	3-8	Week	Junior Short Course
*April	19	Wednesday	Easter recess begins
*April	27	Thursday	Easter recess ends
*May	1-6	Week	First semester condition examinations
May	2	Tuesday	Short Course for traction engineers opens
May	26	Friday	Holiday. Annual boat trip
*May	27	Saturday	Final examinations begin
June	2	Friday	Short course for traction engineers closes
*June	3	Saturday	Second semester closes
*June	4	Sunday	Baccalaureate Service
*June	5	Monday	Senior Class Day Exercises
*June	7	Wednesday	Alumni Day
*June	8	Thursday	Forty-fourth Annual Commencement
*June	9	Friday	Summer vacation begins
*June	12	Monday	Summer Session and Teachers' Training School open
*July	4	Tuesday	Independence Day: a holiday
*July	22	Saturday	Summer Session and Teachers' Training School close
July	24-29	Week	Short Course for Rural Church Workers

The University year for 1916-17 will begin Tuesday, September 12.

THE COLLEGE OF AGRICULTURE

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BERNARD LENTZ, First Lieutenant, 21st U. S. Infantry, Military Science and Tactics

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2091 Buford, St. Paul

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2116 Como Ave. W., St. Paul
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2219 Knapp St., St. Paul

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THE COLLEGE OF AGRICULTURE

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

CEPHAS D. ALLIN, LL.B., M.A., Associate Professor of Political Science
725 7th St. S. E.
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719 E. River Road
RICHARD BURTON, Ph.D., Professor of English Literature
2109 Blaisdell Ave.
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FACULTY COMMITTEES

1915-16

Executive Committee.—Dean, Chiefs of Divisions
Enrollment.—West, Mowry, Biester, Wentling, Bender, Pierce.
Curriculum and Catalog.—Freeman, Boss, Storm, West, Stewart, Berry
Program.—Stewart, Mowry, Williams
Students' Work.—Freeman, West, Berry, Cheyney, Sweeney, Ruggles
Library.—Alway, C. W. Howard, Wellington, Stakman, Sewall, Lansing.
Graduate.—Thatcher, Berry, Freeman, Wentling, Dorsey, Storm
Student Organizations.—Lansing, Berry, Cheyney, Weller, Freeman
Athletics.—Cheyney, Oswald, Montgomery, Boyd
Demonstration and Exhibit.—C. P. Bull, R. M. Washburn, Arny, Allison, Trilling, Smith, Jager, Mackintosh
Sanitation.—Reynolds, Mayne, Hoskins, F. L. Washburn
Grounds.—Boss, Cady, Stewart
Genetics.—Dorsey, Hayes, Palmer, Smith, Jager
Short Course.—Storm, Mayne, R. M. Washburn, Brierley, Berry, Stewart, Boss, Kirkwood
Auditing.—Roe, Peck, Lusk
Publications.—Wilson, Boss, Haecker, Freeman, Thatcher
Faculty Business.—Freeman, West, Berry, Storm
Delayed English Credit.—Lansing, Gist
College Registrar.—Lucetta Bissell
Secretary of Faculty.—R. M. West

GENERAL INFORMATION

ENROLLMENT

Credentials.—All students entering this College for the first time shall submit their credentials to the Enrollment Committee.

Applicants for admission to both the Agricultural and Home Economics courses are urged to present Physics (1 unit), Chemistry (1 unit) and, those entering any of the Agricultural courses, Higher Algebra (½ unit), for entrance credits. If these subjects are not completed in the high school, they will have to be taken in the University, thus postponing some of the vocational courses.

Every prospective student for any of the Agricultural courses is also urged to obtain before entering College at least six months' practical experience on a farm. Entering students whose farm experience credentials are not satisfactory will be examined as to their familiarity with farm practices, and farm experience will be required during the college course in accordance with the results of these examinations.

Announcement.—For and after the college year 1916-17 farm experience will be required for admission under the following regulations:

A working knowledge of the fundamental operations of the farm, such as harnessing horses, milking cows by hand, plowing, planting, and harvesting the common crops, will be required of those entering the Agricultural courses.

It is provided, however, that students transferring from other colleges or universities to the junior year of any of the special science courses will be exempt from this requirement.

This is not to be understood as superseding the existing regulation which remains in effect and provides for at least six months' farm experience before graduation.

For details of admission requirements, see the Bulletin of General Information.

REQUIREMENTS FOR GRADUATION AND DEGREES

After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to a total of 144 credit hours for the Agricultural courses and 136 credit hours (138 for those graduating in June, 1916), for the Home Economics courses, candidates will be recommended for graduation with the degree of Bachelor of Science. The diploma will designate the college in which the candidate completes the work for his degree and his major line of work.

UNIVERSITY STATE TEACHER'S CERTIFICATE

The University State Teacher's Certificate is granted to graduates of the College of Agriculture who have completed fifteen credit hours in approved professional courses. Consult the Chief of the Agricultural Education Division before registering for the work of the junior year.

COURSES OF STUDY

GENERAL AGRICULTURE

For Home Economics, see page 71.

Students are especially urged to read *carefully* the following general instructions and to refer to them frequently during the college course.

Six months' practical farm experience is required of each candidate for graduation in all courses in Agriculture unless satisfactory credentials for previous farm experience are presented.

Students are urged to decide *as early as possible* in what line of work they intend to specialize, and to consult with the faculty of the division in regard to all matters pertaining to their future work, such as electives, farm experience, and the possibilities for preparing especially for distinct fields of work. Students should make at least a tentative decision in regard to their line of specialization before the end of the freshman year. Final decision on the line of specialization does not need to be made, however, until the end of the sophomore year. Students in doubt in regard to specialization should consult the Chairman of the Students' Work Committee or the chiefs of various divisions offering special lines.

Two groups of courses of study are offered:

1. General agricultural courses of study, in which students prepare for general agricultural pursuits, as farming, stock-raising, dairying, or teaching agriculture in secondary schools. Specialists who intend to prepare for experiment station or other research work along these lines will find it necessary to pursue graduate work. The following general agricultural courses of study are offered:

Agricultural Education
Agricultural Education—Manual Training
Agronomy and Farm Management
Dairy and Animal Husbandry
Horticulture

2. Special agricultural science courses of study, in which students prepare for special purposes, usually scientific research. In all of these courses graduate work is necessary for a thoro preparation. The following special agricultural science courses of study are offered:

Agricultural Chemistry
Agricultural Economics
Entomology
Plant Pathology
Soils

The freshman year is alike in all courses. In the sophomore year one half of the subjects are alike in all courses, while in the junior year a considerable amount of difference exists. The senior year is almost en-

tirely devoted to special subjects and electives. The regular amount of work is eighteen credit hours for each semester of all courses and the total amount for graduation is one hundred and forty-four credit hours. Students are requested to note carefully both (a) *the general requirements for all students* and (b) *the special requirements for the different courses of study.*

GENERAL REQUIREMENTS FOR ALL STUDENTS IN AGRICULTURE

FRESHMAN YEAR

Numbers in parentheses below indicate the number of credits for the course. Other numbers are numbers of courses.

GROUP A:

All students must register for Group A, including Botany and *Rhetoric (6 credit hours first semester), and Botany, Rhetoric and Chemistry (9 credit hours, second semester), Military Drill (no credit), and enough additional work from Group B to make a total of 18 credit hours each semester.

GROUP B:

Agricultural Engineering 1, Algebra (3), required the first semester of those not presenting Higher Algebra for entrance.

Agricultural Engineering 2, Trigonometry (3), must be taken during the first year.

Chemistry 3, Advanced General Chemistry (3), or Chemistry 33, General Chemistry and Qualitative Analysis (5), must be taken the first semester. The five credit course must be taken by those not presenting Chemistry for entrance. In the latter case, only 17 credit hours may be registered for.

Economics 1b, Industrial History since 1750 (3), or Economics 2a, Industry and Commerce of U. S. (3). One of these courses must be taken during the first year.

Horticulture 90, General Horticulture (3), or Horticulture Elective (3). Horticulture Elective may be taken if additional Horticulture is registered for later in the course.

Dairy and Animal Husbandry 1, Breeds and Types of Live Stock (3).

Dairy and Animal Husbandry 26, Elements of Dairy Husbandry (3).

Agronomy 1, Farm Crops 1.

Agricultural Engineering 3, Mechanical Drawing (3). Open only to those freshmen who intend to pursue the course in Manual Training.

All courses in Group B, except such options as are indicated, must be taken in either the freshman or sophomore year.

*Special attention is called to rules on delayed credit (page 41).

SPECIAL REQUIREMENTS IN THE DIFFERENT COURSES OF STUDY

COURSE IN AGRICULTURAL CHEMISTRY

Graduate Work Advised

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Chem. 35, Organic Chemistry (4)
*Drawing (3)
Elective (2)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Chem., 36 Organic Chem. (4)
*Drawing (3)
Elective (2)
Military Drill

JUNIOR YEAR

First Semester
Agr. Chem. 101, Quant. Analysis (5)
Physics 1, General (3)
Physics 3, Laboratory (1)
Elective (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Phys. and Mgt. (3)

Second Semester
Agr. Chem. 102, Agr. Quant. Anal. (5)
Physics 2, General (3)
Physics 4, Laboratory (1)
Veg. Path. 2, Industrial Mycology (3)
Elective (3)
Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
Chem. 121, Physical (2)
Chem. 123, Physico-Chemical Lab. (1)
Agr. Chem. 111, Biochemistry (3)
Agr. Chem. 113, Biochemical Lab. (2)
Electives (10)

Second Semester
Chem. 122, Physical (2)
Chem. 124, Physico-Chemical Lab. (1)
Soils 104, Chem. Analysis of Soils (5)
Electives (10)

*Course to be selected on consultation with Chief of Division.

COURSE IN AGRICULTURAL ECONOMICS

Graduate Work Advised

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric, 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Physics 5, General (3)
or
Elective (3)
Mechanical Drawing (3)
Elective (3)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Agr. Chem. 4, Plant and Animal Life (3)
Electives (6)
Military Drill

JUNIOR YEAR

First Semester
Agron. 5, Farm Crops II (3)
Econ. 19, Marketing of Farm Prod. (3)

Second Semester
Dairy and Animal Husbandry 16, Dairy Stock Feeding and Mgt. (3)

Entomology 3, Econ. Entomology (3)
Dairy and Animal Husbandry 15, Principles of Nutrition (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Phys. and Management (3)

Agr. Eng. 8, Agr. Physics (3)
or
Elective (3)
Economic Elective (6)
Agr. Eng. 10, Farm Eng. (3)
Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
Agron. 101, Farm Management I (3)
Economic Electives (6)
Electives (6)
Dairy and Animal Husbandry 7, Feeding Market Stock (3)

Second Semester
Agron. 102, Farm Management II (3)
Agron. Elective (3)
Economic Elective (3)
Farm Management Elective (3)
Electives (6)

COURSE IN AGRICULTURAL EDUCATION

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Physics 5, General (3)
or
Rhetoric 21, Public Speaking (3)
Agr. Educ. 21, Industrial Education (3)
Dy. and An. Husb. 3, Market Classes (3)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Agr. Eng. 3b, Mechanical Drawing (3)
Agr. Educ. 11b, Principles of Educ. (3)
Agr. Chem. 4, Plant and Animal Life (3)
Military Drill

Students desiring to procure a state professional certificate should consult Chief of Division before registering for the sophomore year.

JUNIOR YEAR

First Semester
Ent. 3, Economic Entomology (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Physics and Mgt. (3)
Agron. 3, Farm Machinery (3)
Agron. 5, Farm Crops II (3)
Dairy and Animal Husbandry 15, Principles of Nutrition (3)

Second Semester
Agron. 104, Grain and Corn Judging (3)
Agr. Eng. 8, Agricultural Physics (3)
Vet. 6, Veterinary Medicine (3)
Dairy and Animal Husbandry 16, Dairy Stock Feeding and management (3)
Soils 4, Soil Fertility (3)
{ Dy. and An. Husb. 4, Stock Judging (1)
and
Dy. and An. Husb. 18, Dy. Stk. Jdg. (2) }
or
*Agr. Educ. 131b, Methods (3)

*By permission of Chief of Division a limited number may take Agricultural Education 131b, Methods, to be prepared for Course 141a, first semester, senior year. Those who do will take Dy. and An. Husb. 4 and 18 the second semester, senior year.

SENIOR YEAR

First Semester
Agr. Eng. 7, Farm Structures (3)
Dy. and An. Husb. 11, Poultry (3)
Veg. Path. 9, Seed Testing (3)
Agr. Educ. 151a, Org. and Mgt. (3)
or
Agr. Educ. 141a, Teaching (3)

Second Semester
Agron. 102, Farm Management II (3)
*Vet. 12, Common Diseases (1½)
*Ent. 18, Control of Insect Pests (1½)
Agr. Educ. 151b, Org. and Mgt. (3)
or
Agr. Educ. 141b, Teaching (3)

Dy. and An. Husb. 7, Feeding Market Stock (3)
†Agr. Educ. 131a, Methods (3)
or
Elective (3)

‡Dy. and An. Husb. 4, Stock Jdg. (1)
and
‡Dy.and An. Husb.18, Dy. Stk. Jdg. (2)
and
Electives (6)
or
Electives (9)

*It is recommended that students take the entire 3 hours in each of these courses when possible.

†For all those who did not take Methods in the junior year.

‡Except for those who have taken these courses.

COURSE IN AGRICULTURAL EDUCATION—MANUAL TRAINING

SOPHOMORE YEAR

First Semester
Agricultural Engineering 5
Carpentry (3)
Econ. 3a, Elements (3)
Rhet. 11, Argum. (3)
An. Biol. 3, Zoology (3)
*Physics 5, General (3)
or
Agri. Edu. 21, Indust. Edu. (3)
Dy. and An.Husb. 3, Market Classes(3)

Second Semester
Agricultural Engineering 4
Blacksmithing (3)
Econ. 18, Agri. Econ. (3)
Rhet. 12, Argumentation (3)
An. Biol. 4, Zoology (3)
Agr. Chem. 4, Plant and Animal Life (3)
Agr. Educ. 11b, Principles of Educ. (3)

Students desiring to procure a teachers' certificate should consult Chief of Division before registering for the sophomore year.

JUNIOR YEAR

First Semester
‡Manual Training (3)
Ent. 3, Economic Entomology (3)
Soils 3, Soil Physics and Mgt. (3)
Dy. and An. Husb. 15, Principles of Nutrition (3)
Agron. 3, Farm Machinery (3)
Agron. 5, Farm Crops II (3)

Second Semester
‡Manual Training (3)
Agr. Eng. 8, Agri. Physics (3)
Soils 4, Soil Fertility (3)
Dy. and An. Husb. 16, Dairy Stock Feeding (3)
Dy. and An. Husb. 4, Stock Judging (1)
and
Dy. and An. Husb. 18, Dairy Stock Judging (2) or
†Agr. Educ. 131b, Methods (3)
Agron. 104, Grain and Corn Judging (3)

SENIOR YEAR

First Semester
‡Manual Training (3)
Agr. Eng. 7, Farm Structures (3)
Agr. Educ. 133, Methods and Administration of Manual Training (3)
Agr. Educ. 151a, Organization and Management (3)
‖Agr. Educ. 131a, Methods (3) or Elective (3)
Dy. and An. Husb. 7, Feeding Market Stock (3)

Second Semester
‡Manual Training (3)
Agron. 102, Farm Mgt. II (3)
††Vet. 12, Common Diseases (1½)
††Ent. 16, Control of Insect Pests (1½)
Agr. Eng. 16, Farm Power Machinery (3)
Agr. Educ. 144, Observation and Teaching of Manual Training (3)
**Dy. and An. Husb. 4, Stock Judging (1) and
**Dy. and An. Husb. 18, Dairy Stock Judging (2) or
Agr. Educ. 151b, Organization and Mgt. (3)

*Those failing to present high school physics for entrance must register for the physics and may temporarily omit this course. It must be taken, however, before graduation.

†By permission of Chief of Division a limited number may take Agricultural Education 131b, Methods, to be prepared for Course 141a, first semester, senior year. Those who do will take Dy. and An. Husb. 4 and 18 the second semester, senior year.

‡Courses in Manual Training will be offered to prepare for teaching and supervising this work in the primary grades, elementary grades and the high school; also for designing, construction and repair work needed in the community and not provided for in other courses.

‖For all those who did not take Methods in the Junior year.

**Except for those who have taken these courses.

††It is recommended that students take the entire 3 hours in each of these courses when possible.

COURSE IN AGRONOMY AND FARM MANAGEMENT

Graduate Work Advised for Plant Breeding Specialists

SOPHOMORE YEAR

First Semester
- Econ. 3a, Elements (3)
- Rhetoric 11, Argumentation (3)
- Animal Biology 3, Zoology (3)
- Botany Elective (3)
- Agr. Eng. 3a, Mechanical Drawing (3)
- Physics 5, General (3)
  - or
- Elective (3)
- Military Drill

Second Semester
- Econ. 18, Agr. Economics (3)
- Rhetoric 12, Argumentation (3
- Animal Biology 4, Zoology (3)
- Botany Elective (3)
- Agr. Chem. 4, Plant and Animal Life (3)
- Elective (3)
- Military Drill

JUNIOR YEAR

First Semester
- Agron. 5, Farm Crops II (3)
- Elective (3)
- Ent. 3, Economic Entomology (3)
- Dy. and An. Husb. 15, Principles of Nutrition (3)
- Veg. Path. 1, Plant Pathology (3)
- Soils 3, Soil Physics and Mgt. (3)

Second Semester
- Elective (3)
- Dy. and An. Husb. 16, Dairy Stock Feeding and Management (3)
- Agr. Eng. 8, Agr. Physics (3)
- Vet. 6, Veterinary Medicine (3)
- Agr. Eng. 10, Farm Engineering (3)
- Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
- Agron. 101, Farm Management I (3)
- Agron. 103, Prin. of Genetics (3)
  - or
- Elective (for Farm Mgt. Students) (3)
- Agr. Eng. 7, Farm Structures (3)
- Elective (3)
- Veg. Path. 9, Seed Testing (3)
- Dy. and An. Husb. 7, Feeding Market Stock (3)

Second Semester
- Agron. 102, Farm Management II (3)
- Agron. 104, Grain and Corn Judging (3)
- Agron. 106, Plant Breeding (3)
  - or
- Econ. Elective (for Farm Mgt. Students) (3)
- Agronomy or Farm Mgt. Elective (3)
- Electives (6)

COURSE IN DAIRY AND ANIMAL HUSBANDRY

SOPHOMORE YEAR

First Semester
- Econ. 3a, Elements (3)

Second Semester
- Econ. 18, Agricultural Economics (3)

Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Physics 5, General (3)
or
Elective (3)
Agr. Chem. 3a, Types of Carbon Compounds (3)
Elective (3)
Military Drill

Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Agr. Eng. 3b, Mechanical Drawing (3)
Electives (6)
Military Drill

JUNIOR YEAR

First Semester
Dy. and An. Husb. 15, Principles of Nutrition (3)
An. Biology 15, General Physiology (3)
Dy. and An. Husb. 3, Mkt. Classes (3)
Elective (3)
Soils 3, Soil Physics and Mgt. (3)
Agron. Elective (3)

Second Semester
Dy. and An. Husb. 18, Dy. Stk. Jdg. (2)
An. Biology 16, Gen. Physiology (3)
Dy. and An. Husb. 16, Dairy Stock Feeding and Management (3)
Soils 4, Soil Fertility (3)
Dy. and An. Husb. 4, Stock Judging (1)
Veterinary Elective (3)
Agr. Eng. 8, Agricultural Physics (3)

SENIOR YEAR

First Semester
Dy. and An. Husb. 11, Poultry (3)
Dy. and An. Husb. 7, Feeding (3)
Dy. and An. Husb. 9, Meats (3)
Dy. and An. Husb. 17, An. Breeding (3)
Agr. Eng. 7, Farm Structures (3)
Electives (3)

Second Semester
Agron. 102, Farm Management II (3)
Elective (6)
Agron. Elective (3)
Dy. and An. Husb. Elective (6)

COURSE IN ENTOMOLOGY AND ECONOMIC ZOOLOGY

Graduate Work Advised

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Physics 5, General (3)
or
Elective (3)
Botany or Entomology Elective (3)
Agr. Eng. 3a, Mechanical Drawing (3)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Botany or Entomology Elective (3)
Agr. Chem. 4, Plant and An. Life (3)
Elective (3)
Military Drill

JUNIOR YEAR

First Semester
Agron. Elective (3)
Elective (3)
Ent. 3, Economic Entomology (3)
Horticulture Elective (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Physics and Mgt. (3)

Second Semester
Elective (3)
Entomology Elective (3)
Agr. Eng. 8, Agr. Physics (3)
Vet. 6, Veterinary Medicine (3)
Agr. Eng. 10, Farm Engineering (3)
Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
Chem. 35, Organic Chemistry (4)
Entomology Elective (3)

Second Semester
Chem. 36, Organic Chemistry (4)
Entomology Elective (3)

Veg. Path. 101, Adv. Plant Path. (3)
Ent. 101, Systematic Entomology (3)
Electives (5)

Veg. Path. 102, Adv. Plant Path. (3)
Ent. 102, Systematic Entomology (3)
Electives (2)
Veg. Path. 14, Plant Disease Control (3)

COURSE IN HORTICULTURE

Students majoring in Horticulture are required (1) to complete the following courses: 4, 5, 32 and 71; (2) to elect three from the following list of courses, 19, 21, 50, 54 and 56, 101, 192. General electives should include work in Botany, Plant Pathology, Meteorology, Entomology, or Economics. Students should consult with some member of the Division staff in regard to the selection of electives.

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Botany Elective (3)
†Agr. Eng. 3a, Mechanical Drawing (3)
Physics 5, General (3)
or
Elective (3)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Botany Elective (3)
Agr. Chem. 4, Plant and An. Life (3)
*Elective (3)
Military Drill

JUNIOR YEAR

First Semester
Hort. Elective (3)
Elective (3)
Ent. 3, Econ. Entomology (3)
Forestry 21, Farm Forestry (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Physics and Mgt. (3)

Second Semester
Elective (3)
Agr. Eng. 8, Agr. Physics (3)
Ent. 18, Control of Insect Pests (3)
Veg. Path. 14, Plant Disease Control (3)
Soils 4, Soil Fertility (3)
Hort. Elective (3)

SENIOR YEAR

First Semester
Agron. 103, Principles of Genetics (3)
Elective (6)
Hort. Electives (9)

Second Semester
Agron. 106, Plant Breeding (3)
Vet. 6, Vet. Medicine (3)
or
Elective (3)
Elective (3)
Hort. Elective (9)

*Horticulture Elective or Meteorology advised.

†Students presenting Mechanical Drawing (one unit) for entrance may take a Horticultural Elective.

COURSE IN PLANT PATHOLOGY

Graduate Work Advised

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Botany Elective (3)
Agr. Chem. 3a, Carbon Compounds (3)

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12, Argumentation (3)
Animal Biology 4, Zoology (3)
Botany Elective (3)
Agr. Chem. 2b, Quant. Methods (3)

Elective (3)
Military Drill

Elective (3)
Military Drill

JUNIOR YEAR

First Semester
*Physics 1, General (3)
Elective (3)
Ent. 3, Economic Entomology (3)
Botany Elective (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Physics and Mgt. (3)

Second Semester
Electives (6)
†Physics 2, General (3)
Botany Elective (3)
Veg. Path. 2, Industrial Mycology (3)
Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
Veg. Path. 101, Adv. Pathology (3)
Agr. Chem. 111, Biochemistry (3)
Agron. 103, Prin. of Genetics (3)
Botany or Entomology Elective (3)
Elective (6)

Second Semester
Veg. Path. 102, Advanced Pathology (3)
Botany or Entomology Elective (3)
Horticultural Elective (3)
Elective (3)
Veg. Path. 14, Plant Disease Control (3)
Ent. 18, Control of Insect Pests (3)

*Physics 3 should be taken at same time.
†Physics 4 should be taken at same time.

COURSE IN SOILS

Graduate Work Advised

SOPHOMORE YEAR

First Semester
Econ. 3a, Elements (3)
Rhetoric 11, Argumentation (3)
Animal Biology 3, Zoology (3)
Chem. 35, Organic Chemistry (4)
Geol. 1, General (3)
Elective (2)
Military Drill

Second Semester
Econ. 18, Agricultural Economics (3)
Rhetoric 12 Argumentation (3)
Animal Biology 4, Zoology (3)
Chem. 36, Organic Chemistry (4)
Agr. Eng. 3b, Mechanical Drawing (3)
Elective (2)
Military Drill

JUNIOR YEAR

First Semester
Agr. Chem. 101, Quan. Analysis (5)
Physics 1, General (3)
Physics 3, Laboratory (1)
Elective (3)
Veg. Path. 1, Plant Pathology (3)
Soils 3, Soil Physics and Mgt. (3)

Second Semester
Agr. Chem. 102, Agr. Quant. Anal. (5)
Physics 2, General (3)
Physics 4, Laboratory (1)
Elective (3)
Agr. Eng. 10, Farm Engineering (3)
Soils 4, Soil Fertility (3)

SENIOR YEAR

First Semester
Soils 101, Physical Properties of Soils (3)
Agr. Chem. 111, Biochemistry (3)
Geol. 21, Elements of Mineralogy (3)
Ent. 3, Economic Entomology (3)
Electives (6)

Second Semester
Soils 104, Chem. Analysis of Soils (5)
Veg. Path. 2, Industrial Mycology (3)
Agron. 102, Farm Management II (3)
Electives (7)

AGRICULTURAL CHEMISTRY

Professor ROSCOE W. THATCHER; Assistant Professors CLYDE H. BAILEY, RODNEY M. WEST; Instructors CORNELIA KENNEDY, JOHN J. WILLAMAN.

General statement.—This Division offers two types of work, namely, courses in those phases of chemistry which have special application in agriculture or home economics for students whose major work is in other divisions; and courses designed to train chemists for research or instruction in the special field of Agricultural Chemistry. For specialization in this Division, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Domestic Chemistry	3	Soph., jr.	1 yr. Chem.
2a.	Quantitative Methods	3	Soph., jr.	1 yr. Chem.
2b.	Quantitative Methods	3	Soph., jr.	1 yr. Chem.
3a.	Types of Carbon Compounds	3	Soph., jr.	1 yr. Chem.
3b.	Types of Carbon Compounds	3	Soph., jr.	1 yr. Chem.
4.	Chem. of Plant and An. Life	3	Soph.	1 yr. Chem.
6.	Dairy Chemistry	3	Jr., sr.	2
101.	Quantitative Analysis	5	Jr., sr.	2 yrs. Chem.
102.	Agr. Quant. Analysis	5	Jr., sr.	101
105.	Detection of Adulteration	5	Sr.	102
106.	Agr. Products and By-Products	3	Sr.	102
108.	Chem. of Wheat and Its Products	2	Sr.	3
110.	Flour Laboratory Methods	3	Sr.	102; parallel 108
111.	Biochemistry	3	Sr.	2 yrs. Biol.; Org. Chem.
113.	Biochemical Lab. Methods	2	Sr.	2 yrs. Biol.; Org. Chem.; Agr. Chem. 102
114.	Enzymes	2	Sr.	111

INTRODUCTORY COURSES

1. DOMESTIC CHEMISTRY. Pure and impure air, ventilation; water, contamination, detection of impurities, and purification; fuels; combustion and relative heating value; sanitation and disposal of wastes; textile materials, properties, detection of admixtures. Lectures and laboratory work. KENNEDY.

2a. QUANTITATIVE METHODS. A brief course in the principles of quantitative analysis, including a study of stoichiometric problems and practice in the use of the balance and in a few of the simpler gravimetric and volumetric processes. WEST.

2b. QUANTITATIVE METHODS. Same as Course 2a.

3a. TYPES OF CARBON COMPOUNDS. An elementary study of the different groups of carbon compounds, with special reference to their relation-

ships and their occurrence in plant and animal materials used as food. THATCHER.

3b. TYPES OF CARBON COMPOUNDS. Same as Course 3a.

4. THE CHEMISTRY OF PLANT AND ANIMAL LIFE. The organic compounds commonly found in plant and animal tissues. The chemical changes during growth, harvesting, storage, and preparation for market. Factors affecting composition and changes therein. Utilization of farm by-products. WEST.

6. DAIRY CHEMISTRY. The chemistry of milk and its products. Laboratory work in the quantitative analysis of milk, butter, and cheese, and the detection of adulterants in those products. WILLAMAN.

ADVANCED COURSES

101. QUANTITATIVE ANALYSIS. The principles involved in gravimetric and volumetric analyses. The course includes the gravimetric determination of iron, sulphur, phosphorus, magnesium, and chlorine; acidimetry, alkalimetry; the volumetric determination of iron and calcium; and iodimetry. WEST.

102. AGRICULTURAL QUANTITATIVE ANALYSIS. Methods of proximate analysis of agricultural products, including the determination of moisture, ash, fats, starch, sugars, fiber, proteins, and the different nitrogenous constituents of foods and feeding stuffs. WEST.

105. DETECTION OF ADULTERATION OF FOODS AND FEEDING STUFFS The use of proximate analyses and special tests for the determination of quality and the detection of adulteration of foods and feeds. Includes chemical and microscopical examinations. THATCHER, KENNEDY.

106. AGRICULTURAL PRODUCTS AND BY-PRODUCTS. The composition of the principal products and by-products of agriculture and their utilization as raw material in various industries, and the methods of chemical control work in these industries. WEST.

108. CHEMISTRY OF WHEAT AND WHEAT PRODUCTS. A lecture course, with collateral library reference work, on the chemical technology of the production and milling of wheat and the conversion of its products into human food. BAILEY.

110. FLOUR LABORATORY METHODS. A laboratory course in the methods of analyses of wheat and its products; milling tests of wheat; and baking and special tests of flour. BAILEY.

111. BIOCHEMISTRY. An advanced course in the chemistry of fats, carbohydrates, tannins, proteins, enzymes, and colloids and their relation to the vital processes involved in plant and animal growth and nutrition. THATCHER.

113. BIOCHEMICAL LABORATORY METHODS. Special methods of examination of plant and animal tissues for particular fats, carbohydrates, proteins, and enzymes. THATCHER.

114. ENZYMES. An advanced study of the nature of enzyme action including methods of preparation and investigation of enzymes, their physical and chemical properties and their method of action. (Offered in alternate years, not offered in 1915-16.) THATCHER.

AGRICULTURAL ECONOMICS

See Department of Economics (page 51).

AGRICULTURAL EDUCATION

Professors A. V. STORM, D. D. MAYNE; Associate Professor W. H. BENDER; Assistant Professor W. F. LUSK; Extension Specialists T. A. ERICKSON, G. F. HOWARD.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
11a.	Principles of Industrial Education	3	All	None
11b.	Principles of Industrial Education	3	All	None
21.	Industrial Education	3	All	None
131a.	Methods in Teaching High School Agriculture	3	Sr.	11
131b.	Methods in Teaching High School Agriculture	3	Jr.	11
141a.	Teaching	3	Sr.	11 and 131
141b.	Teaching	3	Sr.	11 and 131
151a.	Organization and Management	3	Sr.	None
151b.	Organization and Management	3	Sr.	None

INTRODUCTORY COURSES

11a. PRINCIPLES OF INDUSTRIAL EDUCATION. A study of the fundamental principles upon which education is based. Throughout the course emphasis is placed on those phases which are most closely related to industrial education. LUSK.

11b. PRINCIPLES OF INDUSTRIAL EDUCATION. Same as Course 11a.

21. INDUSTRIAL EDUCATION. A short history of industrial education; the present status in Europe and United States; manual training and home arts in an educational system; the place of agriculture in the public schools; trade and vocational schools. MAYNE.

ADVANCED COURSES

131a. METHODS IN TEACHING HIGH-SCHOOL AGRICULTURE. Fundamental elements of method in teaching as related to teaching agriculture in

high school. Organizing subject matter of daily work; selection and manipulation of devices. Classroom and laboratory method. Specific plans for teaching secondary agriculture. BENDER.

131b. METHODS IN TEACHING HIGH-SCHOOL AGRICULTURE. Same as Course 131a.

141a. TEACHING. Observation of regular classes; interpretation of class practices; preparation of lesson plans and actual teaching of classes under careful supervision in recitation and laboratory; criticism and discussion of plans, methods, and results of student's teaching. STORM, BENDER, LUSK.

141b. TEACHING. Same as Course 141a.

151a. ORGANIZATION AND MANAGEMENT. Organization and management of work in secondary schools, particularly of Minnesota, with special reference to agricultural work, courses of study, programs, equipment, laboratory and class management, extension work, plots, and coördination of work. STORM.

151b. ORGANIZATION AND MANAGEMENT. Same as Course 151a.

AGRICULTURAL ENGINEERING

Professor JOHN T. STEWART; Assistant Professors ALVAH M. BULL, JASON L. MOWRY, HARRY B. ROE; Instructors ALLEN D. JOHNSTON, HALL B. WHITE, LLOYD R. WHITSON.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Higher Algebra	3	Fr.*	Entrance Math.
1b.	Higher Algebra	3	Fr.*	Entrance Meth.
2a.	Plane Trigonometry	3	Fr.	Higher Algebra
2b.	Plane Trigonometry	3	Fr.	Higher Algebra
3a.	Mechanical Drawing	3	Fr., soph.	None
3b.	Mechanical Drawing	3	Fr., soph.	None
4.	Blacksmithing	3	All	None
5.	Carpentry	3	All	None
7.	Farm Structures	3	Sr.	8
8.	Agricultural Physics	3	Jr.	2, 3
9.	Household Mechanics	3	Sr.	3
10.	Farm Engineering	3	Jr.	2, 4
16.	Farm Power Machinery	3	Sr.	8

*Required of freshmen who do not present Higher Algebra for entrance.

INTRODUCTORY COURSES

1a. HIGHER ALGEBRA. Special attention is given to practical problems, the methods of computation and a foundation for Plane Trigonometry. ROE.

1b. HIGHER ALGEBRA. Same as Course 1a.

2a. PLANE TRIGONOMETRY. Theory and use of logarithms and a study of the functions of Plane Trigonometry with numerous practical applications. ROE.

2b. PLANE TRIGONOMETRY. Same as Course 2a.

3a. MECHANICAL DRAWING. Lectures on drawing, exercise in the use of drawing instruments, lettering, and water colors. The making of working drawings with their practical value. WHITSON.

3b. MECHANICAL DRAWING. Same as Course 3a.

4. BLACKSMITHING. Students are instructed in the management of forge and fire and in bending, shaping, and welding iron and steel. JOHNSTON.

5. CARPENTRY. Instruction given in the use of common carpentry tools and the methods of farm building construction. WHITE.

7. FARM STRUCTURES. The planning, designing, and location of farm buildings, including specifications and estimates of cost. A. M. BULL.

8. AGRICULTURAL PHYSICS. The principles of physics as applied to agriculture including ventilation, heating, lighting, water supply, and electricity. MOWRY.

9. HOUSEHOLD MECHANICS. The general principles of heating, plumbing, ventilating, and lighting, and the planning of Home Economics labatories including floors, woodwork, and ventilating. MOWRY.

10. FARM ENGINEERING. The principles of land surveys, the improvement of farm lands by drainage, explosives and their use, and a brief summary of road construction in agricultural districts. STEWART.

16. FARM POWER MACHINERY. The subjects considered are: flexible connectors, pulleys, shafting, gear wheels, bearings, oils, lubrication, and engines. Special emphasis placed on laboratory work. MOWRY.

AGRONOMY AND FARM MANAGEMENT

Professor ANDREW BOSS; Associate Professors COATES P. BULL, HERBERT K. HAYES; Assistant Professors ALBERT C. ARNY, LOUIS B. BASSETT, ALVA H. BENTON, PETER J. OLSON; Instructor FRANCIS W. PECK; Extension Specialists GEORGE J. BAKER, R. L. DONOVAN, T. B. MCCULLOCH.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Farm Crops I	3	Fr.	None
1b.	Farm Crops I	3	Fr.	None

No.	Title	Credits	Offered to	Prereq. courses
3.	Farm Machinery	3	Sr.	None
4.	Field Work in Farm Management	3	Sr.	Econ. 3; 1 sem. Farm Mgt.; 1 sem. Live Stock Feeding
5.	Farm Crops II	3	Jr.	1 year Botany; Farm Crops I
101.	Farm Management I	3	Sr.	Econ. 3; Farm Crops I
102.	Farm Management II	3	Sr.	Econ. 3; Farm Crops I D. & A. H. 26;
*103.	Principles of Genetics	3	Sr.	1 yr. Botany; 1 yr. Zoology
104.	Grain and Corn Judging	3	Jr., sr.	1 yr. Botany; Farm Crops I
105.	Farm Management Seminar	3	Sr.	101 and 102
*106.	Plant Breeding	3	Sr.	103

*Open to any student of the University having the required perequisites.

INTRODUCTORY COURSES

1a. FARM CROPS I. An elementary study of the important field crops of the United States, with emphasis upon those of local importance; distribution, economic importance, agricultural classifications, cultural methods, and principles of improvement. OLSON.

1b. FARM CROPS I. Same as Course 1a.

3. FARM MACHINERY. Practical suggestions and practice work in the best methods of adjustment, handling, and adapting various kinds of machinery to the soils, weeds, and seasons. BASSETT.

4. FIELD WORK IN FARM MANAGEMENT. A course in the actual management of a farm under the supervision of the staff of the Division of Farm Management. Boss.

5. FARM CROPS II. A systematic study of the form and structure of the entire plants of the cereal, forage, fiber, and root crops adapted to the North Central states. ARNY.

ADVANCED COURSES

101. FARM MANAGEMENT I. Textbook and practice work in the art of record keeping, accounting, and kindred subjects. Designed especially for students expecting to become farm managers or farm-management field men. PECK.

102. FARM MANAGEMENT II. A course in which the business side of farming is emphasized. Special attention is given to farm organization, equipment, and operation. Boss.

103. PRINCIPLES OF GENETICS. A course of lectures and laboratory designed to familiarize the student with the underlying principles of

breeding. Heredity, variation, biometry, and evolution are emphasized. HAYES, DORSEY.

104. GRAIN AND CORN JUDGING. A study in detail of representative samples of the leading varieties of grains and corn and grass seeds, with score card practice in comparative judging of grain, corn, and grass seed. ARNY.

105. FARM MANAGEMENT SEMINAR. An advanced course including a study of farm practices, farm equipment, cost of production, and efficiency of labor. BOSS.

106. PLANT BREEDING. A course in which applied genetics is emphasized. The method of breeding each of the important agricultural and horticultural crops is studied, with special attention to experiment station investigations and to the methods used by plant breeders. HAYES, DORSEY.

BEE CULTURE

Professor FRANCIS JAGER.

General statement.—Theoretical and practical instructions on bees, honey and wax production. At least one year of Botany should be completed before electing these courses. General Zoology and Elementary Entomology are also desirable. If not already completed, they should be taken at same time as the courses in Bee Culture.

COURSES

No.	Title	Credits	Offered to	Perreq. courses
1.	Theoretical	3	Soph., jr., sr.	None
*2.	Practical	3	Soph., jr., sr.	None
4.	Queen Rearing	3	Jr., sr.	1 and 2

*Given only June 1st, to August 1st.

INTRODUCTORY COURSES

1. THEORETICAL BEEKEEPING. Elementary study of queen, drones, and workers. Anatomy of the bee. Propagation, increase, and swarming. Spring, summer, winter management. Bee instincts, queen rearing and feeding. JAGER.

2. PRACTICAL BEEKEEPING. Hives, tools and their uses. Bee carpentry. Handling of bees. Management of the bee-yard for comb and extracted honey production. Running extractor and rendering wax. JAGER.

4. QUEEN REARING. Selection of breeding queens, drone raising, grafting, queen cells, nurseries, nuclei, mating, tested and untested queens, selection of queens, shipping and introducing. JAGER.

DAIRY AND ANIMAL HUSBANDRY

Professors THEOPHILUS L. HAECKER, A. C. SMITH, R. M. WASHBURN; Assistant Professors R. C. ASHBY, G. W. GEHRAND, J. S. MONTGOMERY, T. G. PATERSON; Instructors E. O. HANSON, DWIGHT J. LANE, C. C. PALMER; Extension Specialists N. E. CHAPMAN, A. J. McGUIRE, W. A. McKERROW.

General statement.—For specialization in this division, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Breeds and Types of Live Stock..	3	Fr., soph.	None
1b.	Breeds and Types of Live Stock..	3	Fr., soph.	None
3.	Market Classes of Live Stock....	3	Soph., jr.	1
4.	Stock Judging.....	1	Soph., jr.	3
5.	Adv. Stock Judging.....	3	Sr.	4
7.	Feeding Market Stock.....	3	Sr.	16
9.	Meats.....	3	Sr.	4 and 15
11.	Poultry.....	3	All	None
14.	Elements of Animal Nutrition....	3	Sr.	15
15.	Principles of Nutrition.....	3	Jr.	26
16.	Dy. Stock Feeding and Mgt.....	3	Jr.	15
17.	Animal Breeding.....	3	Sr.	An. Biol. 3, 4
18.	Dairy Stock Judging.....	2	Jr.	26
19.	Factory Management.....	3	Jr., sr.	26
20.	Factory Butter-making.....	3	Jr., sr.	26
22.	Beef Cattle Breeding.....	2	Sr.	4, 7, and 17
24.	Sheep Husbandry.....	2	Sr.	4, 7, and 17
26a.	Elements of Dairy Husbandry....	3	Fr.	None
26b.	Elements of Dairy Husbandry....	3	Fr.	None
28.	Swine Husbandry.....	2	Sr.	4, 7, and 17
30.	Incubating and Brooding.....	2	All	None
32.	Horse Husbandry.....	2	Sr.	4, 7, and 17
34.	Feeding Seminar.....	3	Sr.	7
36.	Adv. Dairy Husbandry.....	3	Sr.	16 and 18
*38.	Cheese-making.....	3	Jr., sr.	None
*40.	Creamery Practice.....	3	Jr., sr.	None

*Summer work.

1a. BREEDS AND TYPES OF LIVE STOCK. A study of the types and breeds of beef cattle, swine, sheep, and horses with special reference to the origin and leading characteristics of each of the important breeds. PATERSON, MONTGOMERY, ASHBY.

1b. BREEDS AND TYPES OF LIVE STOCK. Same as Course 1a.

3. MARKET CLASSES OF LIVE STOCK. Includes a discussion of the various market classes of cattle, sheep, and swine, and practice work in judging market classes during the term. PATERSON.

4. STOCK JUDGING. Practice in judging breeding classes of beef cattle, sheep, horses, and swine. Placings and reasons are submitted, fol-

lowed by a general discussion with the instructor. MONTGOMERY. PATERSON, ASHBY.

5. ADVANCED STOCK JUDGING. Senior elective in Dairy and Animal Husbandry Course. MONTGOMERY.

7. FEEDING MARKET STOCK. Economical rations for growing and fattening all classes of market stock. Includes a discussion of shelter requirements, feed racks, and the details of management applicable to conditions on the average farm. ASHBY.

9. MEATS. General course in the dressing of animals and the cutting of carcasses. Lectures and laboratory work. PATERSON.

11. POULTRY. A study of the poultry industry; best methods of care and management of fowls, turkeys, ducks, and geese, and the most important breeds of same. SMITH.

14. ELEMENTS OF ANIMAL NUTRITION. This includes a thoro study of experiments made on ingo and expenditure of matter and the income and expenditure of energy, the relation of food consumed to energy expended. Not offered in 1915-16.

15. PRINCIPLES OF NUTRITION. The principles of animal nutrition, their relation to the economic production of animal products, and the relation of the constituents in feed consumed to amount and character of products produced. HAECKER.

16. DAIRY STOCK FEEDING AND MANAGEMENT. Characteristics and nutritive values of fodders, feed stuffs, and forage crops. The general development, feeding, and management of dairy stock, with special stress on feeding. One dairy barn plan required. WASHBURN.

17. ANIMAL BREEDING. Anatomy and physiology of reproduction. Variation, heredity, the laws of transmission and the application of these to the breeding of farm animals. Sterility and disease of the reproductive organs. PALMER.

18. DAIRY STOCK JUDGING. Practice work in judging animals of the leading dairy breeds. Herds in the vicinities of the Twin Cities are visited.

19. FACTORY MANAGEMENT. Organization of creamery associations, the construction and equipment of factories, with lectures on calculating dividends, sinking funds, locating financial leaks, and marketing. WASHBURN.

20. FACTORY BUTTER-MAKING. The separation of milk, preparation of pure culture starters, and cream ripening, controlling moisture content of butter, market requirements, scoring of butter, with laboratory practice in the college creamery. Not offered in 1915-16. WASHBURN.

22. Beef Cattle Breeding. The management of pure-bred herds of beef cattle, building equipment, food stuffs suitable, selection of foundation stock, methods of improvement, and marketing. Includes study of pedigrees, herd book registrations, and practicums. Paterson.

24. Sheep Husbandry. The care and management of pure-bred sheep, study of pedigrees, registrations, fitting for show purposes, marketing. Practicums in feeding, shearing, blocking, and caring for young lambs. Paterson.

26a. Elements of Dairy Husbandry. Origin, characteristics, and adaptation of dairy breeds of cows; particular attention is given to feeding followed by a study of the chemical and physical constituents of milk. Practice work in butter-making, and milk testing required. Haecker, Washburn, Gehrand.

26b. Elements of Dairy Husbandry. Same as Course 26a.

28. Swine Husbandry. The business of pork production. Includes housing and equipment, formation of breeding herds, methods of feeding, management, marketing. Every student required to do actual practice work at the swine barns. Ashby.

30. Incubating and Brooding. Includes instruction and practice in incubation and brooding, selection of breeding stock and eggs for hatching, and feeding young chicks. Of practical value to teachers of agriculture and poultry-raisers. Smith, Lane.

32. Horse Husbandry. The feeding, breeding, management, and marketing of horses. Practicums dealing with breaking colts, stable management, fitting for show purposes will be included. Montgomery.

34. Feeding Seminar. Consists of review of recent bulletins, dealing with the results of experiments in feeding beef cattle, sheep, swine, and horses as published by the various experiment stations. Montgomery.

36. Advanced Dairy Husbandry. A critical survey of recent work in the field of animal development and milk production. A study of methods and evidence; the interpretation of results and method of presentation of subject matter. Haecker, Washburn.

38. Cheese Making Practice. A minimum experience of one month in an approved cheese factory is advised of all students specializing in Dairy Manufacture. Washburn.

40. Creamery Practice. Experience in the factory is essential to knowledge or appreciation of the problems of dairy manufacturing. A minimum of four weeks' experience in an approved creamery is advised. Washburn.

ENTOMOLOGY AND ECONOMIC ZOOLOGY

Professor F. L. WASHBURN; Associate Professor ARTHUR G. RUGGLES; Assistant Professors CHARLES W. HOWARD, WILLIAM MOORE.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Entomology	3	All	None
3.	Economic Entomology	3	Jr.	An. Biol. 3 and 4
4.	Economic Ornithology and Zoology	2	Jr., sr.	An. Biol. 3 and 4
5.	Forest Entomology	3	Jr.	An. Biol. 3 and 4
7-8.	Comparative Anatomy and Histology of Insects	6	Jr., sr.	An. Biol. 3 and 4
9.	Animal Parasites	3	Jr., sr.	An. Biol. 3 and 4
10.	Coccidae (Scale Insects)	3	Jr., sr.	1 or 3
12.	Forest Zoology	2	Jr.	An. Biol. 3 and 4
14.	Insects and Public Health	2	Jr., sr.	An. Biol. 3 and 4
17.	Medical Entomology	2	Jr., sr.	An. Biol. 3 and 4 or equivalent
18.	Control of Insect Pests	3	Jr., sr.	3, Pl. Path. 14, Hort. 1 sem.
101-102.	Systematic Entomology	3 or 6	Jr., sr.	3
103a.	Advanced Histology and Morphology of Insects	4	Jr., sr.	7-8
103b.	Advanced Histology and Morphology of Insects	4	Jr., sr.	7-8
104.	Methods in Econ. Ent	3	Jr., sr.	3
105-106.	Special Problems	6	Jr., sr.	3, 104

INTRODUCTORY COURSES

1. GENERAL ENTOMOLOGY. A general discussion of the structure, life-history, and habits of insects. HOWARD.

3. ECONOMIC ENTOMOLOGY. A consideration of the most important insect pests; methods of control; insecticides and insecticidal apparatus; beneficial insects. All students entering this course make a collection of insects. WASHBURN, RUGGLES, HOWARD, MOORE.

4. ECONOMIC ORNITHOLOGY AND ZOOLOGY. The relation of birds and four-footed wild animals to agriculture. Laboratory and field work. Identification of Minnesota birds affecting the horticulturist and agriculturist; also of vertebrate farm pests, study of habits, methods of combating, etc. WASHBURN.

5. FOREST ENTOMOLOGY. A special study is made of insects affecting shade and forest trees and the best means of controlling them. RUGGLES.

7-8. COMPARATIVE ANATOMY AND HISTOLOGY OF INSECTS. A detailed study of structure of representatives of different orders of insects. RUGGLES.

9. ANIMAL PARASITES. A consideration of parasitism and the more common animal parasites of man and domestic animals. HOWARD, BOYD.

10. COCCIDAE (SCALE INSECTS). A study of the classification, identification, and economic importance of the scale insects, with methods of combating. MOORE.

12. FOREST ZOOLOGY. A study of forest animals. Relations of game and other birds and of various four-footed animals to forest protection. Habits, range, usefulness, or the contrary; the manner of protecting the important large and small game, fish, birds; also a discussion of fish culture. WASHBURN.

14. INSECTS AND PUBLIC HEALTH. A consideration of the agency of insects and insect-like animals in the transmission of diseases, as well as general household insects; also methods of sanitation, etc., related to their control and disease transmission. HOWARD.

17. MEDICAL ENTOMOLOGY. Study of insects and their near relatives which are disease-bearers or are parasites of man. Special emphasis is placed upon life-history habits, and methods of control. A course for students in medicine; elective to others. HOWARD.

18. CONTROL OF INSECT PESTS. The principal insects of the orchard and garden are studied in detail. The last part of the course deals with spray materials and their method of application. RUGGLES AND MOORE.

ADVANCED COURSES

101-102. SYSTEMATIC ENTOMOLOGY. A study of a system of classification. RUGGLES.

103a. ADVANCED HISTOLOGY AND MORPHOLOGY OF INSECTS. This course is designed for the student who wishes to study the histology and development of a single organ or a group of organs in insects. RUGGLES.

103b. ADVANCED HISTOLOGY AND MORPHOLOGY OF INSECTS. Same as Course 103a.

104. METHODS IN ECONOMIC ENTOMOLOGY. Methods of breeding insects; identification of insects in various stages; photography of insects; general field work, etc. MOORE.

105-106. SPECIAL PROBLEMS. Investigations of special problems for those intending to specialize in entomology. Problems may be chosen in any section of the Division. Those taking the course are expected to be in attendance during the Summer Session. WASHBURN, RUGGLES, HOWARD, MOORE.

GYMNASIUM

Instructor D. C. MITCHELL.

A gymnasium fee of $1.50 will be charged each semester.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Gymnasium	0	All	None
2.	Gymnasium	0	All	1

1. GYMNASIUM. Calisthenics, light apparatus and corrective work. Swimming and diving.

2. GYMNASIUM. Continuation of course 1 adding games of hand ball, indoor baseball, basketball and volley ball. Students must be able to swim the length of the pool.

HORTICULTURE

Associate Professors LE ROY CADY, MAXWELL J. DORSEY; Assistant Professors WILFRID G. BRIERLEY, RICHARD WELLINGTON; Extension Specialists C. E. BROWN, R. S. MACKINTOSH.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
4.	Commercial Fruit Growing	4	Jr., sr.	1 yr. Botany; 1 sem. Hort.
5.	Systematic Pomology	3	Jr., sr.	4
19.	Fruit and Vegetable Handling	4	Jr., sr.	4, Econ. 18
21.	Small Fruits and Viticulture	3	Jr., sr.	1 yr. Botany
32.	Market Gardening	3	Soph., jr., sr.	1 yr. Botany
50.	Floriculture	3	Soph., jr., sr.	1 yr. Botany
54.	Greenhouse Construction and Management	1½	Jr., sr.	None
56.	Plant Propagation	1	Soph., jr., sr.	None
71.	Landscape Gardening	3	Soph., jr., sr.	None
73.	Nursery Practice	1½	Soph., jr., sr.	None
90a.	General Horticulture	3	All	None
90b.	General Horticulture	3	All	None
101.	Advanced Fruit Growing	3	Sr.	4
104.	Tropical Fruits	3	Sr.	4
131.	Advanced Market Gardening	3	Sr.	32
151-152.	Advanced Floriculture	6	Sr.	50, 54
191.	Hort. Literature	3	Sr.	4
192.	Orchard and Garden Management	3	Sr.	19, 21, 32

INTRODUCTORY COURSES

4. COMMERCIAL FRUIT-GROWING. The fundamental principles of fruit-growing. Sites, soils, nursery stock, planting and planting plans, tillage, fertilization, cover crops, pollination, frost avoidance, pruning, and thinning. Lectures, recitations, references, and laboratory work. BRIERLEY.

5. SYSTEMATIC POMOLOGY. The classification and distribution of temperate, sub-tropical, and tropical fruits; technical description, identification, and general study of the more important varieties; judging

of fruits; fruit literature. Lectures, laboratory work, references. WELLINGTON.

19. FRUIT AND VEGETABLE HANDLING. Lectures on early development, packages, harvesting, packing, by-products, coöperation, marketing, and storage. Laboratory in picking and packing of fruits, reference work on marketing and storage. BRIERLEY.

21. SMALL FRUITS AND VITICULTURE. Lectures and references. Botanical relationship, important species, origin, commercial development, importance, climatic range, sites, soils, propagation, planting plans, planting, pruning, cultivation, irrigation, cover-crops and mulching, intercropping and varieties. BRIERLEY.

32. MARKET-GARDENING. The principles of vegetable-growing for market, including the study of all important vegetable crops from seed to harvest. Lectures, recitations, references, laboratory work, and excursions. BRIERLEY.

50. FLORICULTURE. Instruction is given in a variety of subjects designed to give the student a working knowledge of the culture and uses of common house plants, annuals, perennials, and greenhouse plants. Lectures, reference reading, and laboratory. CADY.

54. GREENHOUSE CONSTRUCTION AND MANAGEMENT. A study of the evolution of the greenhouse, types of houses, materials, and methods of construction. Lectures, field trips, and laboratory work. CADY.

56. PLANT PROPAGATION. Methods of propagation of plants by seed, cuttings, layers, grafting, and budding are studied. The principles of greenhouse management, transplanting, watering, and ventilation are taught. Lectures, reference reading, field and laboratory work. CADY.

71. LANDSCAPE GARDENING. A general course in the practice and principles of landscape gardening as applied to the home and community. Lectures and field trips to parks and private grounds. CADY.

73. NURSERY PRACTICE. Lectures and practice work in management of nursery stock, seeds, bulbs, and plants, particular attention being given to ornamental stock propagation, planting, and storage. CADY.

*90a. GENERAL HORTICULTURE. A general survey of horticulture with a consideration of the elementary principles of fruit-growing, vegetable gardening, floriculture, landscape gardening, plant breeding, plant forcing, and plant propagation. BRIERLEY.

90b. GENERAL HORTICULTURE. Same as Course 90a.

ADVANCED COURSES

101. ADVANCED FRUIT-GROWING. Lectures, laboratory, and special problems. A study of the various tree fruits. Similar in outline to Course 15. BRIERLEY.

104. TROPICAL FRUITS. Lectures, references, and special problems. A study of the various tropical and citrus fruits. Similar in outline to Course 21. Not given in 1915-16. BRIERLEY.

131. ADVANCED MARKET-GARDENING. Lectures, references, and special problems. A study in detail of the various vegetables. Not given in 1915-16. BRIERLEY.

151-152. ADVANCED FLORICULTURE. Lectures, assigned readings, laboratory, and special problems dealing with the culture, botany, and history of florists' plants and methods of greenhouse management. CADY.

191. HORTICULTURAL LITERATURE. This course includes a critical study of foreign and native horticultural literature, and the methods used in the preparation of fruit monographs and bulletins. A knowledge of French and German will be a valuable asset. Lectures. WELLINGTON.

192. ORCHARD AND GARDEN MANAGEMENT. Lectures, references, laboratory, and special problems. A study of the principal problems connected with the management of orchard, small fruit and vegetable tracts. BRIERLEY.

*Students specializing in Horticulture may substitute for Hort. 90 any course in Horticulture for which they are eligible. Students majoring in other divisions who desire to take more specialized work in Horticulture may substitute Hort. 4, 21, 32, 50 or 71, provided that a second course from the same group be elected later.

JOURNALISM

Associate Professor WILLIAM P. KIRKWOOD.

General statement.—This Division offers a course in general journalism. The aim is to give introductory instruction in the various forms of writing for the press.

COURSE			
No. Title	Credits	Offered to	Prereq. courses
1-2. Journalism.....	3 or 6	Jr., sr.	2 yr. Rhet., or 1 yr. Rhet. and 1 yr. English

1-2. JOURNALISM. News-gathering, news-writing, copy-reading, headline-writing, writing of special articles, interpretation of the news or editorial writing, and the application of newspaper rules to agricultural and other class journalism; lectures and practical work. KIRKWOOD.

MILITARY SCIENCE AND TACTICS

Professor and Commandant BERNARD LENTZ; Assistant Commandant and Brigade Adjutant WALTER F. RHINOW; Band Instructor BERT ROSE.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Military Drill	None	Fr.	None
3-4.	Military Drill	None	Soph.	1 yr. Drill
5-6.	Military Drill	3†	Jr., sr.	2 yrs. Drill
8.	Military Science	2*	Jr., sr.	2 yrs. Drill

*If taken in connection with Course 5-6.

†No student may receive more than a total of six credits for elective work in both Physical Education and Military Drill.

1-6. MILITARY DRILL. Two years are required of all men who enroll in the freshman and sophomore classes. Students are cautioned to report for the first drill and inform themselves of the requirements of the department.

1-2. Freshman: Practical instruction in schools of the soldier, company, and battalion signals, ceremonies, first aid.

3-4. Sophomore: Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

5-6. May be taken voluntarily by others outside of the freshman and sophomore classes. No credit will be allowed for such drill for less than one year.

8. MILITARY SCIENCE. Instruction in advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

RHETORIC

Assistant Professor R. C. LANSING; Instructors ESTELLE COOK, JULIAN H. GIST.

Beginning with the class entering in September 1915 rhetoric credits will not be granted officially until the close of the first semester of the senior year.

At least one quiz paper will be selected at random each semester from other than rhetoric classes and read by the Committee on Delayed English Credit. In addition any instructor may nominate to the committee and submit papers for any junior or senior who in his opinion requires special consideration.

The Committee on Delayed English Credit may require upper-class students to take, without credit, additional courses in rhetoric in order to validate their freshman and sophomore rhetoric credits.

Until June, 1918, students registered previous to September, 1915, may be required to take a supplementary three-credit course in rhetoric in place of three of the elective credits required for the degree.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Rhetoric	3	Fr.	None
1b.	Rhetoric	3	Fr.	None
2a.	Rhetoric	3	Fr.	1
2b.	Rhetoric	3	Fr.	1
11.	Argumentation	3	Soph., jr.	1, 2
12.	Argumentation	3	Soph., jr.	11
13-14.	Adv. Argumentation	6	Soph., Jr., sr.	11
21-22.	Public Speaking	6	Soph., jr., sr.	1, 2
30a.	Literature	3	Soph., jr., sr.	1, 2
30b.	Literature	3	Soph., jr., sr.	1, 2

INTRODUCTORY COURSES

1a. RHETORIC. Note taking, thesis writing, exposition, sentence structure, analysis of prose models. LANSING, GIST.

1b. RHETORIC. Same as Course 1a.

2a. RHETORIC. Narration, description, diction. LANSING, GIST.

2b. RHETORIC. Same as Course 2a.

11. ARGUMENTATION. Evidence, methods of reasoning, briefing, debating. LANSING, GIST.

12. ARGUMENTATION. Analysis of persuasive speeches, practice in speaking both from the floor and in formal debate, composition of persuasive articles. LANSING, GIST.

13-14. ADVANCED ARGUMENTATION. A course designed primarily for students desiring to participate in intercollegiate and society debates. Drill in preparing and delivering debates and other forms of address. GIST.

21-22. PUBLIC SPEAKING. The study and practice of the fundamental principles of voice production, articulation, gesture, platform deportment, and expression. COOK.

30a. LITERATURE. Shakespeare, Tennyson, Browning. LANSING, GIST.

30b. LITERATURE. Same as Course 30a.

SOILS

Professor FREDERICK J. ALWAY; Associate Professor ROSS A. GORTNER; Instructors PAUL R. MCMILLER, CLAYTON O. ROST.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3.	Soil Physics and Management....	3	Jr.	1 yr. Chem.
4.	Soil Fertility and Fertilizers.....	3	Jr.	3
*101.	Physical Properties of Soils.....	3	Jr., sr.	Quant. Anal.
103.	Analysis of Fertilizers.....	3	Jr., sr.	Quant. Anal.
†104.	Chemical Analysis of Soils.....	5	Jr., sr.	3 and Quant. Anal.

*Must be preceded or accompanied by Course 3.
†Must be preceded or accompanied by Course 4.

INTRODUCTORY COURSES

3. Soil Physics and Management. Origin, mechanical composition, classification, and physical properties of soils; tillage operations in relation to moisture supply, micro-organisms of the soil. Lecture, laboratory and field work. Alway, McMiller.

4. Soil Fertility and Fertilizers. Chemical composition of soils; effects of different systems of farming; farm manures and green manures; fertilizers, composition and uses; unproductive soils and their reclamation. Lecture, laboratory, and field work. Alway, McMiller.

ADVANCED COURSES

101. Physical Properties of Soils. Mechanical analysis of soils; determination of their physical constants; study, in both laboratory and field, of the movement of water in soils. Alway, Rost.

103. Analysis of Fertilizers. A laboratory course in the analysis of the different products used as fertilizers or as soil amendments. Gortner.

104. Chemical Analysis of Soils. The determination of the most important soil constituents by the various methods used both in the United States and in Europe. Gortner.

VEGETABLE PATHOLOGY AND BOTANY

Professor Edward M. Freeman; Assistant Professors Wieland L. Oswald, Elvin C. Stakman; Instructors Robert C. Dahlberg, Estelle Louise Jensen, Arne G. Tolaas.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Plant Pathology.....	3	Jr.	1 yr. Botany
2.	Industrial Mycology.....	3	Jr.	1
5.	Wood Technology.....	3	Jr. (For.)	1 yr. Botany
7.	Weeds and Grasses.....	3	Soph., jr., sr.	1 yr. Botany

No.	Title	Credits	Offered to	Prereq. courses
9.	Seed Testing	3	Soph., jr., sr.	1 yr. Botany
12.	Seed Problems	3	Jr., sr.	9
14.	Plant Disease Control	3	Jr., sr.	1, Ent. 3
101-102.	Advanced Pathology	6†	Jr., sr.	1, 2

†Both semesters must be completed before credit is allowed for the first semester.

INTRODUCTORY COURSES

1. PLANT PATHOLOGY. Elementary study of plant diseases due to fungi bacteria and slime molds; life-histories and preventive methods. Lecture, laboratory, and reference. FREEMAN, TOLAAS.

2. INDUSTRIAL MYCOLOGY. Morphology, classification, and physiology of bacteria, yeasts and molds with particular reference to those of economic importance. Lectures and laboratory. STAKMAN, TOLAAS.

5. WOOD TECHNOLOGY. For statement, see bulletin of the College of Forestry.

7. WEEDS AND GRASSES. Agricultural and applied botanical study of weeds and grasses with special reference to agricultural importance. OSWALD.

9. SEED TESTING. Detailed study of seed testing methods and seed legislation. Weed and crop seeds studied with special reference to identification. OSWALD, DAHLBERG.

12. SEED PROBLEMS. Special seed problems are assigned. Advanced work in seed testing methods. OSWALD, DAHLBERG.

14. PLANT DISEASE CONTROL. A detailed study of methods of controlling diseases of plants of parasitic origin. Spray materials and spray machinery. Practical applications. STAKMAN, TOLAAS.

ADVANCED COURSE

101-102. ADVANCED PATHOLOGY. Cultural and laboratory methods in plant pathology. Detailed study of bacterial and fungous plant parasites and diseases not known to be of parasitic origin. Problems in plant diseases. Required for specializing in pathology or entomology. STAKMAN.

VETERINARY SCIENCE

Professor MYRON H. REYNOLDS; Assistant Professors WILLARD L. BOYD, HORACE PRESTON HOSKINS; Instructor CHARLES C. PALMER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
*1.	Anatomy of Digestion	1½	Sr.	None
†3.	Physiology of Nutrition	1½	Sr.	1
6.	Veterinary Medicine	3	Jr.	None
*10.	Anatomy of Locomotion and Conformation	2	Jr., sr.	6
12.	Common Diseases of Domestic Animals	3‡	Sr.	6
14.	Hog Cholera	1	Jr., sr.	None

*First half of semester.

†Second half of semester.

‡Credits (1½) will be given for completion of work of first half of semester to students specializing in Agricultural Education.

INTRODUCTORY COURSES

1. ANATOMY OF DIGESTION. Anatomy of digestive organs of horse, cow, sheep, and hog compared in dissection, reading, and lecture as basis for intelligent feeding. PALMER.

3. PHYSIOLOGY OF NUTRITION. Physiology of digestion from standpoint of animal husbandryman. Digestive fluids, nervous mechanism, incomes and expenditures, sources of heat supply and heat loss, and metabolism. PALMER.

6. VETERINARY MEDICINE. Anatomy, animal physiology and veterinary pathology in relation to common diseases. Causes and prevention of diseases. Elements of diagnosis. Common Medicines. Lameness and unsoundness. Common infectious diseases. REYNOLDS.

10. ANATOMY OF LOCOMOTION AND CONFORMATION. The bones, articulations, and muscles involved in conformation and locomotion. Intended to give anatomy basis for intelligent understanding of conformation and locomotion.

12. COMMON DISEASES OF DOMESTIC ANIMALS. Cause, diagnosis, prevention, and treatment of common diseases capable of easy diagnosis and either prevention or simple treatment. General principles of diagnosis are reviewed also preparation and administration of common medicines. BOYD.

14. HOG CHOLERA. A detailed study of various phases of hog cholera and the use of serum. Lectures and laboratory work. Course intended especially for students specializing in Animal Husbandry and Agricultural Education. HOSKINS.

ANIMAL BIOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors HENRY F. NACHTRIEB, THOMAS S. ROBERTS, CHARLES P. SIG-

ERFOOS; Associate Professor HAL DOWNEY; Assistant Professors OSCAR W. OESTLUND, ELMER J. LUND; Instructor GEORGE D. ALLEN; Assistant ADOLPH RINGOEN.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3-4.	General Zoology	6*	All	None
7-8.	Histology and Embryology	6*	Soph., jr., sr.	3-4
9-10.	General Zoology	6*	Fr. in H. E.	None
15-16.	General Physiology	6*	Soph., jr., sr.	3-4
23-24.	Entomology	6*	Soph., jr., sr.	3-4
28.	Ornithology	3	Soph., jr., sr.	3-4
31-32.	Nature Study	2	Soph., jr., sr.	12 credits
51.	Protozoology	3	Jr., sr.	9 credits inc. 3-4

*Both semesters must be completed before credit is given.

INTRODUCTORY COURSES

3-4. GENERAL ZOOLOGY. A survey of the animal kingdom emphasizing the principles of development and structure in relation to function and habit, heredity and evolution and the animals of economic importance. Lectures, quizzes, and laboratory. NACHTRIEB, ALLEN, RINGOEN.

7-8. HISTOLOGY AND EMBRYOLOGY. A comparative microscopic study of the origin and structure of the tissues of vertebrates and invertebrates, and of the organs of mammals. A preparatory course for most of the advanced courses. Textbook, lectures, and laboratory. DOWNEY and Assistant.

9-10. GENERAL ZOOLOGY. A course in general zoology for the students in the Home Economics section. Emphasis will be given to the classes having a more direct bearing on home economics. Lectures, quizzes, and laboratory work. NACHTRIEB, ALLEN, RINGOEN.

15-16. GENERAL PHYSIOLOGY. The functional characteristics of living substance as seen in the cell, tissues, organs, and organisms; theories of the origin of life and death. Textbook, lectures, demonstrations, and laboratory. LUND.

23-24. ENTOMOLOGY. Elements of entomology leading up to discussion of the principles of taxonomy and their application to the classification of insects. Textbook, lectures, quizzes, and laboratory work. OESTLUND.

28. ORNITHOLOGY. The study of the structure and classification of birds with special reference to the common birds of Minnesota. Laboratory, textbook, lectures, and quizzes. Some field work. ROBERTS.

31-32. NATURE STUDY. Discussions, reference, field, and laboratory work once a week through the year. Especially for the fitting of teachers in secondary schools. SIGERFOOS.

51. PROTOZOOLOGY. Lectures, reference, field, and laboratory work on the structure and life-histories of Protozoa, wtih special reference to the relations of the Protozoa to diseases of animals. May be combined with Course 56 for a year course. SIGERFOOS.

BOTANY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors FREDERIC E. CLEMENTS, CARL OTTO ROSENDAHL, JOSEPHINE E. TILDEN; Assistant Professors HERBERT F. BERGMAN, FREDERIC K. BUTTERS, NED L. HUFF; Assistants DONALD FOLSOM, FRANCES LONG, HARVEY STALLARD.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a.	General Botany	3	All	None
1b.	General Botany	3	All	None
2.	Structural Botany	3	All	1 or 3a
3a.	Evolution of Plants	3	All	1 or equivalent
3b.	Evolution of Plants	3	All	1
4.	Field and Garden Botany	3	All	1 or 3a
	Intermediate Courses			
5-6.	Plant Morphology	3 or 6	Soph., jr., sr.	6 credits: see note under course
7-8.	Taxonomy	3 or 6	Soph., jr., sr.	6 credits: see note under course
9-10.	Physiology and Ecology	3 or 6	Soph., jr., sr.	6 credits
11-12.	Industrial Botany	3 or 6	Soph., jr., sr.	6 credits, including 2 or 3
13-14.	Mycology	3 or 6	Soph., jr., sr.	6 credits
	Advanced Courses			
101-102.	Applied Ecology	3 or 6	Jr., sr.	9 credits
103.	Foodstuffs and Textiles	3	Jr., sr.	9 credits
105-106.	Algae	6	Jr., sr.	9 credits
107-108.	Mosses and Ferns	6	Jr., sr.	9 credits, including 2 or 3 or 5-6
110.	Gymnosperms	3	Jr., sr.	7-8 or 107-108
111-112.	Advanced Taxonomy	6	Jr., sr.	7-8
113-114.	Advanced Ecology	6	Jr., sr.	9-10
115-116.	Advanced Physiology	6	Jr., sr.	9-10
117-118.	Cytology	6	Jr., sr.	18 credits
119-120.	Advanced Industrial Botany	6	Jr., sr.	11-12
121-122.	Plant Studies and Methods	6	Jr., sr.	12 credits

INTRODUCTORY COURSES

1a. GENERAL BOTANY. A study of the external form and organs of flowering plants, root, stem, leaf, fruit and seed, and of their relations to each other, together with simple greenhouse experiments to illustrate

the various functions. CLEMENTS, BUTTERS, HUFF, BERGMAN, FOLSOM, LONG, STALLARD.

1b. GENERAL BOTANY. Same as Course 1a.

2. STRUCTURAL BOTANY. A study of the microscopic structure of flowering plants, the cell, tissues and tissue systems, as seen in the root, stem, leaf, etc. BUTTERS, STALLARD.

3a. EVOLUTION OF PLANTS. A comparative study of selected types of plants, illustrating the evolution of land plants from the simplest forms. HUFF, BERGMAN.

3b. EVOLUTION OF PLANTS. Same as Course 3a.

4. FIELD AND GARDEN BOTANY. Greenhouse, garden and field study of the form, behavior, naming and relationships of flowering plants, together with individual problems in the pollination, reproduction and propagation of common flower types. CLEMENTS, FOLSOM, LONG.

INTERMEDIATE COURSES

Either semester in the following courses open to students with the proper prerequisites.

5-6. PLANT MORPHOLOGY. A comparative study of the form, structure and life history of typical algae, fungi, liverworts, mosses, ferns and seed plants. Course 6 but not 5, open to those who have taken Course 3. BUTTERS.

7-8. TAXONOMY. A general study of the classification and relationships of flowering plants. Laboratory and field practice in the determination of species, together with lectures and quizzes. Course 8 (but not 7) open to those who have taken Course 4. ROSENDAHL.

9-10. PHYSIOLOGY AND ECOLOGY. Greenhouse and field study of physical factors and plant responses, absorption, transport, water loss, nutrition, growth, fertilization, reproduction and adaptation; field study of habitat, migration, competition, invasion, and succession. CLEMENTS.

11-12. INDUSTRIAL BOTANY. Laboratory study of the plants which are useful to man, including those which furnish food, shelter, fuel, clothing, etc. TILDEN.

13-14. MYCOLOGY. The classification and life history of the various groups of fungi, based on identification, field work, and cultures. CLEMENTS.

ADVANCED COURSES

101-102. APPLIED ECOLOGY. A study of the physiological processes and the ecological principles and methods involved in the production of field,

garden and forest crops. Either semester open to students who have had introductory botany, physiology and ecology. CLEMENTS.

103. PLANT FOODSTUFFS AND TEXTILES. A special study of the botany of foods, textile fibers and fabrics, together with an inquiry into the relation of plants to household processes and problems. For young women. TILDEN.

105-106. ALGAE. A detailed comparative study of the structure and classification of the algae, including an examination of blue-green and green freshwater forms and the more important brown and red marine species. TILDEN.

107-108. COMPARATIVE MORPHOLOGY OF MOSSES AND FERNS. Designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lecture, laboratory, and field work. BUTTERS.

110. MORPHOLOGY AND TAXONOMY OF GYMNOSPERMS. A comparative study of cycads, conifers, and their allies, their structure and history with especial attention to the classification of living forms. Lectures, reference reading, and laboratory work. Not offered in 1915-16. BUTTERS.

111-112. ADVANCED TAXONOMY. An advanced course in which special attention is given to the taxonomy of difficult natural groups, involving systematic principles and practice, rules of nomenclature, systems of classification, etc. Laboratory, field work, lectures, and quizzes. ROSENDAHL.

113-114. ADVANCED ECOLOGY. A critical study of plant habitats by means of instruments and the adaptations produced by water and by light, together with careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work. CLEMENTS.

115-116. ADVANCED PLANT PHYSIOLOGY. A study of the relations of factor, function, and structure in the various organs of plants, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work. CLEMENTS.

117-118. CYTOLOGY. A survey of cell structure and the various phenomena of division, fusion, and metamorphosis, together with a review of the history of cytological investigation. Methods of cytological research indicated in the laboratory. ROSENDAHL.

119-120. ADVANCED INDUSTRIAL BOTANY. A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and uses of these products and the processes by which they are obtained from the plants. TILDEN.

121-122. PLANT STUDIES AND METHODS. Nature study and high-school botany are presented as they are to be taught; the material is taken up in detail in proper sequence. Training in method is afforded by practice in the University High School. CLEMENTS.

CHEMISTRY

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

Professor GEORGE B. FRANKFORTER; Assistant Professor IRA H. DERBY; Instructors ROSS A. BAKER, WOLF KRITCHEVSKY, EARL PETTIJOHN, FREDERICK W. POPPE.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3a-4b.	Adv. General Chem. and Qualitative Analysis	6*	Fr., soph., jr.	Entrance credit in Chem.
3b-4a.	Adv. General Chem. and Qualitative Analysis	6*	Fr., soph., jr.	Entrance credit in Chem.
33.	General Chem. and Qual. Analysis	5**	Fr., soph., jr.	None
35-36.	Organic Chemistry	8*	Soph., jr., sr.	3-4 or 7-8
121-122.	Physical Chemistry	4*	Jr., sr.	36, Phys. 2 and 4
123-124.	Physico-Chemical Laboratory	2*	Jr., sr.	See statement

*Both semesters must be completed before credit is given for the first semester.
**Course 4b must be completed before credit is given.

INTRODUCTORY COURSES

3a-4b. ADVANCED GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Lectures, recitations, and laboratory work. General descriptive chemistry, including the fundamental theories and laws, and qualitative analysis. FRANKFORTER, BAKER, PETTIJOHN, POPPE.

3b-4a. ADVANCED GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Same as Course 3a-4b.

33. GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Designed for those who have had no high school chemistry; in preparation for Course 4b. See statement under 3a-4b. FRANKFORTER, BAKER, PETTIJOHN, POPPE.

35-36. ORGANIC CHEMISTRY. This course includes the aliphatic and the aromatic series with the preparation of the more important compounds. FRANKFORTER, KRITCHEVSKY.

ADVANCED COURSES

121-122. PHYSICAL CHEMISTRY. A consideration of the theories and laws, phenomena and processes which form the basis of chemical science. Charts, models, and experiments are employed to supplement and illustrate the discussions. DERBY.

123-124. PHYSICO-CHEMICAL LABORATORY PRACTICE. Open only to students pursuing Course 121-122 or who have had it or its equivalent. Physico-chemical methods and measurements. DERBY.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors JOHN H. GRAY, E. DANA DURAND; Assistant Professors J. FRANKLIN EBERSOLE, THOMAS WARNER MITCHELL; Instructors LLOYD M. CROSGRAVE, H. G. HAYES.

COURSES

General Courses (given, except 4a,b, at University Farm)

No.	Title	Credits	Offered to	Prereq. courses
1b.	Indust. Hist. since 1750	3	All	None
2a.	Indust. and Commerce of U. S.	3	All	None
3a,b.	Elements of Economics	3	Soph., jr., sr.	None
4a,b.	Advanced Economics	3	Soph., jr., sr.	1 or 2, and 3
18.	Agricultural Economics	3	Soph., jr., sr.	1 or 2, and 3
19.	Marketing of Farm Products	3	Jr., sr.	1 or 2, and 3
251-2.	Sem. in Agric. Economics	6*	Sr.	1 or 2, 3 and either 18 or 19

Specialized Courses (given only at University Campus)

13.	Econ. Geog. of For. Countries	3	Soph., jr., sr.	1 or 2
15.	Forest Econ. and Conservation	3	Jr., sr.	1 or 2
34.	Business Management	3	Soph., jr., sr.	1 or 2 and 3
35-36.	Accounting Principles	6*	Soph., jr., sr.	None
43a,b.	Banking	3	Soph., jr., sr.	1 or 2 and 3
46.	Property Insurance	3	Soph., jr., sr.	1 or 2
73.	Railway Problems	3	Jr., sr.	1 or 2 and 3 other credits
91.	Public Finance	3	Jr., sr.	1 or 2 and 3 other credits
101.	Statistics	3	Jr., sr.	1 or 2 and 6 other credits
141.	Money and Prices	3	Jr., sr.	1 or 2 and 3 other credits
145.	The Modern Business Corporation	3	Jr., sr.	1 or 2 and 3 and 3 other credits
161.	Labor Problems	3	Jr., sr.	1 or 2
164.	Econ. Functions of the State	3	Jr., sr.	1 or 2 and 3 and 3 other credits

Other specialized courses are given at the University Campus and may be elected under certain conditions (see catalog of S. L. A.)

*Both semesters must be completed before credit is given for the first semester.

GENERAL COURSES

(Courses 1a and 2b, same as 1b and 2a, are given at the University Campus.)

1b. INDUSTRIAL HISTORY SINCE 1750. Economic effects of inventions, wars, political changes, increased supply of precious metals, improved trans-

portation, and modifications of business organization in chief European countries and the United States. GRAY.

2a. INDUSTRIES AND COMMERCE OF THE UNITED STATES. Agricultural, mining, manufacturing industries and internal and foreign commerce. Industries and commerce of the several sections of the country. Leading individual industries: geographical distribution, methods of reorganization, production and marketing, and relationships to one another. DURAND.

3a. ELEMENTS OF ECONOMICS. Elements of economic theory with special reference to present-day economic and social problems. Textbook, lectures and discussions. HAYES.

3b. ELEMENTS OF ECONOMICS. Same as Course 3a.

4a. ADVANCED ECONOMICS. An advanced course in economic theory, devoted chiefly to a study of recent theories of distribution. Assigned readings, reports and discussions. HAYES.

4b. ADVANCED ECONOMICS. Same as Course 4a.

18. PRINCIPLES OF AGRICULTURAL ECONOMICS. The fundamentals of economics applied to agricultural organization and management, with special attention to factors affecting prices of agricultural products and to questions of land tenure and agricultural credit. Lectures and assigned readings. DURAND.

19. MARKETING OF FARM PRODUCTS. The organization and methods of marketing; the functions of middlemen; the costs of marketing various products; produce exchanges; future trading; coöperative marketing. Textbook with lectures and special reports. Not given in 1915-16. DURAND.

251-252. SEMINAR IN AGRICULTURAL ECONOMICS. Research problems in the marketing and distribution of farm products, agricultural credit, farm ownership and tenancy, and agricultural organizations. DURAND.

SPECIALIZED COURSES

13. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES. Economic basis of modern civilization; localization of industries; principal extractive, manufacturing and distributive industries of leading foreign countries, especially markets for American manufacturers. Textbook with lectures and special reports. HAYES.

15. FOREST ECONOMICS AND CONSERVATION. Development of forest policies; relation of forests to other industries; effects of transportation rates and taxation; general problem of the conservation of natural resources. Lectures, assigned readings, and reports.

34. BUSINESS MANAGEMENT. The principles of efficiency in business op-

eration and forms of organization to apply them; the typical departments of a business; their functions, office organization and administration. Textbook, assigned readings, and lectures. MITCHELL.

35-36. PRINCIPLES OF ACCOUNTING. Purposes of accounts and principles of account classification; capital and revenue; accruals; principles of valuation; depreciation; preparation and interpretation of balance sheets, income accounts, and other business statements; corporation accounts. Laboratory course with supplementary lectures. MITCHELL.

43a. PRINCIPLES AND PRACTICE OF BANKING. Contemporary banking institutions, both national and state; their incorporation, organization, administration; reserves, note issues, clearing houses, domestic and foreign exchange; the banking systems of foreign countries; and the Federal Reserve Banks of the United States. EBERSOLE.

43b. PRINCIPLES AND PRACTICE OF BANKING. Same as Course 43a.

46. PROPERTY INSURANCE. Basic theory and critical examination of policy contracts of fire, marine, other casualty, title, and credit insurance. Textbook, lectures, and assigned readings.

73. RAILWAY PROBLEMS. Methods of railway organization and operation; statistics of operation and finance; economic principles of rate-making and of government regulation; railroad discriminations; competition, pooling and combinations. Foreign railways. Lectures, assigned readings and special topics. CROSGRAVE.

91. PUBLIC FINANCE AND TAXATION. The state as an economic organism; public expenditures from the viewpoint of public wants; budget systems; public revenues from public domains and industries; tax systems and tax reforms. Textbook with lectures and reports on special topics. HAYES.

101. THEORY AND PRACTICE OF STATISTICS. Principles of collection, tabulation, and interpretation of statistical material, illustrated by present-day statistical data. Lectures, assigned readings, and special investigations by individual members of the class. DURAND.

141. MONEY AND PRICES. The functions of money; the nature and effects of credit; changes in prices as shown by index numbers; international movements of gold; monetary standards and currency systems; the problem of securing an ideal money. EBERSOLE.

145. THE MODERN BUSINESS CORPORATION. The organizing, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. GRAY.

161. LABOR PROBLEMS. Modern labor-problems: woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work, profit sharing, coöperation, labor unions, strikes, boycotts,

conciliation and arbitration; economic causes and effects of immigration. CROSGRAVE.

164. THE ECONOMIC FUNCTIONS OF THE STATE. Proper limits of state interference. How far can private property, freedom of contract, and individual liberty be modified without lessening economic production. Relation of education, equality of opportunity, and democratizing of industry to general welfare. GRAY.

EDUCATION

COLLEGE OF EDUCATION

Professors LOTUS D. COFFMAN, ALBERT W. RANKIN, FLETCHER H. SWIFT; Assistant Professor RAYMOND A. KENT.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Brief Course in the Hist. of Educ.	3	Jr., sr.	Phil. 1-2
1b.	Brief Course in the Hist. of Educ.	3	Jr., sr.	Phil. 1-2
3a.	Technique of Teaching.....	3	Jr., sr.	Phil. 1-2
3b.	Technique of Teaching.....	3	Jr., sr.	Phil. 1-2
101.	History of Educ. to Reformation..	3	Jr., sr.	Phil. 1-2 and 6 credits in dept. of History.
102.	Hist. of Educ. since Reformation..	3	Jr., sr.	Phil. 1-2 and 6 credits in dept. of History.
104.	Principles of Teaching.....	3	Sr.	1 or 101-102 and 3
105.	Educational Psychology.....	3	Sr.	1 or 101-102 and 3
111a.	Social Aspects of Education.....	3	Sr.	1 or 101-102 and 3
111b.	Social Aspects of Education.....	3	Sr.	1 or 101-102 and 3

1a. BRIEF COURSE IN THE HISTORY OF EDUCATION. Current school problems and educational theories in the light of their history. Emphasis upon secondary education and those aspects of education of most immediate concern to high school teachers. SWIFT.

1b. BRIEF COURSE IN THE HISTORY OF EDUCATION. Same as Course 1a.

3a. TECHNIQUE OF TEACHING. Types of classroom exercises; preparation of teaching plans; hygiene of instruction; classroom management; the professional ethics of teaching; observation of high school work. COFFMAN.

3b. TECHNIQUE OF TEACHING. Same as Course 3a.

101. HISTORY OF EDUCATION TO THE REFORMATION. An interpretative historical study of educational institutions and ideals, designed for those who wish a more comprehensive historical view than can be gained in Education 1. The foundations of modern education,—Hebrew, Greek, Roman, Medieval. SWIFT.

102. HISTORY OF EDUCATION SINCE THE REFORMATION. Modern education-

al movements, current theories, and standards in the light of their history. For fuller description of general character of course, see Course 101. SWIFT.

104. PRINCIPLES OF METHOD. An advanced course in principles of method with special application to high school subjects.

105. EDUCATIONAL PSYCHOLOGY. An advanced course in psychology of the learning process.

111a. SOCIAL ASPECTS OF EDUCATION. The school as a community factor; the present peculiar relation of the school to social problems; the function of the school in these relations. KENT.

111b. SOCIAL ASPECTS OF EDUCATION. Same as Course 111a. RANKIN.

ENGLISH

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors RICHARD BURTON, HARDIN CRAIG, ELMER STOLL; Assistant Professors JOSEPH W. BEACH, OSCAR W. FIRKINS, GEORGE N. NORTHROP.

The following courses are recommended for election by the students of the College of Agriculture; other courses also open for election will be found in the bulletin of the College of Science, Literature, and the Arts.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Gen. Survey Eng. Literature	6	Soph., jr., sr.	Rhet. 1-2
5a.	Chaucer	3	Soph., jr., sr.	1-2
55.	Shakespeare	3	Jr., sr.	1-2
59-60.	Modern Drama	6	Sr.	1-2
62.	Milton	3	Jr. sr.	1-2
63.	19th Century Literature	3	Jr., sr.	1-2
66.	Browning and Tennyson	3	Jr., sr.	1-2
68.	English Novel	3	Jr., sr.	1-2
108.	Romantic Movement	3	Jr., sr.	1-2
115.	English Idiom	3	Jr., sr.	1-2
118.	Bible as Literature	3	Jr., sr.	1-2
121.	American Literature	3	Jr., sr.	1-2

1-2. GENERAL SURVEY OF ENGLISH LITERATURE (includes the literature produced in the United States). Lectures, recitations, and assigned readings. Designed to cover the whole period in historical outline, and to prepare for a more minute study of special periods. The class will meet in recitation sections once a week. CRAIG, BEACH, NORTHROP.

5a. CHAUCER. The grammar and literary forms of fourteenth-century English, with selected readings from Chaucer's works. Special attention to the *Canterbury Tales*. Open to students who have taken or are taking Course 1-2. FIRKINS, BEACH.

55. SHAKESPEARE. An introductory study of Shakespeare's development as a poet and dramatist, with reading of representative plays. CRAIG, NORTHROP.

59-60. THE MODERN DRAMA. Contemporary drama from 1870 to the present; the new impulse in dramatic literature under the stimulus of latter-day thought. BURTON.

62. MILTON. The principal poets of the time of Charles I and the Protectorate with special emphasis upon Milton. NORTHROP.

63. OUTLINE OF NINETEENTH-CENTURY LITERATURE. The main features of Victorian literature, with particular emphasis upon the poetry of Arnold and the prose of Carlyle. NORTHROP.

66. BROWNING AND TENNYSON. A reading of the representative work of the two major poets of the Victorian era, in order to show their quality and contrasted power. STOLL.

68. THE ENGLISH NOVEL. Principles and personalities in the evolution of the English novel. Written reports on selected novels. CRAIG.

108. THE ROMANTIC MOVEMENT. The Romantic School of poets from Wordsworth to Keats and the influence of the revolution in France. CRAIG.

115. ENGLISH IDIOM. A discussion of current idiom with the purpose of relating it to the underlying principles of historic development. BURTON.

118. THE BIBLE AS LITERATURE. A literary study of the Old Testament with special attention to forms and the critical study of selected readings. BURTON.

121. AMERICAN LITERATURE. Lectures on American literature, with extensive readings from the principal poets and prose writers of this country. CRAIG.

FORESTRY

COLLEGE OF FORESTRY

Professor E. G. CHEYNEY; Associate Professor J. P. WENTLING.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
21.	Farm Forestry	3	Jr.	None

21. FARM FORESTRY. A study of the establishment, care, maintenance, and utilization of the farm woodlot and windbreaks. A sketch of the forestry work in Minnesota and the United States. CHEYNEY, WENTLING.

GEOLOGY AND MINERALOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor WILLIAM H. EMMONS; Assistant Professors FRANK F. GROUT, CHESSLEY J. POSEY; Instructors A. WALFRED JOHNSTON, EDGAR K. SOPER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Geology	3	Soph., jr., sr.	None
3.	Laboratory Work	1	Soph., jr., sr.	Supports 1
4.	Geology of Minnesota	3	Soph., jr., sr.	1
5.	Economic Geology	3	Soph., jr., sr.	1
21.	Elements of Mineralogy	3	Soph., jr., sr.	See statement
29.	General Physiography	3	Soph., jr., sr.	None
34.	Meteorology	3	Soph., jr., sr.	1 or 29

INTRODUCTORY COURSES

1. GENERAL GEOLOGY. A synoptical treatment of materials of the earth and of geologic processes. Physiographic, dynamic and structural geology, with a brief introduction to historical geology. Lectures, laboratory work, field excursions, map study, and conferences. EMMONS, JOHNSTON.

3. LABORATORY WORK. Open only to students taking Course 1. Supplements Course 1 with study of rocks and ores, topographic and geologic maps and reference reading. JOHNSTON and Assistants.

4. GEOLOGY OF MINNESOTA. The physical geography and geological history of Minnesota. The relations of industrial development to geological features. The principles of pre-Cambrian geology as exemplified in Minnesota. JOHNSTON.

5. ECONOMIC GEOLOGY. The mineral resources of the United States. The origin, occurrence, distribution, and uses of the more important minerals and mineral fuels of economic value. Lectures, map work, conferences, and field excursions. SOPER.

21. ELEMENTS OF MINERALOGY. Open to students taking Chemistry. The crystal systems; morphological, physical, and chemical character of minerals; occurrence, genesis, and uses of minerals; classification and description of common minerals. Determinative work in laboratory, blowpipe analysis, sight identification. GROUT.

29. GENERAL PHYSIOGRAPHY. Principles of earth sculpture; physiographic changes in progress, and agencies causing them; hydrography and oceanography; planetry relations; climatology; laboratory conferences on interpretation of topographic maps, field excursions. POSEY.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor CARL SCHLENKER; Assistant Professors OSCAR C. BURKHARD, WALTER R. MYERS; Instructors JAMES DAVIES, J. THEODORE GEISSENDOERFER, ARTHUR R. GRAVES, ALFRED E. KOENIG, LEON METZINGER, ROBERT P. MORE, T. H. SCHROEDEL, HAROLD W. SOULE, RICHARD WISCHKAEMPER; Assistant ARNOLD W. SHUTTER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Beginning	6	All	None
1b.	Beginning	6	All	None
2a.	Intermediate	6	All	1
2b.	Intermediate	6	All	1
3.	Intermediate	3	All	1 or equiv.
4.	Intermediate	3	All	3
5.	Prose and Poetry	3	All	2 yrs. of prep. German
6.	Prose and Poetry	3	All	5
7.	Classic Drama	3	All	4 or 6 or 4 yrs. prep. German
8.	Modern Drama	3	All	7
21-22.	Scientific Intermediate	*6	All	1 or equiv.
23-24.	Scientific Advanced	*6	All	22 or 2 or 4. yrs. prep. Ger.

*Both semesters must be completed before credit is given for the first semester.

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1a. BEGINNING. Double course given each semester as a six-hour course. Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse. MYERS, DAVIES, GRAVES, KOENIG, METZINGER, SCHROEDEL, SOULE, SHUTTER.

1b. BEGINNING. Same as Course 1a.

2a. INTERMEDIATE. Double course given each semester as six-hour course. Selected texts in modern narrative and descriptive prose; selected lyrics and ballads; a drama of Lessing, Goethe or Schiller. Assigned readings of texts outside of class. MYERS, DAVIES, GRAVES, KOENIG, METZINGER, SCHROEDEL, SOULE, SHUTTER.

2b. INTERMEDIATE. Same as Course 2a.

3-4. INTERMEDIATE. Is the same as Course 2, but given as a three-hour course throughout the year. This course will not be given after 1915-16. GRAVES.

5-6. PROSE AND POETRY. Geography, history, and legend. Review of Ger-

man grammar throughout the year. BURKHARD, DAVIES, GEISSENDOERFER, METZINGER, MORE, SOULE, WISCHKAEMPER.

7-8. DRAMA. First semester: classic drama; plays of Lessing, Goethe, Schiller. Second semester: modern drama; plays of Hebbel, Sudermann, Hauptmann and others. Assigned readings and reports throughout the year. METZINGER.

21-22. SCIENTIFIC INTERMEDIATE. This course aims to give students a reading knowledge of German for use in scientific studies. Not open to those who have obtained credit for either Course 3-4 or 5-6. GEISSENDOERFER.

23-24. SCIENTIFIC ADVANCED. Reading of monographs and periodicals. Not open to those who have obtained credit for Course 7-8. WISCHKAEMPER.

HUMAN PHYSIOLOGY

MEDICAL SCHOOL

Professor ELIAS P. LYON; Associate Professors RICHARD O. BEARD, FREDERICK H. SCOTT; Assistant Professor M. RUSSEL WILCOX; Instructors FRANCIS B. KINGSBURY, J. F. MCCLENDON, C. J. V. PETTIBONE, GERTRUDE THOMAS; Assistants ROY E. CRUZEN, LYLE J. ROBERTS.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3a.	Elem. Human Physiology	3	All	1 yr. Chem., ½ yr. Biol.
3b.	Elem. Human Physiology	3	All	1 yr. Chem., ½ yr. Biol.
*4.	Elementary Physiology and Physiologic Chemistry	5	All	Elem. Chem. and Biol. or Anat.
52.	Physiologic Chemistry	4	Jr., sr.	Organ. Chem.
53.	Physiol. Muscle, etc	4	Jr., sr.	An. Biol. 1-2
54.	Physiol. Nerv. Sys., etc	4	Jr., sr.	An. Biol. 1-2
101.	Urinalysis: Advanced Methods	2	Jr., sr.	Physiol. 52
103.	Metabolism	2	Jr., sr.	Physiol. 52
105-106.	Physical Chem. of Cells and Tissues	3 or 6	Jr., sr.	Organ. Chem. and An. Biol. 1-2
115-116.	Advanced Physiologic Chem	Ar.	Jr., sr.	Ph. 52
117-118.	Advanced Physiology	Ar.	Jr., sr.	Physiol. 53
120.	Physiology of Development	2	Jr., sr.	An. Biol. 1-2 or Phy. 3
125.	Foods and Practical Dietetics	2	Jr., sr.	Gen'l Chem. and Qual. Anal. and Phy. 3 or 4

*Students may not receive credit for both Courses 3 and 4.

For a full list of courses offered by the department, see the bulletin of the Medical School.

INTRODUCTORY COURSES

3a. ELEMENTARY HUMAN PHYSIOLOGY. Primarily for Home Economics students; open to others. Lectures and laboratory work. LYON, BEARD, SCOTT.

3b. ELEMENTARY HUMAN PHYSIOLOGY. Same as Course 3a.

*4. ELEMENTARY PHYSIOLOGY AND PHYSIOLOGIC CHEMISTRY. Covers the essential facts. Lectures and laboratory work. SCOTT, PETTIBONE.

ADVANCED COURSES

52. PHYSIOLOGIC CHEMISTRY. The chemistry of the components of the animal body; foods, digestion, and the excreta. Lectures and laboratory work. PETTIBONE, KINGSBURY, MCCLENDON.

53. PHYSIOLOGY OF MUSCLE, NERVE, BLOOD, CIRCULATION, RESPIRATION. Lectures and laboratory work. LYON, BEARD, SCOTT, PETTIBONE, MCCLENDON, KINGSBURY.

54. PHYSIOLOGY OF THE NERVOUS SYSTEM AND SENSES, DIGESTION, METABOLISM, NUTRITION AND EXCRETION. Lectures and laboratory work. LYON, BEARD, SCOTT, WILCOX.

†101. URINALYSIS. Advanced methods. PETTIBONE.

‡103. PHYSIOLOGY OF METABOLISM. Students are placed on known diets and the results studied chemically. PETTIBONE.

105-106. PHYSICAL CHEMISTRY OF CELLS AND BIOLOGICAL FLUIDS. Physical chemistry of colloids, hydrogen ion concentration, surface tension, osmotic pressure, electric conductivity, their bearing on biochemical analysis, digestion, stimulation, anesthesia, muscular contraction and cell division. First semester may be taken for credit without second. MCCLENDON.

115-116. ADVANCED COURSE IN PHYSIOLOGIC CHEMISTRY. Qualified students may arrange with instructors for special work. Either semester may be taken without the other. PETTIBONE, KINGSBURY.

117-118. ADVANCED COURSE IN PHYSIOLOGY. An opportunity for qualified students to arrange with instructors for special work in various problems of physiology and physiologic chemistry. Either semester may be taken without the other. LYON, SCOTT, MCCLENDON.

120. THE PHYSIOLOGY OF DEVELOPMENT. A study of the physiology of the ovum, the embryo, and the foetus; of birth, infancy, childhood, adolescence, menstruation, ovulation, pregnancy, partuition, maturity, and old age. BEARD.

*Not given 1915-16.
†First eight weeks, first semester.
‡Second eight weeks, first semester.

125. FOODS AND PRACTICAL DIETETICS. Study of human foods; their composition; the principles of food selection; caloric indices; balanced dietetics. Exercises in practical dietetics covering the principles of food preparation with typical illustrations of the method. Limited to 12 students. BEARD AND THOMAS.

MUSIC

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor CARLYLE SCOTT; Instructor DONALD FERGUSON; Special Instructors.

Credit is offered to seniors and juniors in the College of Agriculture who may wish to elect work in the Department of Music in the College of Science, Literature, and the Arts. Six credits may be obtained. The following courses are recommended:

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Harmony	3	Jr., sr.	None
13-14.	Pianoforte	4	Jr., sr.	See statement
15-16.	Violin	4	Jr., sr.	See statement
23-24.	Chorus	1	Jr., sr.	None
25-26.	Orchestra	1	Jr., sr.	None

1-2. HARMONY. The study of chords, their construction, relations, and progressions. Written exercises on basses, the harmonization of given melodies. SCOTT.

13-14. PIANOFORTE. Open to juniors who have mastered technical difficulties of the degree of Czerny's *School of Velocity* and the easier Haydn and Mozart sonatas. The fee is thirty-two or sixty-four dollars a semester. SCOTT, FERGUSON.

15-16. VIOLIN. Candidate must be able to play the first ten of Kreutzer's forty etudes, and the easier Handel and Mozart sonatas.

23-24. CHORUS. A popular course in choral practice for four-part mixed voices. SCOTT.

25-26. ORCHESTRA.

PATHOLOGY, BACTERIOLOGY, AND PUBLIC HEALTH

MEDICAL SCHOOL

Professor H. E. ROBERTSON; Assistant Professor WINFORD P. LARSON; Instructors ARTHUR T. HENRICI, MARGARET WARWICK.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
58.	General Bacteriology	5	Soph.	1 yr. Biol.

58. BACTERIOLOGY. General scope of bacteriology. Preparation of culture media. Morphological and biological character of bacteria. Methods of identification, sterilization, and disinfection. Bacteriology of water, milk, and air. Application of bacteriology to agricultural and industrial pursuits. LARSON, WARWICK, HENRICI.

NOTE: For further courses in this Department see the bulletin of the Medical School. Qualified students may elect any work in the Medical School for which they are prepared.

PHILOSOPHY AND PSYCHOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor NORMAN WILDE; Associate Professor DAVID F. SWENSON; Assistant Professors JAMES BURT MINER, HERBERT WOODROW; Instructors AUSTIN S. EDWARDS, RUPERT C. LODGE; Lecturer JOSEPH PETERSON.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	General Psychology	6	Soph., jr.	None
5a.	Elements of Psychology	3	Soph., jr.	None
5b.	Elements of Psychology	3	Soph., jr.	None
9a.	Logic	3	Soph., jr.	None
9b.	Logic	3	Soph., jr.	None
51a.	Ethics	3	Jr., sr.	6 credits
51b.	Ethics	3	Jr., sr.	6 credits

INTRODUCTORY COURSES

1-2. GENERAL PSYCHOLOGY. This course counts towards the university teacher's certificate. Aims and methods of psychology; facts and laws of mental life and the functions of the various mental processes in the adjustment of man and his environment. MINER, WOODROW, EDWARDS.

5a. ELEMENTS OF PSYCHOLOGY. This course counts toward the university teacher's certificate. For those who wish a brief outline of psychology either as preparatory to work in philosophy or as part of a general education. SWENSON, EDWARDS.

5b. ELEMENTS OF PSYCHOLOGY. Same as Course 5a.

9a. LOGIC. The nature of knowledge, the laws of reasoning, and the principles and methods of scientific proof. SWENSON, LODGE.

9b. LOGIC. Same as Course 9a.

51a. ETHICS. An introductory study of the principles of morals. LODGE.

51b. ETHICS. Same as Course 51a.

PHYSICAL EDUCATION FOR WOMEN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Assistant Professor J. ANNA NORRIS; Instructors MAY S. KISSOCK, EDITH G. RAYNOR, VALERIA LADD.

INTRODUCTORY STATEMENT

This department aims to look after the health of the women students. It gives physical examination and advice to all newly entering students; conducts systematic yearly consultations with and examines when necessary, all upper class students; gives courses in hygiene, organizes physical work to meet the various needs and physical tastes of students; cooperates closely with the Woman's Athletic Association in encouraging and organizing athletic sports; investigates cases of illness in dormitory and boarding houses.

Office open at regular hours to all students who desire consultation regarding their physical condition.

Work in this department is required of all newly entering students (see courses 1-2 and 11), and of all students permitted, for reasons connected with their physical condition, to carry less than the minimum number of credit hours. Physical examinations or consultations required annually of all students.

Elective work without credit arranged in social dancing, gymnastic dancing, swimming, fencing, basketball, baseball, skating, etc. Students standing not recorded in Registrar's office, but department takes responsibility of dropping from class such students as do not meet standards of class.

A large, new, well-equipped gymnasium will be ready for use in the autumn of 1915.

See page 78 for Physical Training on Agricultural College Campus.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Elementary Physical Training....	..	All. Required of all fr.	
3-4.	Intermediate Physical Training...	3	Soph., jr., sr.	Equivalent of 1-2
5-6.	Advanced Physical Training.....	3	Jr., sr.	3-4
11.	Preliminary Hygiene.....	3	Required of all new students	None
13.	Personal Hygiene.....	3	Jr. sr.	Animal Biology
14.	Hygiene of the Family.....	3	Sr.	Course 13

Six credits the maximum number that can be gained by taking courses in this Department (courses 3-4, 5-6) and in Physical Training, Agricultural College Campus; only one of these courses may be taken for credit in a semester.

1-2. ELEMENTARY PHYSICAL TRAINING. Lighter gymnastics; dances; games; swimming. Study of habits of daily living. Divided into sections according to physical capacity. Girls who cannot swim at end of freshman year required to register for swimming in sophomore year. KISSOCK, RAYNOR, LADD.

3-4. INTERMEDIATE PHYSICAL TRAINING. Advanced gymnastics, gymnastic dances, and organized team games. Includes study of daily habits of living and written abstract of one book each semester. If taken for no credit no reading or written work is required. KISSOCK.

5-6. ADVANCED PHYSICAL TRAINING. Advanced gymnastics and an election of dancing, fencing, or a sport. Includes a study of the daily habits of living and a written abstract of one book a semester. If taken for no credit no written work or reading will be required. LADD.

11. PRELIMINARY HYGIENE. Twelve lectures. The most essential aspects of the care of the body. NORRIS.

13. PERSONAL HYGIENE. The essential knowledge of the care of the body, including a brief consideration of its anatomy and a study of its physiology, the prevention of contagious diseases, and first aid to the injured. NORRIS.

14. HYGIENE OF THE FAMILY. A study of maternity and infancy and the essentials of home nursing. NORRIS.

PHYSICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors ANTHONY ZELENY,† HENRY A. ERIKSON; Associate Professor ALOIS F. KOVARIK; Assistant Professor LOUIS W. MCKEEHAN; Instructors E. O. DIETERICH, ARTHUR F. GORTON, EARLE H. KENNARD, PAUL E. KLOPSTEG, OTTO J. ZOBEL.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	General Physics	3	Soph. jr., sr.	Agr. Eng. 1 or 2 or registration in Agr. Eng. 1 or 2.
2.	General Physics	3	Soph. jr., sr.	1
3.	General Laboratory Practice	1	Soph. jr., sr.	See statement
4.	General Laboratory Practice	1	Soph. jr., sr.	See statement
5.	General Physics (Col. of Agr.)	3	Soph., jr., sr.	None
6.	General Physics (Col. of Agr.)	3	Soph., jr., sr.	5
17.	General Physics (Home Econ.)	3	Fr.	None
18.	General Physics (Home Econ.)	3	Fr.	17

1. GENERAL PHYSICS. Mechanics of solids and fluids, sound, heat. Treatment experimental rather than mathematical; the fundamental principles. First part of a general course 1-2. Should be taken in conjunction with Course 3, but may be taken separately. ZELENY, KLOPSTEG, DIETERICH, GORTON, ZOBEL.

2. GENERAL PHYSICS. Light, electricity, magnetism. Treatment experimental; fundamental principles, including radioactivity, ionization,

†Absent on leave 1915-16.

X-radiation, and electrical constitution of matter. Second part of general course 1-2. Should be taken in conjunction with Course 4, but may be taken separately. ZELENY, KLOPSTEG, DIETERICH.

3. GENERAL LABORATORY PRACTICE. Physical measurements in the mechanics of solids, fluids, sound, heat, giving students knowledge of experimental methods, and acquaintance with the fundamental facts. Open to all who have completed or are taking Course 1. McKEEHAN, KENNARD, DIETERICH, GORTON, ZOBEL.

4. GENERAL LABORATORY PRACTICE. Physical measurements in light, electricity and magnetism. Open to all who have completed or are taking Course 2, and have completed Course 3. McKEEHAN, KENNARD, DIETERICH.

5. GENERAL PHYSICS. Mechanics of solids and fluids, sound, and heat. Treatment experimental; the fundamental principles. The first part of a general course 5-6. Open to students registered in the College of Agriculture. ZELENY, KLOPSTEG, DIETERICH.

6. GENERAL PHYSICS. Light, electricity and magnetism. The second part of a general course 5-6. Open to students registered in the College of Agriculture. ZELENY, KLOPSTEG, DIETERICH.

17. GENERAL PHYSICS. Mechanics of solids and fluids, sound, and heat. Treatment experimental with special emphasis on applications to the household. The first part of a general course 17-18. Open to students in Home Economics. ZELENY, DIETERICH.

18. GENERAL PHYSICS. Light, electricity and magnetism. The second part of a general course 17-18. Open to students in Home Economics. ZELENY, DIETERICH.

POLITICAL SCIENCE

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor WILLIAM A. SCHAPER; Associate Professors CEPHAS D. ALLIN, JEREMIAH S. YOUNG; Assistant BENJAMIN W. PALMER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	American Government	3	Soph., jr., sr.	None
1b.	American Government	3	Soph., jr., sr.	None
5.	European Municipal Administration	3	Soph., jr., sr.	1
6.	American Municipal Administration	3	Soph., jr., sr.	1
7a.	State and Local Government	3	Soph., jr., sr.	1
7b.	State and Local Government	3	Soph., jr., sr.	1
26.	Commercial Law	2	Sr.	1 or Econ. 3

1a. AMERICAN GOVERNMENT. Organization and actual workings of the

national government; nature and origin of the American governmental system. SCHAPER, YOUNG, ALLIN, PALMER.

1b. AMERICAN GOVERNMENT. Same as Course 1a.

5. EUROPEAN MUNICIPAL ADMINISTRATION. A study of French, German, Austrian and English cities; the forms of government, parties and elections; achievements in finance, police, sanitation, with planning and other public services undertaken. SCHAPER.

5. AMERICAN MUNICIPAL ADMINISTRATION. A study of the organization and chief functions of American cities; their growth, relation to the state, forms of charters, inefficiency and corruption, reform measures; and the administration of finance, police, health and other activities. SCHAPER.

7a. STATE AND LOCAL GOVERNMENT. Comparison of American state governments, especially Minnesota; relation of state to the United States and to local units of government; recent experiments such as initiative and referendum, the recall and primaries; social and economic legislation. YOUNG, PALMER.

7b. Same as Course 7a.

26. COMMERCIAL LAW. The principles of law governing ordinary business transactions. This course will deal with the general law of contracts, including sales, bankruptcy, and agency. YOUNG, PALMER.

ROMANCE LANGUAGES

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors EVERETT WARD OLMSTED, COLBERT SEARLES; Assistant Professor JULES T. FRELIN; Instructors HARRY E. ATWOOD, NELSON F. COBURN, MARCEL MORAUD, CHARLES E. MULLER, RUTH S. PHELPS, EDWARD H. SIRICH.

In addition to the courses offered at the Agricultural College, the following courses given in the College of Science, Literature, and the Arts may interest those juniors and seniors of the College of Agriculture who care to elect Romance Languages.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Beginning French	6	All	None
1b.	Beginning French	6	All	None
3a.	Intermediate French	6	All	1 or equivalent
3b.	Intermediate French	6	All	1 or equivalent
5-6.	Gen. Survey Fr. Lit	6	All	3 or equivalent
7-8.	Elem. Fr. Conver	2	All	3 or equivalent
9-10.	Elem. Fr. Composition	2	All	3 or equivalent
31a.	Beginning Spanish	6	All	None
31b.	Beginning Spanish	6	All	None

No.	Title	Credits	Offered to	Prereq. courses
33-34.	Beginning Spanish	6	All	None
35-36.	Intermediate Spanish	6	All	31 or equivalent
37-38.	Elem. Spanish Conver	2	All	35-36 or equiv.
39-40.	Elemen. Spanish Compos	2	All	35-36 or equiv.

FRENCH

1a. BEGINNING FRENCH. Double course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar drill, oral exercises and translation. ATWOOD, FRELIN, PHELPS.

1b. BEGINNING FRENCH. Same as Course 1a.

3a. INTERMEDIATE FRENCH. Double course. This course will complete in one semester the work heretofore done in two. Review of grammar, composition, conversation and reading,—representative authors of the Nineteenth Century. ATWOOD, FRELIN, MULLER, SEARLES.

3b. INTERMEDIATE FRENCH. Same as Course 3a.

5-6. GENERAL SURVEY OF FRENCH LITERATURE. This course will cover the whole period in historical outline and is a prerequisite for the century courses devoted to special periods. ATWOOD, MORAUD, SIRICH.

7-8. ELEMENTARY FRENCH CONVERSATION. A small amount of outside preparation will be required. The section meeting at ten o'clock Monday, Wednesday and Friday is limited to students taking Course 5-6 and is based on the work of that course. FRELIN, MORAUD, MULLER.

9-10. ELEMENTARY FRENCH COMPOSITION. FRELIN, MORAUD, MULLER.

SPANISH

31a. BEGINNING SPANISH. Double course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar drill, oral exercises, and translation. COBURN.

31b. BEGINNING SPANISH. Same as Course 31a.

33-34. BEGINNING SPANISH. This course is the same as Course 31 except that it is a year-course. COBURN, OLMSTED.

35-36. INTERMEDIATE SPANISH. Review of grammar, composition, conversation, and reading. COBURN.

37-38. ELEMENTARY SPANISH CONVERSATION. A small amount of outside preparation required. The life and customs of modern Spain; accompanied by illustrative material. COBURN.

39-40. ELEMENTARY SPANISH COMPOSITION. Special attention given to social and commercial correspondence. COBURN.

SOCIOLOGY AND ANTHROPOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor ALBERT ERNEST JENKS; Professional Lecturers FRANK J. BRUNO. OTTO W. DAVIS, CHARLES C. STILLMAN, GEORGE EDGAR VINCENT; Superintendents of State Board-of-Control Institutions; Teaching Fellow, ...

Modern University education is not complete unless the graduate has obtained the social point of view. To this end the Department offers elementary courses dealing with peoples, with social forces, institutions and movements. Its more advanced courses are designed especially for students majoring in the Social Sciences, namely: Economics, History, Political Science, and Sociology and Anthropology.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a.	Introduction to Anthropology....	3	Soph. jr., sr.	None
1b.	Introduction to Anthropology....	3	Soph., jr., sr.	None
*3a.	Introduction to Sociology.....	3	Soph. jr., sr.	None
3b.	Introduction to Sociology.....	3	Soph., jr., sr.	None
5.	Cultural Anthropology.....	3	Jr., sr.	None
	General Courses			
9.	Poverty.....	3	Jr., sr.	1 or 3
10.	Poverty (continued).....	3	Jr., sr.	1 or 3
11.	Housing Problems.....	3	Jr., sr.	1 or 3 and one other course
12.	Ethnology.....	3	Jr., sr.	1 and one other course
*14.	Rural Sociology.....	3	Jr., sr.	1 or 3
	Advanced Courses			
102.	Social Theory.....	3	Jr., sr.	1 or 3, 9 or 10 and one other course
104.	State Board-of-Control Institut'ns	3	Jr., sr.	1 or 3, 9 or 10 and one other course
108.	The Philippine People.....	3	Jr., sr.	1 and 5
110.	Physical Anthropology.....	3	Jr., sr.	See statement
112.	The American Negro.....	3	Jr., sr.	1 or 3, 12 or 113
113.	The American People.....	3	Jr., sr.	1 or 3 and one other course
114.	The American People (continued).	3	Jr., sr.	1 or 3, 113 and one other course
117.	Social Psychology.....	3	Jr., sr.	See statement
119.	Modern Social Institutions.....	3	Jr., sr.	1 or 3, 9 or 10 and one other course
121.	Seminar in Social Problems.....	3	Sr.	For sr., four cor-. related courses
123.	Seminar in Anthropology.....	3	Sr.	For sr., four correlated courses

*At University Farm.

INTRODUCTORY COURSES

1a. INTRODUCTION TO ANTHROPOLOGY. Characteristic activities, institutions, and elemental laws of primitive societies. Lectures, text-book, and essays. JENKS.

1b. INTRODUCTION TO ANTHROPOLOGY. Same as Course 1a. JENKS.

3a. INTRODUCTION TO SOCIOLOGY. Presentation of elemental social laws and theories. Lectures, text-book, and essay. .....

3b. INTRODUCTION TO SOCIOLOGY. Same as Course 3a.

5. CULTURAL ANTHROPOLOGY. Origin and development of the most important activities and institutions which have had their beginning in primitive society. Text-book, lectures, readings, and essay. JENKS.

GENERAL COURSES

9. POVERTY. Attempts which have been made to understand poverty; various public and private efforts to relieve, control, and prevent it. Especial consideration is given to conditions in Minneapolis. Text-book, readings, and lectures. BRUNO.

10. POVERTY (Continued). Poverty as a social disease; its relation to certain vital social forces; outstanding types of dependence. Especial consideration is given to conditions in St. Paul. Text-book, readings, and lectures. STILLMAN.

11. HOUSING PROBLEMS. An examination of housing evils and their causes; the various movements for the prevention or improving of bad housing; town planning; garden cities. Lectures, readings, field work, and essay. DAVIS.

12. ETHNOLOGY. The different so-called races of men; their historical classifications; causes of origin and distribution, and their development; important ethnic problems. Text-book, lectures, assigned readings, and essay. Not offered in 1915-16. JENKS.

14. RURAL SOCIOLOGY. A study and exposition of rural social conditions; existing agencies for rural betterment; suggestions for solution of rural social problems. Text-book, lectures, readings, and essay. Given only at the University Farm. .....

ADVANCED COURSES

102. SOCIAL THEORY. The foundations of sociology; the leading American, English, French, and German writers and their methods of approach to the science and the leading results they have secured. Text-book, readings, lectures, essay. .....

104. STATE BOARD-OF-CONTROL INSTITUTIONS. Organization, machinery, and function of such institutions as the State Hospitals, Asylums, Training Schools, Prison, Schools for the Feeble-minded, the Blind, and the Deaf. Lectures and readings. EXPERTS FROM THE INSTITUTIONS STUDIED.

108. THE PHILIPPINE PEOPLE. Comparative study of the four large eth-

nic and cultural groups of people in the Philippine Islands; policy of the insular civil government as it affects American home interests in the Orient. Lectures, readings, and essay. Not offered in 1915-16. JENKS.

110. PHYSICAL ANTHROPOLOGY. Theory of evolution applied to natural and cultural man; theory and application of eugenics. Prerequisites, Course 1, 5 or Course 1-2 in Animal Biology, and one other course in this department. Lectures, readings, and essay. JENKS.

112. THE AMERICAN NEGRO. The negro in Africa; development of the American negro; present characteristics, conditions, developing tendencies, and probable future of the American negro. Lectures, readings, and essay. Not offered in 1915-16. JENKS.

113. THE AMERICAN PEOPLE. Dominant characteristics of the diverse foreign peoples now in the United States; their modification in America; the importance of these peoples to the American nation. Lectures, readings, and essay. JENKS.

114. THE AMERICAN PEOPLE (Continued). A continuation of Course 113. Essential and unique historical Americanisms, and their value and virility for the future; facts and forces of amalgamation and assimilation in America; America's ethnic problems. Lectures, readings, and essay. JENKS.

117. SOCIAL PSYCHOLOGY. Study of reciprocal influence of minds. (Same as Course 57 in the Department of Philosophy and Psychology.) Prerequisites: Course 3 and one other course, and Course 1-2 or 5 in Department of Philosophy and Psychology. PETERSON.

119. MODERN SOCIAL INSTITUTIONS. Fundamental social institutions in their relation to human progress. .....

121. SEMINAR IN SOCIAL PROBLEMS. An advanced course of method and independent research. .....

123. SEMINAR IN ANTHROPOLOGY. An advanced course of method and independent research. JENKS.

COURSES OF STUDY

HOME ECONOMICS

The following courses of study are designed (a) to prepare women for the responsibilities of citizenship, and of home-making; (b) to prepare teachers for the extension of Home Economics education. They are planned to meet the needs of three groups of young women:

1. Students electing to major in Home Economics as a type of General Arts education for women.

2. Students preparing for teaching in the general field of Home Economics.

3. Students preparing for teaching in the special field of Home Economics, viz., Textiles and Clothing.

Upon the completion of the prescribed courses and the electives provided for in one of the following schedules, in all 136 credit hours, the candidate is recommended for graduation with the degree of Bachelor of Science (Home Economics).

Descriptions of the courses in Home Economics are given on pages 74 to 78. Required courses given by other divisions are described on pages 26 to 70. Electives may be chosen from these groups or from courses offered in other colleges.

The courses required for the freshman year are the same in each course of study. Some differentiation appears in the sophomore year. Specialization is provided for in the junior-senior years.

REQUIREMENTS FOR ALL COURSES OF STUDY IN HOME ECONOMICS

FRESHMAN YEAR

Second Semester

*H. E. 11a, Garment Making (3)
Agr. Eng. 3a, Mechanical Drawing (2)
or
H. E. 51a, Drawing and Design (3)
H. E. 1a, Textiles (2)
Chem. 3, Advanced General (3)
or
†Chem. 33, General (5)
Animal Biology 9, General Zoology (3)
Rhetoric 1 (3)
‡Econ. 2a, Industries and Commerce of the United States (3)
or
‖Physics 17, General (3)
¶Hygiene
¶Survey Talks on Home Economics

*H. E. 11b, Garment Making (3)
Agr. Eng. 3b, Mechanical Drawing (2)
or
H. E. 51b, Drawing and Design (3)
H. E. 1b, Textiles (2)
Chem. 4b, Qualitative (3)
Animal Biology 10, General (3)
Rhetoric 2 (3)
‡Econ. 1b, Industrial History since 1750 (3)
or
‖Physics 18, General (3)

*Students offering approved Domestic Art for entrance may substitute for H. E. 11.

†Students not offering Chemistry (one unit) for entrance must register for this course, but are not required to take Mechanical Drawing.

Students offering Physics (one unit) for entrance will enroll for Industrial History, and Industries and Commerce of the United States.

‖For those not presenting Physics for entrance.

¶All freshmen are required to attend a course of lectures on Hygiene and a course of general talks on Aims and Methods in Home Economics.

SOPHOMORE YEAR

First Semester

*H. E. 21a, Foods and Cookery (3)
Physiol. 3a, Elem. Human Physiol. (3)
Sociol. 1a or 3a (3)
Elective in English Literature (3)
H. E. 13a, Dressmaking (3)
or
Agr. Chem. 2a, Quant. Methods (3)
†Agr. Chem. 3a, Types of Carbon Compounds (3)
or
Elective (2)

Second Semester

H. E. 22b, Food Economics (3)
Bacteriol. 58 (5)
Psychol. 5b, Elements (3)
Rhetoric 12, Argumentation (3)
H. E. 13b, Dressmaking (3)
or
Agr. Chem. 2b, Quant. Methods (3)

*Students offering approved Domestic Science for entrance may substitute for H. E. 21

†Students graduating from the Teachers' Course in Textiles and Clothing are not required to take Agricultural Chemistry 3.

REQUIREMENTS FOR THE GENERAL COURSE IN HOME ECONOMICS

JUNIOR YEAR

First Semester

H. E. 101, Nutrition (5)
H. E. 33, Home Care of the Sick (1)
H. E. 53a, Historic Ornament and Advanced Design (3)
or
Econ. 3a, Elements (3)
Elective (8)

Second Semester

H. E. 102, Nutrition (5)
H. E. 53b, Historic Ornament and Advanced Design (3)
or
Econ. 3b, Elements (3)
Elective (9)

SENIOR YEAR

First Semester

H. E. 103a, Dietetics (3)
or
H. E. 17a, Clothing Economics (3)
{H. E. 34a, Home Management: Operation and Maintenance, Lectures (2)
and
H. E. 35a, Home Management: Operation and Maintenance, Lab. (3)}
or
H. E. 32a, Home Management: House Planning and Equipment (3)
Elective (9) or (11)

Second Semester

H. E. 103b, Dietetics (3)
or
H. E. 17b, Clothing Economics (3)
{H. E. 34b, Home Management: Operation and Maintenance, Lectures (2)
and
H. E. 35a, Home Management: Operation and Maintenance, Lab. (3)}
or
H. E. 32b, Home Management: House Planning and Equipment (3)
Elective (8) or (10)

REQUIREMENTS FOR THE TEACHERS' COURSE IN HOME ECONOMICS

JUNIOR YEAR

First Semester
- H. E. 101, Nutrition (5)
- H. E. 33, Home Care of the Sick (1)
- H. E. 53a, Historic Ornament and Advanced Design (3)
  - or
- Econ. 3a, Elements (3)
- Agr. Ed. 11a, Principles of Industrial Education (3)
- Elective (5)

Second Semester
- H. E. 102, Nutrition (5)
- H. E. 42, Home Economics Educ. (3)
- H. E. 53b, Historic Ornament and Advanced Design (3)
  - or
- Econ. 3b, Elements (3)
- Ed. 1b, History of Education (3)
- Elective (3)

SENIOR YEAR

First Semester
- H. E. 103a, Dietetics (3)
  - or
- H. E. 17a, Clothing Economics (3)
- H. E. 34a, Home Management: Operation and Maintenance, Lectures (2)
  - and
- H. E. 35a, Home Management: Operation and Maintenance, Lab. (3)
  - or
- H. E. 32a, Home Management: House Planning and Equipment (3)
- H. E. 43, Observation and Teaching (3)
- H. E. 45, Home Econ. Education (1)
- Elective (5) or (7)

Second Semester
- H. E. 103b, Dietetics (3)
  - or
- H. E. 17b, Clothing Economics (3)
- H. E. 34b, Home Management: Operation and Maintenance, Lectures (2)
  - and
- H. E. 35b, Home Management: Operation and Maintenance, Lab. (3)
  - or
- H. E. 32b, Home Management: House Planning and Equipment (3)
- H. E. 46, Home Econ. Education (1)
- Elective (7) or (9)

REQUIREMENTS FOR THE TEACHERS' COURSE IN TEXTILES AND CLOTHING

JUNIOR YEAR

First Semester
- H. E. 53a, Historic Ornament and Advanced Design (3)
  - or
- Econ. 3a, Elements (3)
- H. E. 55a, Decorative Needlework and Crafts (2)
- Agr. Ed. 11a, Principles of Industrial Education (3)
- H. E. 33, Home Care of the Sick (1)
- Elective (8)

Second Semester
- H. E. 53b, Historic Ornament and Advanced Design (3)
  - or
- Econ. 3a, Elements (3)
- H. E. 4b, Advanced Textiles (3)
- H. E. 44, Organization and Methods for Textiles and Clothing (3)
- H. E. 16, Tailoring (2)
- Ed. 1b, History of Education (3)
- Elective (3)

SENIOR YEAR

First Semester
- H. E. 17a, Clothing Economics (3)
- H. E. 45, Observation and Teaching (3)
- Elective (11)

Second Semester
- H. E. 18, Commercial Clothing Manufacture (3)
- H. E. 32b, Home Management: House Planning and Equipment (3)
- Elective (11)

DESCRIPTION OF COURSES IN HOME ECONOMICS

Professor JOSEPHINE T. BERRY; Assistant Professors ALICE M. BIESTER, HARRIET GOLDSTEIN, MABEL BARBARA TRILLING, MARION WELLER, LUCILE WHEELER, GRACE I. WILLIAMS; Instructors BESSIE BEMIS, AMY P. MORSE, DOROTHY MOTL, ETHEL L. PHELPS; Assistant VETTA GOLDSTEIN; Lecturer MARTHA B. MOORHEAD; Extension Specialists MARGARET J. BLAIR, MARY L. BULL, BESS M. ROWE, JUNIATA L. SHEPPERD.

General Statement.—The following courses are planned primarily for students majoring in Home Economics, and are required in the courses of study in Home Economics, see schedule, pages 71 to 73. They are open for election to students in other courses who offer the prerequisites as stated below.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Textiles	2	Fr.	None
1b.	Textiles	2	Fr.	None
4a.	Advanced Textiles	3	Jr.	1, 51
4b.	Advanced Textiles	3	Jr.	1, 51
11a.	Garment Making	3	Fr.	None
11b.	Garment Making	3	Fr.	None
13a.	Dressmaking	3	Jr.	1, 11
13b.	Dressmaking	3	Jr.	1, 11
16.	Tailoring	2	Jr.	13
17a.	Clothing Economics	3	Sr.	13, 53
17b.	Clothing Economics	3	Sr.	13, 53
18.	Commercial Clothing Manufacture	3	Sr.	17
21a.	Foods and Cookery	3	Soph.	Chem. 4, Parallel Physiol. 3
21b.	Foods and Cookery	3	Soph.	Chem. 4, Parallel Physiol. 3
22a.	Food Economics	3	Soph.	21
22b.	Food Economics	3	Soph.	21
24.	Camp Cookery	1	Fr.	None
32a.	Home Management: House Planning and Equipment	3	Sr.	51
32b.	Home Management: House Planning and Equipment	3	Sr.	51
33.	Home Care of the Sick	1	Jr.	Chem. 4, Bact. 58
34a.	Home Management: Operation and Maintenance, Lectures	2	Sr.	22
34b.	Home Management: Operation and Maintenance, Lectures	2	Sr.	22
35a.	Home Management: Operation and Maintenance, Laboratory	3	Sr.	22
35b.	Home Management: Operation and Maintenance, Laboratory	3	Sr.	22
42.	Home Economics Education	3	Jr.	22, Psychol. 5b
43.	Observation and Teaching	3	Sr.	42
44.	Organization and Methods for Textiles and Clothing	3	Jr.	13; Psychol. 5b

No.	Title	Credits	Offered to	Prereq. courses
45.	Home Economics Education.....	1	Sr.	42
46.	Home Economics Education.....	1	Sr.	45
51a.	Drawing and Design.....	3	Fr.	None
51b.	Drawing and Design.....	3	Fr.	None
53a.	Historic Ornament and Advanced Design.....	3	Jr.	51
53b.	Historic Ornament and Advanced Design.....	3	Jr.	51
55a.	Decorative Needlework and Crafts	2	Jr.	1, 11, 51
55b.	Decorative Needlework and Crafts	2	Jr.	1, 11, 51
101.	Nutrition.....	5	Jr.	22, Agr. Chem. 2, Bacteriol. 58; parallel Agr. Chem. 3
102.	Nutrition.....	5	Jr.	101
103a.	Dietetics.....	3	Sr.	102
103b.	Dietetics.....	3	Sr.	102

1a. TEXTILES. A study of textile fibers, their structure, properties and chemical reactions; of fabrics, their structure and processes of manufacture; of art and economic considerations in selection and purchase of materials for clothing and household furnishing. WELLER, TRILLING.

1b. TEXTILES. Same as Course 1a.

4a. ADVANCED TEXTILES. A more intensive study of textile fibers and fabrics; the organization of laboratory problems leading to the establishment of a basis for standardization by the general consumer and for a demand for pure textiles. WELLER.

4b. ADVANCED TEXTILES. Same as Course 4a.

11a. GARMENT MAKING. Instruction and laboratory practice in hand sewing; in the reading and adaptation of commercial patterns; in the construction and use of the sewing machine; in designing, cutting, and making simple outer garments from washable materials. PHELPS.

11b. GARMENT MAKING. Same as Course 11a.

13a. DRESSMAKING. Consideration of quality, suitability and cost of materials adapted to technique involved in construction of simple wool and silk dresses; adaptation of art principles in selection of designs; instruction and practice in methods of construction. TRILLING, ...

13b. DRESSMAKING. Same as Course 13a.

16. TAILORING. The technique and methods of construction employed in the making of tailored suits and wraps. Not offered in 1915-16.

17a. CLOTHING ECONOMICS. General consideration of economic function of woman; history of woman's place in home and industry with ref-

erence to clothing and textiles; study of clothing budgets, hygiene and standardization of dress. Laboratory problem in costume modeling. WELLER.

17b. CLOTHING ECONOMICS. Same as Course 17a.

18. COMMERCIAL CLOTHING MANUFACTURE. A study of the organization of the clothing trades and industries; of wages and standards of efficiency in workmanship. Laboratory practice upon a commercial basis, measured by trade standards. Not offered in 1915-16. WELLER.

21a. FOODS AND COOKERY. (a) Production, manufacture, chemical composition of typical foods; their classification into food principles; changes in digestion; function in nutrition. (b) Fundamental science principles from chemistry, physics, biology, bacteriology, and their application in typical cookery processes. WHEELER, WILLIAMS, BEMIS.

21b. FOODS AND COOKERY. Same as Course 21a.

22a. FOOD ECONOMICS. Cost and nutritive value of typical foods; the study of dietaries; preparation and serving of meals, the cost bearing a definite relation to the family budget. WHEELER, WILLIAMS, BEMIS.

22b. FOOD ECONOMICS. Same as Course 21b.

24. CAMP COOKERY. This course is designed to give prospective foresters, engineers, and others a knowledge of the simpler cookery processes; and of such adaptations as are practicable in the several types of out-of-doors camps. BEMIS.

32a. HOME MANAGEMENT: HOUSE PLANNING AND EQUIPMENT. Problems in house planning, house furnishing and equipment for various sums. Types of domestic architecture; choice of site; floor-plans; building materials; details of construction; heating; ventilating; lighting; plumbing; walls; rugs; furniture; color; hangings; pictures; gardens. MORSE.

32b. HOME MANAGEMENT: HOUSE PLANNING AND EQUIPMENT. Same as Course 32a.

33. HOME CARE OF THE SICK. (a) First aid; communicable diseases; their transmission and prevention; hygiene of infancy, maidenhood, maturity. (b) The care of the sick room; observation and care of the patient; elementary symptomatology. MOORHEAD, MOTL.

34a. HOME MANAGEMENT: OPERATION AND MAINTENANCE, LECTURES. The family budget for varying incomes, and for the "Home Management House"; household accounts. BERRY, WILLIAMS, BEMIS.

34b. HOME MANAGEMENT: OPERATION AND MAINTENANCE, LECTURES. Same as Course 34a.

35a. HOME MANAGEMENT: OPERATION AND MAINTENANCE, LABORATORY

PRACTICE. (a) Nine weeks' experience as manager and helper in a household of twenty members. (b) A dietary study covering a period of one month in the above household. BERRY, WILLIAMS, BEMIS.

35b. HOME MANAGEMENT: OPERATION AND MAINTENANCE, LABORATORY PRACTICE. Same as Course 35a.

42. HOME ECONOMICS EDUCATION. Curricula, equipment, methods of teaching for Home Economics. BERRY.

43. OBSERVATION AND TEACHING. Observation of teaching in regular classes; criticism and discussion of class practice, lesson plans, methods, results, and examinations; preparation of lesson plans, and the teaching of a minimum of thirty-six lessons under careful supervision. WILLIAMS.

44. ORGANIZATION AND METHODS. Organization of subject content, and methods of teaching for Textiles and Clothing. WELLER.

45. HOME ECONOMICS EDUCATION. Continuation of Course 42. BERRY.

46. HOME ECONOMICS EDUCATION. Continuation of Course 45. BERRY.

51a. DRAWING AND DESIGN. Composition, perspective, color, theory, and color harmonies applied to costume design and interiors; harmony, balance, rhythm, in line and area design. GOLDSTEIN.

51b. DRAWING AND DESIGN. Same as Course 51a.

53a. HISTORIC ORNAMENT AND ADVANCED DESIGN. The historical development of art, architecture, ornament, and furniture, studied with reference to their influence upon modern styles. Problems in constructive design for articles of clothing and for house furnishing. GOLDSTEIN, MORSE.

53b. HISTORIC ORNAMENT AND ADVANCED DESIGN. Same as Course 53a.

55a. DECORATIVE NEEDLEWORK AND CRAFTS. Applied design in embroidery, lace, stencils, block-printing, applique, porcelain decoration, pottery and leather work. MORSE, ...

55b. DECORATIVE NEEDLEWORK AND CRAFTS. Same as Course 55a.

101. NUTRITION. A study of the chemistry and physiology of metabolism, involving a qualitative examination of the food principles; of the body tissues; of salivary, gastric, and pancreatic digestion. BERRY, BIESTER.

102. NUTRITION. A continuation of Course 101, including the qualitative examination of blood, bile, milk; urine analysis; metabolism experiments. BERRY, BIESTER.

103a. DIETETICS. The fundamental principles of human nutrition as applied to the feeding of individuals and groups under conditions of

health, and under such pathological conditions as are chiefly dependent upon dietetic treatment. BIESTER, WHEELER.

103b. DIETETICS. Same as Course 103a.

PHYSICAL TRAINING

Instructor GRACE E. DENNY.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Physical Training	0	Fr.	None
1b.	Physical Training	0	Fr.	None
*3a.	Adv. Physical Training	2	Fr., soph.	1
*3b.	Adv. Physical Training	2	Fr., soph.	1

*Not more than six credits may be obtained from these courses and courses offered in Department Physical Education, Minneapolis Campus.

1a. PHYSICAL TRAINING. Analysis of standing position, and of walking; exercises to correct faulty position and to strengthen the vital organs; aesthetic and folk dancing; cross country tramps, skating, tennis, and games. DENNY.

1b. PHYSICAL TRAINING. Same as Course 1a.

3a. ADVANCED PHYSICAL TRAINING. A continuation of Course 1.

3b. ADVANCED PHYSICAL TRAINING. Same as Course 3a.

Bulletin of The University of Minnesota

THE COLLEGE OF FORESTRY

1915-1916

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1915

JULY

Su	Mo	Tu	W	Th	Fr	Sa
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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1916

JANUARY

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FEBRUARY

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MARCH

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APRIL

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MAY

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JUNE

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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31	..	..	..	..	..	..

CALENDAR

COLLEGE OF FORESTRY

1915-1916

The College year covers a period of thirty-eight weeks, beginning on the second Tuesday in September. Commencement Day is always the second Thursday in June.

Starred dates are uniform with other colleges of the University.

1915			
*August	31	Tuesday	Registration closes except for new students
*September	7-14	Week	Entrance examinations, registration of new students, payment of fees
*September	15	Wednesday	First Semester begins
*October	9	Saturday	Last day for removal of second semester incompletes
October	15	Friday	Half holiday. Annual freshman-sophomore contest
*November	24	Wednesday	Thanksgiving recess begins 9:00 p.m.
*November	29	Monday	Thanksgiving recess ends 8:00 a.m.
Nov. 29 to Dec. 4		Week	Examinations for the removal of second semester conditions
*December	17	Friday	Christmas vacation begins 9:00 p.m.
1916			
*January	4	Tuesday	Christmas vacations ends 8:00 a.m.
*January	18	Tuesday	Registration for the second semester closes except for new students
*January	24	Monday	Final examinations begin
*February	1	Tuesday	Registration and payment of fees for second semester closes. All grades for first semester due in Registrar's office
*February	2	Wednesday	Second semester begins
*February	12	Saturday	Lincoln's Birthday: a holiday
*February	22	Tuesday	Washington's Birthday: a holiday
*February	26	Saturday	Last day for removal of first semester incompletes
*April	19	Wednesday	Easter recess begins, 9 p.m.
*April	27	Thursday	Easter recess ends, 8 a.m.
*May	1-6	Week	First semester condition examinations
May	26	Friday	Holiday: annual boat trip
*May	27	Saturday	Final examinations begin
*June	3	Saturday	Second semester closes
*June	4	Sunday	Baccalaureate service

*June	5	Monday	Senior class day exercises
*June	7	Wednesday	Alumni Day
*June	8	Thursday	Forty-fourth annual commencement
*June	9	Friday	Summer vacation begins
*June	12	Monday	Summer Session and Teachers' Training School open
*July	4	Tuesday	Independence Day: a holiday
*July	22	Saturday	Summer Session and Teacher's Training School close

The University year for 1916-17 will begin Tuesday, September 12.

THE COLLEGE OF FORESTRY

FACULTY

George E. Vincent, Ph.D., LL.D., President
1005 5th St. S. E., Minneapolis

Cyrus Northrop, LL.D., President Emeritus
519 10th Ave. S. E., Minneapolis

Albert F. Woods, M.A., D.Agr., Dean 1199 Raymond Ave., St. Paul

Edward M. Freeman, Ph.D., Assistant Dean 2196 Carter Ave., St. Paul

Edward G. Cheney, B.A., Professor of Forestry, Director, College of Forestry 2163 Carter Ave., St. Paul

John H. Allison, Ph.B., M.F., Professor of Forestry
2118 Knapp St., St. Paul

William H. Kenety, M.S., Assistant Professor in Forestry
In charge Forest Experiment Station, Cloquet, Minn.

John P. Wentling, M.A., Associate Professor of Forestry
2160 Carter Ave., St. Paul

G. H. Wiggin, B.S.F., Instructor in Forestry
Forest Experiment Station, Cloquet, Minn.

William T. Cox, B.S. in For., State Forester, Special Lecturer
1540 Lincoln Ave., St. Paul

J. V. Hofmann, M.F., Ph.D., Special Lecturer on Sylviculture
2089 Carter Ave., St. Paul

Dillon P. Tierney, M.F., Assistant State Forester, Special Lecturer
State Capitol, St. Paul

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THE COLLEGE OF FORESTRY

AGRICULTURE

Willard L. Boyd, D.V.S., Assistant Professor Veterinary Science
2227 Knapp St., St. Paul

LeRoy Cady, B.S. in Agr., Associate Professor Horticulture
2121 Doswell Ave., St. Paul

Edward M. Freeman, Ph.D., Professor Plant Pathology and Botany
2196 Carter Ave., St. Paul

H. Preston Hoskins, V.M.D., Assistant Professor Veterinary Science
2195 Doswell Ave., St. Paul

Robert C. Lansing, M.A., Assistant Professor of English
2237 Knapp St., St. Paul

Myron H. Reynolds, B.S.A., D.V.M., M.D., Ph.G., Professor Veterinary Science 2145 Knapp St., St. Paul

HARRY B. ROE, B.S., Assistant Professor Mathematics
2105 Scudder Ave., St. Paul
ARTHUR G. RUGGLES, M.A., Associate Professor Entomology
1465 Raymond Ave., St. Paul
ELVIN C. STAKMAN, Ph.D., Assistant Professor Plant Pathology
2138 Knapp St., St. Paul
JOHN T. STEWART, C.E., Professor Agricultural Engineering
2223 Knapp St., St. Paul
FREDERIC L. WASHBURN, M.A., Professor of Entomology
1112 Sixth St. S. E., Minneapolis
ESTELLE COOK, Instructor in English 2130 Carter Ave., St. Paul
JULIAN H. GIST, M.A., Instructor in English
1237 Raymond Ave., St. Paul
ALLEN D. JOHNSTON, B.Sc., Instructor in Blacksmithing
2211 Knapp St., St. Paul
D. C. MITCHELL, C.E., Director Gymnasium 1395 Chelmsford, St. Paul
CHARLES C. PALMER, D.V.M., Instructor Veterinary Science
1520 Hythe St., St. Paul
HALL B. WHITE, B.S.A., Instructor in Carpentry
1426 Raymond Ave., St. Paul
LLOYD R. WHITSON, E.M., Instructor in Mechanical Drawing
1741 Fourth St. S. E., Minneapolis

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

IRA H. DERBY, Ph.D., Assistant Professor of Chemistry
2157 Commonwealth Ave., St. Paul
GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
525 E. River Road
ROSS A. BAKER, Ph.D., Instructor in Chemistry 429 8th Ave. S. E.
WOLF KRITCHEVSKY, D.Sc., Instructor in Chemistry 908 Logan Ave. N.
EARL PETTIJOHN, M.S., Instructor in Chemistry
2282 Carter Ave., St. Paul
FREDERICK W. POPPE, M.S., Instructor in Chemistry 1110 S. E. 7th St.

SCIENCE, LITERATURE, AND THE ARTS

CEPHAS D. ALLIN, LL.B., M.A., Associate Professor of Political Science
721 7th St. S. E., Minneapolis
HERBERT F. BERGMAN, B.S., Assistant Professor of Botany
723 7th St. S., Minneapolis
FREDERICK K. BUTTERS, B.S., B.A., Assistant Professor Botany
815 7th St. S., Minneapolis
FREDERICK E. CLEMENTS, Ph.D., Professor Botany
800 4th St. S. E., Minneapolis
E. DANA DURAND, Ph.D., Professor of Economics
915 6th St. S.E., Minneapolis
J. FRANKLIN EBERSOLE, M.A., Assistant Professor Economics
312 State St. S. E., Minneapolis
W. H. EMMONS, Ph.D., Professor Geology 611 1st Ave. S. E., Minneapolis

JULES FRELIN, B.A., Assistant Professor of Romance Languages
1206 5th St. S. E., Minneapolis
JOHN H. GRAY, Ph.D., Professor of Economics
412 Walnut St. S. E., Minneapolis
NED L. HUFF, M.A., Assistant Professor of Botany
1219 7th St. S. E., Minneapolis
BERNARD LENTZ, 1st. Lieut., 21 U.S. Inf., Professor Military Science and Tactics
WALTER R. MEYERS, Ph.D., Assistant Professor of German
1629 University Ave. S. E., Minneapolis
HENRY F. NACHTRIEB, B.S., Professor Animal Biology
905 6th St. S. E., Minneapolis
EVERETT WARD OLMSTED, Ph.D., Professor of Romance Languages
901 5th St. S. E., Minneapolis
CHESSLEY J. POSEY, M.S., Assistant Professor of Geology
1627 Melbourne Ave. S. E., Minneapolis
CARL OTTO ROSENDAHL, Ph.D., Professor of Botany
2191 Commonwealth Ave., St. Paul
WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
625 Fulton S. E., Minneapolis
CARL SCHLENKER, B.A., Professor of German
514 11th Ave. S. E., Minneapolis
CHARLES SIGERFOOS, Ph.D., Professor of Zoology
1023 University Ave. S. E., Minneapolis
JOSEPHINE TILDEN, M.S., Professor of Botany
2235 Como Ave. W., St. Paul
JEREMIAH S. YOUNG, Ph.D., Associate Professor of Political Science
1120 6th St. S. E., Minneapolis
HARRY E. ATWOOD, M.A., Instructor in Romance Languages
NELSON F. COBURN, M.A., Instructor in Romance Languages
LLOYD M. CROSGRAVE, M.A., Instructor in Economics
1078 17th Ave. S. E., Minneapolis
JAMES DAVIES, Ph.D., Instructor in German
3230 3d Ave. S., Minneapolis
ARTHUR R. GRAVES, Ph.D., Instructor in German
407 4th St. S. E., Minneapolis
HARRY G. HAYES, M.A., Instructor in Economics
422 4th St. S. E., Minneapolis
ALFRED E. KOENIG, M.A., Instructor in German
977 14th Ave. S. E., Minneapolis
LEON METZINGER, Ph.B., Instructor in German
MARCEL MORAUD, licencié ès lettres, Instructor in Romance Languages
CHARLES E. MULLER, licencié ès lettres, Instructor in Romance Languages
60 13th Ave. S. E., Minneapolis
RUTH S. PHELPS, M. A., Instructor in Romance Languages
WALTER L. RHINOW, Assistant Commandant Military Science and Tactics
1523 Rollins Ave. S. E., Minneapolis
BERT ROSE, Band Instructor 710 7th S. E., Minneapolis

THEOPHILUS H. SCHROEDEL, B.A., Instructor in German
977 14th Ave. S. E., Minneapolis
ARNOLD W. SHUTTER, B.A., Instructor in German
HAROLD W. SOULE, M.A., Instructor in German
DONALD FOLSOM, B.A., Assistant in Botany
619 9th Ave. S. E., Minneapolis
FRANCES L. LONG, B.A., Assistant in Botany
BENJAMIN W. PALMER, M.A., LL.B., Assistant in Political Science
308 18th St. S. E., Minneapolis
HARVEY STALLARD, Ph.B., Assistant in Botany 2357 Carter Ave., St. Paul

FACULTY COMMITTEES

1915-16

Executive Committee.—Dean, Chiefs of Divisions
Enrollment.—WEST, MOWRY, BIESTER, WENTLING, BENDER, PIERCE.
Curriculum and Catalog.—CHEYNEY, WENTLING, ALLISON
Program—STEWART, MOWRY, WILLIAMS
Students' Work.—FREEMAN, WEST, BERRY, CHEYNEY, SWEENEY, RUGGLES
Library.—ALWAY, C. W. HOWARD, WELLINGTON, STAKMAN, SEWALL, LANSING
Graduate.—THATCHER, BERRY, FREEMAN, WENTLING, DORSEY, STORM
Student Organizations.—LANSING, BERRY, CHEYNEY, WELLER, FREEMAN
Athletics.—CHEYNEY, OSWALD, MONTGOMERY, BOYD
Demonstration and Exhibit.—C. P. BULL, R. M. WASHBURN, ARNY, ALLISON, TRILLING, SMITH, JAGER, MACKINTOSH.
Sanitation.—REYNOLDS, MAYNE, HOSKINS, F. L. WASHBURN
Grounds.—BOSS, CADY, STEWART
Genetics.—DORSEY, HAYES, PALMER, SMITH, JAGER
Short Course.—STORM, MAYNE, R. M. WASHBURN, BRIERLEY, BERRY, STEWART, BOSS, KIRKWOOD
Auditing.—ROE, PECK, LUSK
Publications.—WILSON, BOSS, HAECKER, FREEMAN, THATCHER
Faculty Business.—FREEMAN, WEST, BERRY, STORM
Delayed English Credit.—LANSING, GIST
College Registrar.—LUCETTA BISSELL
Secretary of Faculty.—R. M. WEST

GENERAL INFORMATION

ENROLLMENT

Credentials.—All students upon entering this College for the first time shall submit their credentials to the Enrollment Committee.

The Forestry Courses.—All students desiring to enter the Forestry courses are urged to present Physics and Chemistry for entrance credits.

For details of entrance requirements, see the Bulletin of General Information.

REQUIREMENTS FOR GRADUATION AND DEGREE

After the completion of the prescribed Course of Study, including all of the required work and the requisite amount of elective work equivalent to 157 credit hours, candidates will be recommended for graduation with the degree of Bachelor of Science. The diploma will designate the College of Forestry and the candidate's major line of work.

COURSES OF STUDY

TECHNICAL FORESTRY COURSE[1]

Leading to Degree of Bachelor of Science

FRESHMAN YEAR

First Semester

[5]Agr. Eng. 1, Higher Algebra (3)
or
Econ. 1a, Indust. and Com. of the U.S. (3)
Bot. 1, General (3)
[4]German or French (6)
Rhet. 1, General (3)
Forestry 1, General (3)
Military Drill

Second Semester

Agr. Eng. 2, Plane Trig. (3)
[3]Bot. 2, Structural (3)
[2]German or French 2 (6)
Rhet. 2, General (3)
Forestry 2, Dendrol. (2)
Hort. 56, Plant Prop. (1)
Military Drill
(At Itasca Park, June and July)
Freshman Woods Work (8)

SOPHOMORE YEAR

First Semester

Agr. Eng. 3, Mech. Draw'g (3)
Rhet. 11, Argumentation (3)
Chemistry 33a, Gen. and Qual. (5)
or
[6]Chemistry 3a, Adv. General (3)
and
Elective (3)
An. Biol. 3, General Zoology (3)
Forestry 5, Dendrol. (3)
Military Drill

Second Semester

Agr. Eng. 12, Forest Eng. (3)
Rhet. 12, Argumentation (3)
Chem. 4b, Qualitative (3)
An. Biol. 4, General Zoology (3)
Veg. Path. 10, Forest Pathology (3)
Geol. 2, Geology (3)
Military Drill

JUNIOR YEAR

First Semester

Forestry 31, Sylviculture (3)
[2]Geol. 33, General Physiography (3)
Ent. 5, Forest Entomology (3)
Veg. Path. 5, Wood Technology (3)
[2]Bot. 101, Applied Ecology (3)
[2]Hort. 71, Landscape Gardening (3)

Second Semester

First 10 weeks
Agr. Eng. 6, Forest Mech. (2)
Forestry 32, Sylviculture (2)
Ent. 12, Forest Zoology (2)
[2]Vet. Sci. 16, Vet. Medicine (2)
[2]Bot. 102, Applied Ecology (2)
Itasca Park (April-September)
Forestry 34, Sylvic. (4)
Forestry 14, Mensuration (4)
Agr. Eng. 14, Forest Eng. (3)
Veg. Path. 8, Dendropathology (1)
Ent. 6, Forest Ent. (1)

[1]Students preparing for the lumber business are advised to consult the Director in regard to electives in Economics. Electives in economics and chemistry are open to those looking to the paper and pulp business.

[2]Substitutions may be made for these courses with the consent of the Director.

[3]Botany 3 or 4 may be substituted.

[4]In case a modern language is not elected, chemistry will be taken in the freshman year.

[5]Students presenting higher algebra for entrance will take Economics 1a.

[6]Students who do not present chemistry for entrance must take course 33, 5 hours. If a language is chosen the two extra credits will take the place of the sophomore elective; if a language is not taken they will take the place of the language credits. In either case one extra credit must be made up for graduation.

SENIOR YEAR

First Semester

Forestry 17, Forest Management (3)
Forestry 15, Lumbering (6)
[1]Forestry 23, Forest By-Products (2)
Economics 3a, Elements (2)
Forestry 29, Wood Pres. (1)
[1]Pol. Sci. 51, Business Law (2)
[1]Economics 15, Forest Economics (2)

Second Semester

Forestry 18, Forest Management (2)
Forestry 28, Seminar (4)
Forestry 24, Lumber Manufacturing (2)
Forestry 10, Forest Protection (2)
Forestry 102, Exp. Sylvicul. (2)
(April 15 to June)
Forestry 26, Working Plans (6)

[1]Substitutions may be made for these courses with the consent of the Director.

DEPARTMENTAL STATEMENTS

FORESTRY

Professors E. G. CHEYNEY, JOHN ALLISON; Associate Professor JOHN P. WENTLING; Assistant Professor WILLIAM H. KENETY; Instructor G. H. WIGGIN.

COURSES

No.	Title	Credits	Offered to	Prereq. cour ses
1.	General Forestry	3	Fr.	None
2.	Dendrology	2	Fr., soph.	Bot. 1
5.	Dendrology	3	Fr., soph.	2
†6.	Elementary Sylviculture	4	Fr.	Bot. 2
10.	Forest Protection	2	Jr., sr.	2, 5
†12.	Elementary Mensuration	4	Fr.	None
†14.	Forest Mensuration	4	Jr.	2, 5
15.	Lumbering	6	Sr.	1, 2, 5
‡17.	Forest Management	3	Sr.	14, 15, 34
18.	Forest Management	2	Sr.	17
‡23.	Forest By-Products	2	Jr., sr.	None
24.	Lumber Manufacturing	2	Jr., sr.	1, Veg. Path. 5
26.	Forest Working Plans	6	Sr.	1, 2, 5, 17, 34
30.	Forest Seminar	4	Sr.	17
31.	Sylviculture	3	Jr.	1, 2, 5, Bot. 2
32.	Sylviculture	2	Jr.	31
†34.	Sylviculture	4	Jr.	32
*35.	Wood Preservation	1	Jr.	Veg. Path. 5
102.	Experimental Sylviculture	2	Sr.	2, 5, 34, Bot. 2

*This course continues only six weeks, 3 hours per week.
†Given in summer at Itasca.
‡These courses are concluded at the beginning of the Christmas vacation.

1. GENERAL FORESTRY. A brief history of the development of forestry in Europe and America; its bearing on the forestry problems of the United States; description of the United States forests. Lectures and collateral reading. CHEYNEY.

2. DENDROLOGY. Comprehensive study of the forest trees of the United States; their classification, characteristics, range, etc., with special attention to prominent and constant characteristics. Lectures, assigned reading, special papers, field work. WENTLING.

5. DENDROLOGY. Continuation of Course 2.

6. ELEMENTARY SYLVICULTURE. Largely field work designed to give the student a working knowledge of the forest. It includes dendrological study of the species found in the north woods and the general principles of underlying reconnaissance. WENTLING.

10. FOREST PROTECTION. Consideration of practical measures for the protection of forests from fires, trespass, grazing, etc. State and Federal forest-fire and trespass laws. Insects and fungi are taken care of in special courses. ALLISON.

12. ELEMENTARY MENSURATION. This course is largely field work. It includes elementary work in timber cruising, valuation surveys, stem analysis, and the study of the measurements of stand, volume, and yield. ALLISON.

14. FOREST MENSURATION. The measurement of lumber and of logs by different units; of volume, growth and yield; of individual trees and stands. Cruising; the formation of log rules, stand, height, volume and yield tables. ALLISON.

15. LUMBERING. This course is designed to give the student a clear, balanced view of the lumber industry, especially logging. A month's work in a lumber camp in the senior year is required with a full report. CHEYNEY.

17. FOREST MANAGEMENT. Policy of forest owners; principles of governing all forest management; forest valuation; the calculation of soil rent, forest rent, and the value of growing stock; the values of even and uneven-aged stands. Working plans. ALLISON.

18. FOREST MANAGEMENT. Continuation of Course 17.

23. FOREST BY-PRODUCTS. A special study of forest products other than timber. Cellulose for paper, sugar, tanning materials, turpentine, tar, oil, resin, waxes, gum, creosote, wood alcohol, acetic acid, acetone, etc. ALLISON.

24. LUMBER MANUFACTURING. A study of sawmills and sawmill machinery, and other processes in the primary manufacture of wood, the general principles and the purpose of grading lumber. A brief study of the lumber market. CHEYNEY.

26. FOREST WORKING PLANS. The principles of working plans. Each class will be required to work out a complete plan including surveys, sylviculture plans, estimates, field tables, maps and systems of management. ALLISON.

30. SEMINAR. This is not a class for the prosecution of original research, but for the purpose of systematically reviewing the whole field of forestry and studying the concrete application of the different branches. CHEYNEY, WENTLING, ALLISON.

31. SYLVICULTURE. Study of the fundamental principles forming the basis of sylviculture. Forest types. Special attention to the sylvics of the important species. Lectures and laboratory. WENTLING.

32. SYLVICULTURE. Sylvicultural systems. WENTLING.

34. SYLVICULTURE. Nursery work and planting. Lectures, reading and field work. WENTLING.

35. WOOD PRESERVATION. Lectures and collateral reading upon the history, development and methods of wood preservation. Different systems now in use and preservatives used. ALLISON.

102. EXPERIMENTAL SYLVICULTURE. A study of fundamental principles of sylviculture which are broadly applicable, as well as methods used at Forest Experiment Stations in solving problems in forestation, management, protection and mensuration. KENETY.

AGRICULTURAL ENGINEERING

Professor JOHN T. STEWART; Assistant Professor H. B. ROE; Instructors ALLEN D. JOHNSTON, HALL B. WHITE, LLOYD R. WHITSON.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Higher Algebra	3	Fr.	Entrance Math.
1b.	Higher Algebra	3	Fr.	Entrance Math.
2a.	Plane Trigonometry	3	Fr.	Higher Algebra
2b.	Plane Trigonometry	3	Fr.	Higher Algebra
3.	Mechanical Drawing	3	Soph.	..
6.	Forest Mechanics	2	Jr.	..
12.	Forest Engineering	3	Soph.	2 and 3
*14.	Forest Engineering	3	Jr.	12

*Given at Itasca.

INTRODUCTORY COURSES

1a. HIGHER ALGEBRA. Special attention is given to practical problems, the methods of computation, and a foundation for Plane Trigonometry. ROE.

1b. HIGHER ALGEBRA. Same as Course 1a.

2a. PLANE TRIGONOMETRY. Theory and use of logarithms and a study of the functions of Plane Trigonometry with numerous practical applications. ROE.

2b. PLANE TRIGONOMETRY. Same as Course 2a.

3. MECHANICAL DRAWING. Lectures on drawing, exercises in the use of drawing instruments, lettering and water colors. The making of working drawings with their practical value. WHITSON.

6. FOREST MECHANICS. Blacksmithing: practice work in the handling of forge and anvil; the bending, shaping, and welding of steel. Carpentry; practice work in the use and care of tools used in lumbering. JOHNSTON, WHITE.

12. FOREST ENGINEERING. Methods of making original land surveys, study of topographic symbols and the elements of topographic drawing. General principles of surveying. STEWART.

14. FOREST ENGINEERING. Field practice and mensuration, surveying and topography. STEWART.

ANIMAL BIOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors HENRY NACHTRIEB, CHARLES P. SIGERFOOS; Assistant Professor OESTLUND; Instructor ALLEN; Assistant RINGOEN.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3-4.	General Zoology	6	All	None

BOTANY

Professors FREDERIC E. CLEMENTS, CARL OTTO ROSENDAHL, JOSEPHINE E. TILDEN; Assistant Professors HERBERT F. BERGMAN; FREDERIC K. BUTTERS, NED L. HUFF; Assistants DONALD FOLSOM, FRANCES L. LONG, HARVEY STALLARD.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a.	General Botany	3	All	None
1b.	General Botany	3	All	None
2.	Structural Botany	3	All	1 or 3
3a.	Evolution of Plants	3	All	1 or equivalent
3b.	Evolution of Plants	3	All	1 or equivalent
4.	Field and Garden Botany	3	All	1 or 3
	Intermediate Courses			
5-6.	Plant Morphology	3 or 6	Soph., jr., sr.	6 credits; see note under course
7-8.	Taxonomy	3 or 6	Soph., jr., sr.	6 credits; see note under course
9-10.	Physiology and Ecology	3 or 6	Soph., jr., sr.	6 credits

INTRODUCTORY COURSES

1a. GENERAL BOTANY. A study of the external form and organs of flowering plants, root, stem, leaf, fruit and seed and of their relations to each other, together with simple greenhouse experiments to illustrate the various functions. CLEMENTS, BUTTERS, HUFF, BERGMAN, FOLSOM, LONG, STALLARD.

1b. GENERAL BOTANY. Same as Course 1a.

2. STRUCTURAL BOTANY. A study of the microscopic structure of flowering plants, the cell, tissues and tissue systems, as seen in the root, stem, leaf, etc. BUTTERS, STALLARD.

3a. EVOLUTION OF PLANTS. A comparative study of selected types of plants, illustrating the evolution of land plants from the simplest forms. HUFF, BERGMAN.

3b. EVOLUTION OF PLANTS. Same as Course 3a.

4. FIELD AND GARDEN BOTANY. Greenhouse, garden and field study of the form, behavior, naming and relationships of flowering plants, together with individual problems in the pollination, reproduction and propagation of common flower types. CLEMENTS, FOLSOM, LONG.

INTERMEDIATE COURSES

Either semester of the following courses open to students with the proper requisites.

5-6. PLANT MORPHOLOGY. A comparative study of the form, structure and life history of typical algae, fungi, liverworts, mosses, ferns and seed plants. Course 6 (but not 5) open to those who have taken Course 3. BUTTERS.

7-8. TAXONOMY. A general study of the classification and relationships of flowering plants. Laboratory and field practice in the determination of species, together with lectures and quizzes. Course 8 (but not 7) open to those who have taken Course 4. ROSENDAHL.

9-10. PHYSIOLOGY AND ECOLOGY. Greenhouse and field study of physical factors and plant responses, absorption, transport, water loss, nutrition, growth, fertilization, reproduction and adaptation; field study of habitat, migration, competition, invasion, and succession. CLEMENTS.

CHEMISTRY

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

Professors GEORGE B. FRANKFORTER, CHARLES F. SIDENER; Assistant Professor FRANCIS C. FRARY; Instructors ROSS A. BAKER, WOLF KRITCHEVSKY, EARL PETTIJOHN, FREDERICK W. POPPE, WOLF STERNBERG.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
3a-4b.	Adv. General Chem. and Qual. Analysis	6†	Fr., soph., jr.	Entrance credit in Chem.
3b-4a.	Adv. General Chem. and Qual. Analysis	6†	Fr., soph., jr.	Entrance credit in Chem.
‡33.	General Chem. and Qual. Anal.	5	Fr., soph., jr.	None
11-12.	Quantitative Analysis	8†	Soph., jr., sr.	3-4 or 7-8
35-36.	Organic Chemistry	8†	Jr., sr.	3-4 or 7-8
155.	Wood Chemistry	6	Jr., sr.	35-36
156.	Technology of Wood Pulp	6	Jr., sr.	155

†Both semesters must be completed before credit is given for the first semester.
‡Course 4b must be completed before credit is given.

INTRODUCTORY COURSES

3a-4b. ADVANCED GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Lectures, recitations and laboratory work. General descriptive chemistry, including the fundamental theories and laws, and qualitative analysis. FRANKFORTER, BAKER, PETTIJOHN, POPPE and Assistants.

3b-4a. ADVANCED GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Same as Course 3a-4b.

11-12. General discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester, followed by a discussion of standard solutions and the necessary stoichiometric calculations, with laboratory work in volumetric analysis, second semester. SIDENER, PETTIJOHN, STERNBERG and Assistants.

33. GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. Designed for those who have had no high school chemistry; in preparation for Course 4b. See statement under 3a-4b. FRANKFORTER, BAKER, PETTIJOHN, POPPE.

36-36. ORGANIC CHEMISTRY. This course includes the aliphatic and the aromatic series with the preparation of the more important compounds. FRANKFORTER, KRITCHEVSKY and Assistants.

155. WOOD CHEMISTRY. The course includes a general survey of the chemistry of the carbohydrate group, special attention being given to the resins, the terpenes, cellulose and lignocellulose. FRANKFORTER.

156. WOOD PULP TECHNOLOGY. Preparation of the various wood products, as pure cellulose, commercial wood, and paper. Special attention will also be given to factory control of these processes. FRARY.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors JOHN H. GRAY, E. DANA DURAND, J. FRANKLIN EBERSOLE; Instructors LLOYD M. CROSGRAVE, H. G. HAYES.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1b.	Industrial Hist. since 1750.....	3	All	None
2a.	Industries and Commerce of U. S.	3	All	None
†3a.	Elements of Economics.....	3	Soph., jr., sr.	None
3b.	Elements of Economics.....	3	Soph., jr., sr.	None
4a	Adv. Economics.....	3	Soph., jr., sr.	1 or 2 and 3
4b	Adv. Economics.....	3	Soph., jr.. sr.	1 or 2 and 3
†15.	Forest Econ. and Conservation..	3	Jr., sr.	1 or 2 and 3
22.	Commercial Policies.....	3	Soph., jr., sr.	1 or 2 and 3
43a	Banking.....	3	Soph., jr., sr.	1 or 2 and 3
43b.	Banking.....	3	Soph., jr., sr.	1 or 2 and 3
145.	Corporations.....	3	Jr., sr.	1 or 2 and 3
146.	Public Utilities.....	3	Jr., sr.	1 or 2 and 3; and 145
161.	Labor Problems.....	3	Jr., sr.	1 or 2 and 3

†Seniors in forestry taking these courses discontinue them at the Christmas vacation and are allowed 2 credits on each 3 credit course.

1b. INDUSTRIAL HISTORY SINCE 1750. Economic effects of inventions, wars, political changes, increased supply of precious metals, improved transportation, and modifications of business organization in chief European countries and the United States. GRAY.

2a. INDUSTRIES AND COMMERCE OF THE UNITED STATES. Agricultural, mining, and manufacturing industries, internal and foreign commerce. Industries and commerce of the several sections of the country. Leading individual industries: geographical distribution, methods of reorganization, production and marketing, and relationships to one another. DURAND.

3a. ELEMENTS OF ECONOMICS. Elements of economic theory with special reference to present-day economic and social problems. Textbook, lectures and discussions. HAYES.

3b. ELEMENTS OF ECONOMICS. Same as Course 3a.

4a. ADVANCED ECONOMICS. An advanced course in economic theory, devoted chiefly to a study of recent theories of distribution. Assigned readings, reports and discussions. HAYES.

4b. ADVANCED ECONOMICS. Same as Course 4a.

15. FOREST ECONOMICS AND CONSERVATION. Development of forest policies; relation of forests to other industries; effects of transportation rates and taxation; general problem of the conservation of natural resources. Lectures, assigned readings, and reports.

22. COMMERCIAL POLICIES. Theory of international commerce; free trade, reciprocity, and protection, with special emphasis on the tariff history and policy of the United States; commercial treaties and foreign politics. Lectures, assigned readings, and reports.

43a. PRINCIPLES AND PRACTICE OF BANKING. Contemporary banking institutions, both national and state; their incorporation, organization, administration; reserves, note issues, clearing houses, domestic and foreign exchange; the banking systems of foreign coutries; and the Federal Reserve Banks of the United States. EBERSOLE.

43b. PRINCIPLES AND PRACTICE OF BANKING. Same as Course 43a.

145. THE MODERN BUSINESS CORPORATION. The organizing, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. GRAY.

146. PUBLIC UTILITIES. Economic and legal basis of classification, consideration of relative advantages of public ownership and of public regulation. Central regulation compared with municipal regulation. Basis of rates; relative rates; rates and service. Theories of valuation. GRAY.

161. LABOR PROBLEMS. Modern labor problems: woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work, profit sharing, coöperation, labor unions, strikes, boycotts, conciliation, arbitration; economic causes and effects of immigration. Discussions, investigations of local conditions. CROSGRAVE.

ENTOMOLOGY AND ECONOMIC ZOOLOGY

COLLEGE OF AGRICULTURE

Professor F. L. WASHBURN; Associate Professor A. G. RUGGLES.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
5.	Forest Entomology	3	Jr.	An. Biol. 3-4
*6.	Forest Entomology	1	Jr.	5
12.	Forest Zoology	2	Jr.	An. Biol. 3-4

*Given at Itasca Park in summer session.

INTRODUCTORY COURSES

5. FOREST ENTOMOLOGY. A special study is made of insects affecting shade and forest trees, and the best means of controlling them. RUGGLES.

6. FOREST ENTOMOLOGY. Each student is assigned a particular forest insect or a group of insects to study in the field. Lectures and field excursions are given at Itasca Park. RUGGLES.

12. FOREST ZOOLOGY. A study of forest animals. Relations of game and other birds, and of various four-footed animals to forest protection; habits, range, usefulness, or the contrary; also a discussion of fish culture. WASHBURN.

GEOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor W. H. EMMONS; Assistant Professor C. J. POSEY.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
2.	Geology	3	Soph., jr.	None
33.	Physiography	3	Soph., jr., sr.	1 or 2 or 29

2. GEOLOGY. An elementary course giving a brief survey of the field of geology. Topographic map and field work. Given in College of Forestry only. POSEY.

33. PHYSIOGRAPHY. Origin and significance of the earth's features, and the agencies affecting them; detailed study of the physiographic provinces of the United States; topographic map and field work. Given in College of Forestry only. POSEY.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor CARL SCHLENKER; Assistant Professor WALTER R. MYERS; Instructors JAMES DAVIES, ARTHUR R. GRAVES, ALFRED E. KOENIG, LEON METZINGER, T. H. SCHROEDEL, SHUTTER, SOULE.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Beginning	6	All	None
1b.	Beginning	6	All	None
2a.	Intermediate	6	All	1a, b.
2b.	Intermediate	6	All	1a, b.
3.	Intermediate	3	All	1a, b or equivalent
4.	Intermediate	3	All	3

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1a. BEGINNING. Double course, given each semester as a 6 hour course. Pronunciation, grammar, conversation and composition; selected reading in easy prose and verse. MYERS, DAVIES, GRAVES, KOENIG, METZINGER, SCHROEDEL, SOULE, SHUTTER.

1b. BEGINNING. Same as Course 1a.

2a. INTERMEDIATE. Double course given each semester as 6 hour course. Selected texts in modern narrative and descriptive prose; selected lyrics and ballads; a drama of Lessing, Goethe or Schiller. Assigned readings of texts outside of class. MYERS, DAVIES, GRAVES, KOENIG, METZINGER, SCHROEDEL, SOULE, SHUTTER.

2b. INTERMEDIATE. Same as Course 2a.

3-4. INTERMEDIATE. Is the same as Course 2a,b, but given as a 3 hour course throughout the year. This course will not be given after 1915-16. GRAVES.

GYMNASIUM

Instructor D. C. MITCHELL.

A gymnasium fee of $1.50 will be charged each semester.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Gymnasium	0	All	None
2.	Gymnasium	0	All	1

1. GYMNASIUM. Calisthenics, light apparatus and corrective work. Swimming and diving.

2. GYMNASIUM. Continuation of Course 1, adding games of hand ball, indoor baseball, basketball and volley ball. Students must be able to swim the length of the pool.

HORTICULTURE

COLLEGE OF AGRICULTURE

Associate Professor LE ROY CADY.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
56.	Plant Propagation	1	Soph., jr., sr.	None
71.	Landscape Gardening	3	Jr., sr.	None

56. PLANT PROPAGATION. Methods of propagation of plants by seeds, cuttings, layers, grafting, and budding are studied. The principles of greenhouse management, transplanting, watering, and ventilation are taught. Lectures, reference reading, field and laboratory work. CADY.

71. LANDSCAPE GARDENING. A general course in the practice and principles of landscape gardening as applied to the home and community. Lectures and field trips to parks and private grounds are given. CADY.

POLITICAL SCIENCE

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor WILLIAM A. SCHAPER; Associate Professor JEREMIAH S. YOUNG; Assistant BENJAMIN W. PALMER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	American Government	3	Soph., jr., sr.	None
1b.	American Government	3	Soph., jr., sr.	None
5.	European Municipal Administration	3	Soph., jr., sr.	1
6.	American Municipal Administration	3	Soph., jr., sr.	1
*7a.	State and Local Government	3	Soph., jr., sr.	1
7b.	State and Local Government	6	Soph., jr., sr.	1
51.	Business Law	2	Jr., sr.	1 or Econ. 3.

*Seniors in forestry taking this course discontinue it at the Christmas vacation.

INTRODUCTORY COURSES

1a. AMERICAN GOVERNMENT. Organization and actual workings of the national government; nature and origin of the American governmental system. SCHAPER, YOUNG, ALLIN, PALMER.

1b. AMERICAN GOVERNMENT. Same as Course 1a.

5. EUROPEAN MUNICIPAL ADMINISTRATION. A study of French, German, Austrian, and English cities; the forms of government, parties and elections; achievements in finance, police, sanitation, with planning and other public services undertaken. SCHAPER.

6. AMERICAN MUNICIPAL ADMINISTRATION. A study of the organization

and chief functions of American cities; their growth, relation to the state, forms of charters, inefficiency and corruption, reform measures; and the administration of finance, police, health and other activities. SCHAPER.

7a. STATE AND LOCAL GOVERNMENT. Typical American state governments, special attention given to Minnesota; relation of state to the United States and the local units; recent experiments such as initiative and referendum, the recall and primaries; social and economic legislation. YOUNG, PALMER.

7b. Same as Course 7a.

51. ELEMENTS OF BUSINESS LAW, Part I. The aim is to teach so much of the law as every educated man ought to know for his guidance in every day business affairs. This course deals with law of contracts including sales, bankruptcy, and agency. YOUNG.

MILITARY SCIENCE AND TACTICS

Professor and Commandant BERNARD LENTZ; Assistant Commandant and Brigade Adjutant WALTER F. RHINOW; Band Instructor BERT ROSE.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1-2.	Military Drill	None	Fr.	None
3-4.	Military Drill	None	Soph.	1 yr. Drill
5-6.	Military Drill	3†	Jr., sr.	2 yrs. Drill
8.	Military Science	2*	Jr., sr.	2 yrs. Drill

*If taken in connection with Course 5-6.

†No student may receive more than a total of six credits for elective work in both Physical Education and Military Drill.

1-6. MILITARY DRILL. Two years are required of all men who enroll in the freshman and sophomore classes. Students are cautioned to report for the first drill and inform themselves of the requirements of the department.

1-2. Freshman: Practical instruction in schools of the soldier, company, and battalion; signals, ceremonies; first aid.

3-4. Sophomore: Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

5-6. May be taken voluntarily by others outside of the freshman and sophomore classes. No credit will be allowed for such drill for less than one year.

8. MILITARY SCIENCE. Instruction in advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

RHETORIC

COLLEGE OF AGRICULTURE

Assistant Professor R. C. LANSING; Instructors ESTELLE COOK, JULIAN H. GIST.

Beginning with the class entering in September 1915, rhetoric credits will not be granted officially until the close of the first semester of the senior year.

At least one quiz paper will be selected at random each semester from other than rhetoric classes and read by the Committee on Delayed English Credit. In addition any instructor may nominate to the committee and submit papers for any junior or senior who in his opinion requires special consideration.

The Committee on Delayed English Credit may require upper-class students to take, without credit, additional courses in rhetoric in order to validate their freshman and sophomore rhetoric credits.

Until June 1918, students registered previous to September 1915 may be required to take a supplementary three credit course in rhetoric in place of three of the elective credits required for the degree.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Rhetoric	3	Fr.	None
1b.	Rhetoric	3	Fr.	None
2a.	Rhetoric	3	Fr.	1
2b.	Rhetoric	3	Fr.	1
11.	Argumentation	3	Soph., jr.	2
12.	Argumentation	3	Soph., jr.	11
13-14.	Advanced Argumentation	6	Soph., jr., sr.	12
21-22.	Public Speaking	6	Soph., jr., sr.	1, 2
30a.	Literature	3	Soph., jr., sr.	1, 2
30b.	Literature	3	Soph., jr., sr.	1, 2

INTRODUCTORY COURSES

1a. RHETORIC. Note taking, thesis, writing exposition, sentence structure, analysis of prose models. LANSING, GIST.

1b. RHETORIC. Same as Course 1a.

2a. RHETORIC. Narration, description, diction. LANSING, GIST.

2b. RHETORIC. Same as Course 2a.

11. ARGUMENTATION. Evidence, methods of reasoning, briefing, debating. LANSING, GIST.

12. ARGUMENTATION. Analysis of persuasive speeches, practice in speaking both from the floor and in formal debate. Composition of persuasive articles. LANSING, GIST.

13-14. ADVANCED ARGUMENTATION. A course designed primarily for students desiring to participate in intercollegiate and society debates. Drill in preparing and delivering debates and other forms of address. GIST.

21-22. PUBLIC SPEAKING. The study and practice of the fundamental principles of voice production, articulation, gesture, platform deportment and expression. COOK.

30a. LITERATURE. Shakespeare, Browning. LANSING, GIST.

30b. LITERATURE. Same as Course 30a.

ROMANCE LANGUAGES

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor EVERETT WARD OLMSTED; Assistant Professor JULES T. FRELIN; Instructors HARRY E. ATWOOD, NELSON F. COBURN, MARCEL MORAUD, CHARLES E. MULLER, RUTH S. PHELPS.

In addition to the courses offered on the Agricultural College Campus the following courses given in the College of Science, Literature, and the Arts may interest those juniors or seniors of the College of Forestry who care to elect Romance Languages.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1a.	Beginning French	6	All	None
1b.	Beginning French	4	All	None
3a.	Intermediate French	6	All	1 or equivalent
3b.	Intermediate French	6	All	1 or equivalent
7-8.	Elemen. French Conversation	2	All	3 or equivalent
31a.	Beginning Spanish	6	All	None
31b.	Beginning Spanish	6	All	None
33-34.	Beginning Spanish	6	All	None
35-36.	Intermediate Spanish	6	All	31 or equivalent

FRENCH

1a. BEGINNING FRENCH. Double course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar drill, oral exercises and translation. ATWOOD, FRELIN, PHELPS.

1b. BEGINNING FRENCH. Same as Course 1a.

3a. INTERMEDIATE FRENCH. Double course. This course will complete in one semester the work heretofore done in two. Review of grammar, composition, conversation and reading,—representative authors of the Nineteenth Century. ATWOOD, FRELIN, MULLER, SEARLES.

3b. INTERMEDIATE FRENCH. Same as Course 3a.

7-8. ELEMENTARY FRENCH CONVERSATION. Small amount of outside preparation will be required. The section meeting at ten o'clock on Monday, Wednesday and Friday is limited to students taking Course 5-6 and is based on the work of that course. FRELIN, MORAUD, MULLER.

SPANISH

31a. BEGINNING SPANISH. Double course. This course will complete in one semester the work heretofore done in two. Pronunciation, grammar drill, oral exercises, and translation. COBURN.

31b. BEGINNING SPANISH. Same as Course 31a.

33-34. BEGINNING SPANISH. This course is the same as Course 31 except that it is a year-course. COBURN, OLMSTED.

35-36. INTERMEDIATE SPANISH. Review of grammar, composition, conversation, and reading. COBURN.

VEGETABLE PATHOLOGY AND BOTANY

COLLEGE OF AGRICULTURE

Professor EDWARD M. FREEMAN; Assistant Professor ELVIN C. STAKMAN.

General statement. For specialization in this department, see bulletin of College of Agriculture.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
5.	Wood Technology	3	Jr.	1 yr. Botany
*8.	Dendropathology	1	Jr., sr.	10
10.	Forest Pathology	3	Soph.	1 yr. Botany

*At Itasca Park in summer.

INTRODUCTORY COURSES

5. WOOD TECHNOLOGY. A comprehensive study of the structural features of types of important woods, especially of the United States. Special emphasis on the identification, classification, and histology. STAKMAN.

8. DENDROPATHOLOGY. A field study of diseases of trees given at Itasca Park in summer session. FREEMAN.

10. FOREST PATHOLOGY. Elementary study of plant diseases due to fungi, bacteria, and slime-molds; life histories and preventive methods. Lectures, laboratory, and reference. FREEMAN, STAKMAN.

VETERINARY SCIENCE

COLLEGE OF AGRICULTURE

Professor MYRON H. REYNOLDS; Assistant Professors W. L. BOYD, H. P. HOSKINS; Instructor C. C. PALMER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
*16.	Veterinary Medicine.....	2	Jr.	None

*First two-thirds of semester.

INTRODUCTORY COURSES

16. VETERINARY MEDICINE. Brief course covering food and care in relation to disease, elementary pathology, diagnosis, common diseases, common medicines, wounds, unsoundness. REYNOLDS, BOYD, HOSKINS, PALMER.

Bulletin of The University of Minnesota

THE SCHOOL OF AGRICULTURE

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‡Resigned March 1, 1915.
†Resigned Jan. 1, 1915.

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Enrollment and Program.—LUSK, Chairman, MOORE, MORTON, EWING

GENERAL INFORMATION

LOCATION

The School of Agriculture is located on University Farm, St. Paul, Minnesota, about midway between the business portions of the cities of St. Paul and Minneapolis. The School is a part of the University of Minnesota, and is governed by the Board of Regents.

How to Get to the School

Check all baggage to Minneapolis or St. Paul, and bring checks to the School.

A charge of twenty-five cents is made by the School for transporting trunks at the opening of the school year. A charge of twenty-five cents is made for the return of the baggage at the close of school, provided it is ready to go on the days assigned.

Monday and Tuesday, October 4 and 5, members of the Y. M. C. A., wearing lettered badges will be at the Union Station in St. Paul, and at the Great Northern, Milwaukee, Soo, and St. Louis Stations in Minneapolis, to meet and direct new students. Take the Como-Harriet or Como-Hopkins car from either St. Paul or Minneapolis, and get off at Doswell Avenue.

TIME OF OPENING AND CLOSING

The School of Agriculture will open Monday, October 4, 1915, and close March 29, 1916. The fall term will close at 4:30 p.m., Friday, December 17, and the winter term will begin Tuesday, January 11, 1916.

Instruction begins promptly at the opening of each term. Students should be present the first day and remain until the close of the term.

PURPOSE

The School of Agriculture was organized in 1888 with the object of giving a practical education to young men and women. It offers a practical course of study designed to fit young men and young women for successful farm life, and aims to give to its students the necessary preparation for useful citizenship; but does not aim to prepare students for college.

ADMISSION

Students should correspond with the Registrar of the School, J. M. Drew, University Farm, St. Paul, Minnesota, prior to coming to the institution, to make the necessary preliminary arrangements for registration.

All male students are required to have had six months' farm practice before entrance. No student under seventeen years of age will be admitted.

Students who have completed eighth-grade work, or its equivalent, in the common schools, and who are seventeen years of age or older, are admitted without examination. Each applicant for admission should send to the Registrar the certificate of admission which will be found at the back of this catalog, and which when properly filled out by former teacher or superintendent, will be accepted in place of entrance examinations. Diplomas should not be sent.

Applicants whose home schools do not afford complete instruction in the common branches may be admitted with not more than two conditions which must be removed according to instructions given the student upon admission.

Students from city or grade schools must present a dismissal card from the last school attended; they will not be admitted before finishing eighth-grade work, or until their former school records have been passed upon by the Registrar. These records must be presented at least three weeks prior to the opening of the School.

State High-School Board certificates are accepted for work in English, Physiology, Algebra, Geometry, and Civics, or credits of seventy-five per cent or more received on state teacher's examinations.

Students who have finished agricultural subjects in the high schools of the State, or other schools under the Putnam or Benson-Lee acts may receive full credit for such subjects as are pursued an equivalent length of time, with proper facilities for instruction. Students are advised to review, while here, such subjects as the enlarged facilities of this School render advantageous.

Young women living in the cities are earnestly advised to attend their home high school, where domestic science and art are provided. Those who enter the School of Agriculture will be required to provide facilities for summer practice work with poultry, bees, gardening, or similar practicums each summer during the School course. This is an important part of the course and no substitute will be accepted.

COURSE OF STUDY

The course of study offered covers a wide range of subjects and is largely industrial in character; but provision is made for some instruction in English and Mathematics. The course is briefly outlined on pages 16 to 18. Instruction is given in the workshop, laboratories, barns, and fields, as well as in the classroom. The course requires three winters of six months each for completion, and is coeducational. Much of the work is taken in common by the young men and the young women. Some of the subjects, such as blacksmithing, carpentry, field work, handling grain and machinery, are taken by the young men, while the young women pursue home economics in two groups,—Foods and Management, and Textiles and Clothing. The methods of instruction tend to educate students toward the farm instead of away from it and to develop in them a love for farm life by showing them its possibilities. In this respect the School has been very successful, as over eighty per cent of its graduates continue agricultural pursuits.

RULES AND REGULATIONS

(1) No student will be allowed to register after the second week of the term except by permission of the Students' Work Committee.

(2) Students who wish to carry more than the required work of the term must have the permission of the Students' Work Committee.

(3) No student who has been unable to carry successfully the regular work of any term shall be allowed extra work in the succeeding term, except by permission of the Students' Work Committee.

(4) Any student who fails in forty per cent of his work shall be dropped at the end of the term and may be reinstated by the Students' Work Committee upon the approval of the Faculty.

(5) The Students' Work Committee shall report to the Faculty at the beginning of the second term the names of all candidates for graduation, for that year, and no student shall be considered a senior whose name does not appear on the list furnished unless approved by the Students' Work Committee.

(6) A report of the work of doubtful and below-grade pupils shall be sent to the Chairman of the Students' Work Committee at the end of each month.

(7) An incomplete mark, if not removed by the time of the 8 weeks' report of the next term, becomes a failure.

(8) No person shall be permitted to graduate who has an unremoved incomplete, or failure.

(9) No student with incomplete preparatory work, or more than one incomplete freshman subject, excepting high-school graduates, will be classified as a junior.

(10) No student shall be admitted without a pass from the Principal's office into any class from which he has been absent.

(11) All student organizations making use of any of the college buildings must file a statement with the Registrar, giving names of president, secretary, and treasurer, and all organizations collecting fees must deposit the fees with the department cashier and turn in their books at least once a term to be audited by the department auditing committee to whose rules all such organizations must conform. Before any new student organization is formed, permission must be obtained from the chairman of the Entertainment Committee.

HOME LIFE ON THE CAMPUS

The life of the students while attending the School of Agriculture is subject to supervision. The home life of each student is carefully guarded, and everything is done to promote a healthful and moral atmosphere. The use of tobacco and spirituous liquors of all kinds is strictly forbidden. No person will be admitted as a student who is known to have the cigarette habit. Any one not in accord with these restrictions and not willing to lend a hand toward a strong moral growth should not come to the School of Agriculture.

STUDENTS IN DORMITORIES

The Principal of the School of Agriculture has charge of the boys in their dormitory and social life, and the Preceptress has charge of the girls in their dormitory and social life, under such regulations as may be approved by the Dean.

From 8:00 a.m. to 4:30 p.m. and also after 7:00 p.m., students not at recitation or chapel are expected to be in their rooms or in the library studying or reading. The rooms shall at all times be quiet, especially in the evening, so that no student may be disturbed.

ASSEMBLY

On each school day, at 11:40 a.m., excepting Monday and Wednesday, the students meet in the Assembly Hall. After the opening exercises, brief talks are given by the Principal, members of the Faculty, or invited guests. During the year the list of speakers will include prominent state and national officials, business men, particularly those connected with the agricultural industries, professional men, prominent clergymen of all denominations, educators from other institutions, and successful farmers. It has been found that this plan gives to the students an opportunity to hear men of prominence discuss a wide range of topics, many of which relate to rural and agricultural problems.

HOLIDAYS

On Thanksgiving Day no classes will be held, but school will continue as usual on the Friday and Saturday following.

Lincoln's birthday, February 12, and Washington's birthday, February 22, will be observed by appropriate exercises.

REQUIREMENTS FOR GRADUATION

(1) The completion of the prescribed course of study, with an honorable standing in deportment.

(2) An essay of not less than one thousand words, upon a topic connected with Agriculture or Home Economics, typewritten on paper of approved size for binding and filing in the library.

(3) For young men, a practical experience in field work at the University Farm or elsewhere, as shall appear in reports, received from responsible sources.

Students will be required to complete at least four Summer Practicums before graduating from the School of Agriculture, except that high-school students entering with sufficient credits to complete the course in two years may be excused from two Summer Practicums. Two of these Practicums should be completed in the first year, and two in the second year. Freshman students must choose Practicums before the end of the winter term, first year. Junior students must choose Practicums before the end of the winter term, junior year. A choice may be made of the Practicums offered, but not more than two may be taken in any one Divi-

sion. Students must be enrolled with the registrar for Summer Practicums before March 10. Blanks for enrollment will be provided in the Registrar's office.

EXPENSES

The necessary expenses for the year do not exceed $100. This amount does not include the fifteen-dollar deposit made to cover cost of the required military suit for the young men, traveling and personal expense.

Residents of Minnesota are charged an entrance fee of $5 a school year; non-residents of the State, $10.

The cost to the student for board, heat, light, and laundry is the actual cost of maintaining the table (including management) and caring for the buildings. This has not exceeded $3 a week. Each term's board is paid in advance. The buildings are all lighted by electric lights and warmed by steam. The sleeping rooms are each furnished with a bedstead, mattress, dressing bureau, chairs, and table.

No deduction in charge is made for any absence of less than five days. If students are compelled to be absent for that length of time, they are allowed half rates, if they make arrangements before leaving.

Textbooks are furnished at a rental of $2.50 a year through the Students' Coöperative Store to students who do not desire to purchase. A gymnasium fee of $1 a term is charged each student.

The average cost to students for drawing instruments and material, note-books, and all necessary stationery and supplies is betweeen $10 and $12.

Each student is required to pay for breakage of apparatus used in practical work.

A competent nurse is kept on the ground to care for the sick. To meet this expense each student pays $1 a term.

For the purpose of supplying, calcimining, and painting the sleeping rooms, a reserve fund is created by assessing each one occupying them $2 for the school year.

A deposit of $5 is required of each student as a guaranty for the return of all books and other articles borrowed. This deposit is not returned until the student severs his connection with the School.

On entering the School the student, if he is a resident of Minnesota and is to room and board at the institution, makes a payment of $5, entrance fee; $30, board; $1.25, book rent; $1, gymnasium fee; $1.50, maintaining nurse; $2, reserve fund; $5, deposit; $15, military uniform deposit; total, $60.75.

Students who do not room in the dormitories will be required to rent a post-office box in the Main Building in order that notices, etc., may reach them promptly. A rental of 20 cents a term is charged.

All male students are required to provide themselves with the prescribed uniform, which consists of cadet gray blouse, trousers, and cap, and is as neat and economical a dress as the student can obtain. A deposit of $15 is required on first registration to cover the cost of the uniform.

For the boys' gymnasium work a track suit and gymnasium shoes costing $2.50 are required.

Each girl is required to provide two large aprons suitable for the protection of her clothing while working in the foods and cooking laboratory.

For the girls' gymnasium work a white middy-blouse, black bloomers and white tennis shoes are required. These can be obtained by sending orders to Miss Grace Denny, Instructor in Physical Training. The cost of bloomers is $1.40; middy-blouse, $1.15; tennis shoes, $1.20. All girls entering the school for the first time are required to take a physical examination in October. This examination is conducted by Doctor Norris, Director of Health and Physical Education for Women, and a corps of doctors and nurses. It consists of an examination of the heart and lungs, nose and throat, spine and feet. Height and weight are measured, eyes and ears tested. Medical advice is given and recommendations for special exercises are made for students who would be benefited by them. Every girl should be provided with a kimono or bath-robe.

Each student provides four sheets, one pair of blankets, one quilt, one bedspread, one pillow, three pillowcases, towels, napkins, comb and brushes, one glass tumbler, and one teaspoon.

DORMITORIES

Each student in attendance at the School who expects to return the following year and who desires to room in the dormitory will, before going home, make a deposit of $2 with the Cashier as evidence of good faith that he expects to return on the opening day of the following school year. Dormitory rooms will be assigned to new students in the order in which their applications are received. Each prospective student who desires to room in the dormitory will be required to send a deposit of $2, which will be returned in case the application is received after all dormitory rooms are spoken for.

In case of either a former student or a prospective student, this two-dollar deposit will be forfeited if the student does not appear for registration on the opening day of the school year, unless he has signified in writing to the Registrar at least ten days before the opening that he does not intend to return. All money orders or checks should be made payable to Harriet Matthews, Cashier.

HOSPITAL FUND

The Hospital Fund will be expended under the general direction of the Sanitation Committee.

This fund insures, for those contributing to it, the care of regular nurses and such medicines and materials as the regular nurses may use.

It does not provide medical treatment by physician.

It does not provide hospital expenses of students rooming off the campus or away from the institution. Students rooming off the campus are not expected to contribute to this fund. They may, if they so desire, purchase hospital service cards for $1 a term which will entitle them to

office consultation and treatment by the nurse and, if they live within reasonable distances from the grounds, may have the privileges of nurse calls at 50 cents a call, when nurses can be spared from regular duties on the grounds.

It does not provide for special nurses, if such be required by reason of serious or long-continued illness, except as provided for in the following rule, adopted by the Sanitation Committee, March 9, 1909.

"After usual and necessary running expenses connected with the Hospital Fund have been taken care of, any available balance may be used for paying special nurses or other extraordinary expenses. Any balance still due such special nurses shall be paid by students requiring such extra help and pro-rated according to the number of days attendance for each.

"A dispensary fee of 25 cents for each office service by nurses will be collected from those who have not contributed to the hospital fund."

STUDENTS' TRUST FUND

The class of 1902 left with the School a fund of $100 "to assist by temporary loans, at a reasonable rate of interest, deserving students needing such help, who are not below the junior class in the School of Agriculture." This fund is in charge of a committee consisting of the Dean, the Principal, the Preceptress, and the President of the senior class.

THE LUDDEN TRUST

The late Honorable John D. Ludden, of St. Paul, gave the University of Minnesota $10,000, to be held, invested and reinvested by the University through its Board of Regents, and the income thereof to be collected, received, and applied by said Board of Regents to the financial assistance of students of either sex in the School of Agriculture.

Mr. Ludden imposed the following conditions: "The beneficiaries must be youths who are residents of the State of Minnesota; they must be and continue of unblemished moral character, and of temperate and industrious habits; and they must be such as by examination and trial shall evince and maintain a taste, habit, and aptitude for study and improvement; and any student who shall fail to come, or shall cease to be, within the above conditions shall forfeit all claims to the benefit of such fund. Subject to these conditions the administration of such income is entrusted to the said Board of Regents, which may make such rules therefor as they may deem judicious."

This fund produces $400 a year. Those wishing to avail themselves of its benefits should apply to the Executive Committee of the Board of Regents of the University of Minnesota.

LECTURES AND ENTERTAINMENTS

During the school year, evening lectures and entertainments are given in the Assembly Hall. These entertainments are strictly high grade. They furnish a pleasant relaxation from school work, and serve as a mental stimulus.

ORGANIZATIONS AND PUBLICATIONS

Students' Debating Societies.—Students are urged to unite with one of the eleven literary societies of the School for both pleasure and profit. The work is under the supervision of one of the instructors in the English Department. It affords training in parliamentary practice, public speaking, debating, and dramatic work.

Students' Christian Associations.—The Young Men's and Young Women's Christian Associations are voluntary organizations which have for their objects the maintenance of a positive moral and religious atmosphere and the development of complete Christian manhood and womanhood, physical, intellectual, social, and spiritual. These Associations carry on various lines of activity. Employment and Housing Bureaus are maintained for the use of students. A general reception is given at the beginning of each semester. Each Sunday morning at 8:30 a song service is held followed directly by meetings of Bible, Mission, and Rural Study groups, while in the afternoon at 5:30 a vesper service is conducted. Each Thursday evening at 6:00 o'clock the men gather for a Fellowship meeting, and the women for a Y. W. C. A. meeting. The work is under the direction of a General Secretary and the supervision of a Board of Directors made up of professors, business men, and students. The Associations are non-sectarian so that all students may find in them an opportunity for Christian activity and mutual helpfulness.

Agrarian.—The *Agrarian* is an annual published by the senior class of the School. The book gives an outline of all school and class activities; is fully illustrated and contains, in addition to brief articles and items of purely local interest, a number of contributions from student and faculty members, dealing with the various phases of agricultural education and with agricultural problems.

Minnesota Farm Review.—The *Minnesota Farm Review* is a monthly agricultural paper owned and published by the Alumni Association of the School of Agriculture. The paper is intended to be a medium by which the former students of this institution shall be kept in touch with each other, and also with the School and Experiment Station. It also endeavors to bring the farmers of the State into closer connection with the institution, and to this end it strives to present the latest progress in experimental work at the various stations. It is the official organ of the Alumni Association and of the Farmers' Clubs.

LIBRARY

The Agricultural Library is well equipped for supplying the needs of both undergraduate and graduate students. It contains over 20,000 volumes of general and technical literature, government reports, etc., besides 50,000 unbound pamphlets, bulletins, and reports. The general subject and author card index and the index of publications of the state experiment stations are always at the disposal of all students, to aid them in locating the various sources of information which the library affords. There are complete sets of all the standard encyclopedias and dictionaries,

and files of over 225 popular and technical magazines and periodicals.

The librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and are given whatever privileges the library can provide.

ZOOLOGICAL MUSEUM

This is in the third story of the Administration Building, connecting with the entomology lecture room. It contains one of the finest collections of birds in the Northwest, a large series of mammals, shells, anatomical models, etc., all used in class instruction. One case is given up to models of injurious insects and a collection of spray pumps, nozzles, etc., showing the various makes on the market. Another case is devoted to a beautiful series of Minnesota fishes, reptiles, and amphibians, and on two sides of the large room devoted to museum purposes are cases containing thousands of pinned insects. Friends of the institution who are inclined to donate zoological specimens may rest assured that they will be properly installed and given the best of care.

COURSES OF STUDY

In general the class periods are arranged for the morning and are scheduled singly. The periods designated as "laboratory" are scheduled in the afternoon in groups of two or three. The courses in Blacksmithing, Carpentry, Elementary Mechanics, and Dairy Manufacturing for the boys, each require four periods consecutively. Both class and laboratory periods are forty-five minutes each.

BOYS

First Term			*Second Term*		
			FRESHMAN YEAR		
	Class period	Laboratory period		Class period	Laboratory period
English (A)	3	..	English (B)	3	..
Blacksmithing (B)[1] or Carpentry (C)	..	8	Carpentry (C) or Blacksmithing (B)	..	8
Personal Hygiene (B)	1	..	Mechanics Laboratory (F)	..	4
Physiology (D)	3	..	Arithmetic (A)	4	..
Farm Crops (A)	2	2	Chemistry (A)	5	..
Agricultural Botany (A)	5	3	Farm Crops (B)	3	2
Breeds (A)	3	2	Gymnasium	..	2
Gymnasium	—	2			
			JUNIOR YEAR		
English (C)	3	..	English (D)	3	..
Dairy Breeds (B)	2	2	Farm Crops (C)	3	5
Feeding (C)	4	..	Dairy Feeding (E)	2	..
Stock Judging (D)	..	2	Dairy Manufacturing (F)	1	4
Drawing (D)	..	6	Meats (H)	..	3
Physics (A)	4	..	Vegetable Gardening (B)	3	..
Soils (A)	4	..	Civics (A)	3	..
Gymnasium	..	2	Gymnasium	..	2
			SENIOR YEAR		
English (E)	2	..	Poultry (K)	1	1
Farm Records and Accounts (D)	3	2	English (F)	2	..
Farm Implements (F)	3	2	Farm Management (E)	3	4
Poultry (K)	1	1	Dairy Stock Judging (L)	..	2
Stock Judging (O)	..	2	Animal Breeding (M)	2	..
Live Stock Practicums (J)	..	5	Meats (N)	..	3
Fruit Growing (A)	3	..	Stock Judging (O)	..	2
Veterinary (A)	3	..	Plant Propagation and Ornamental Horticulture (C)	2	2
Farm Zoology (A)	2	..	Farm Motors (E) or Gymnasium	..	2
Gymnasium	..	2	Veterinary (A)	3	..
			Entomology	2	..
			Forestry (B)	1	..

Note.—Military Drill is required of all boys throughout the first two years.

Music is required of all new students for two hours each week during the first year.

[1] Students pursuing the course in Blacksmithing the first term will register for Carpentry the second.

GIRLS

First Term			*Second Term*		
		FRESHMAN YEAR			
	Class period	Laboratory period		Class period	Laboratory period
English	3	..	English	3	..
Physical Training	2	..	Physical Training	2	..
Biology	4	..	Physiology	3	..
Arithmetic	4	..	Agricultural Botany	5	3
Social Training	1	..	Social Training	1	..
Foods and Cookery	..	6	Foods and Cookery	..	6
Drawing and Design	..	2	Drawing and Design	..	2
Elementary Garment Making	..	4	Elementary Garment Making	..	4
Dairy Manufacturing	1	4	Poultry	3	..
Hygiene	1	..			
		JUNIOR YEAR			
English	3	..	English	3	..
Physical Training	2	..	Physical Training	2	..
Chemistry (B)	5	..	Home Gardening	4	3
Social Science	2	..	Civics	3	..
Foods and Cookery	..	6	Foods and Cookery	..	6
Drawing and Design	..	2	Drawing and Design	..	2
Elementary Dressmaking	..	4	Elementary Dressmaking	..	4
Elementary Sociology	3	..	Elementary Sociology	3	..
Home Nursing	1	2			
		SENIOR YEAR			
English	3	..	English	3	..
Physical Training	2	..	Physical Training	2	..
House Planning and Furnishing	..	6	Home Management	..	6
Textiles	..	6	Dressmaking and Millinery	..	6
Household Accounts	..	4	Social Science	3	..
History	3	..	History	3	..
Elementary Economics	2	..	Elementary Economics	3	..
Household Physics	5	..	Home Nursing	1	4

Note.—Music is required of all new students for two hours each week during the first year.

FOR GRADUATES OF THE SCHOOL OF AGRICULTURE

A number of courses of a more advanced nature than those taught in the School are offered to the graduates and other qualified students of the School of Agriculture. These courses present an opportunity for the student, who so wishes, to return for one or more years and specialize in those subjects in which he is particularly interested. No additional diploma is offered and the completion of these courses does not entitle the student to college credit.

NORMAL TRAINING COURSE FOR RURAL TEACHERS

There has been established at University Farm a Normal Training course similar to that given in the High Schools of the state, and based on the outline in Bulletin 45 issued by the State High School Board. This course covers work given by a special instructor for one year of eight months, and prescribed work in summer school during two summers. The course includes supervised teaching in country schools, and

is intended to prepare teachers for rural school work. On completion of the work a certificate is awarded giving the holder license to teach in the rural schools of the state. None but a graduate of the School of Agriculture may pursue this course.

Those graduates of the regular course of the School of Agriculture, who intend to pursue the Normal Training course offered by the School, will take two summers in the State Teachers' Training School at University Farm, and the regular work in the Normal Training Class during the intervening year of the School of Agriculture as follows:

State Teachers Training School, University Farm, June 14-July 24, 1915.

ARITHMETIC AND GRAMMAR

School of Agriculture, University Farm, Year 1915-16.

First Term

Teaching Process
Geography
English
Primary Occupations
Woodwork

Second Term—School of Agriculture, 1916.

Country School Management and Country Life
Hygiene—Civics
American History
Composition
Agriculture

Opportunity will be given thruout the year for observation and supervised teaching in rural schools.

In addition to the regular Normal Course offered above, provision will be made for instruction in nature study, agriculture, music, physical education, and drawing by specialists in those subjects.

Summer Session—June, July, 1916

Work will be arranged to meet the individual needs of the members of the class.

Courses Open to Graduates of the School of Agriculture

(And other qualified students)

Course	Class period	Laboratory period	Offered to	Term
Advanced Farm Management (H)	3	2	Boys	1 and 2
Advanced Farm Crops (I)	3	..	Boys	2
Plant Diseases (C)	3	..	Boys	2
Seed Testing (D)	..	4	Boys	2
Bee Keeping (A)	2	..	All	1 and 2
Live-Stock Management (P)	3	..	Boys	1 and 2
Advanced Dairy Husbandry (Q)	3	..	Boys	1 and 2
Meats (I)	..	2	Girls	2
Poultry (R)	1	1	All	2
Elementary Agricultural Economics (C)	5	..	All	1
Elementary Pedagogy	..	..	All	.....
Methods of Teaching	..	..	All	.....

For details of courses, see Description of Courses.

ADMISSION TO THE COLLEGE OF AGRICULTURE

The College of Agriculture will admit to the freshman class graduates of the schools of agriculture who can present the following units in addition to the work required in a three-year course of the school:

English 2 units,

Mathematics 2 units, selected from group D,

Four units selected from groups B, C, D, or E, to make a total of 8 units. No credit will be given for any subject in group F, outside of the work done in the School of Agriculture.

Completion of the above work must be certified by an accredited high school or covered by examination as specified in the bulletin on General Information.

ADMISSION GROUPS

The term *unit* means not less than five recitations of forty minutes each per week for a period of thirty-six weeks. In manual subjects and kindred courses, it means the equivalent of ten recitation periods per week for thirty-six weeks.

GROUP A: ENGLISH

English, four or three units*

(a) Principles of rhetoric

(b) Practice in written expression in each of the years of the course, on an average of not less than one hour a week.

(c) Classics

GROUP B: LANGUAGES

Latin—

- Grammar, one unit
- Cæsar, four books, one unit
- Cicero, six orations, one unit
- Virgil, six books, one unit

Greek—

- Grammar, one unit
- Anabasis, four books, one unit

German—

- Grammar, one unit
- Literature, one, two, or three units

French—

- Grammar, one unit
- Literature, one, two, or three units

Spanish—

- Grammar, one unit
- Literature, one, two, or three units

Scandinavian Languages—

- Grammar, one unit
- Literature, one, two, or three units

GROUP C: HISTORY AND SOCIAL SCIENCES

History—

- Ancient, to Charlemagne, one unit
- Modern, from Charlemagne one unit

English, one-half unit

Senior American, one-half unit

*Three units will satisfy the English requirement in the Colleges of Engineering and Dentistry and the School of Mines, and when the applicant presents four units in one foreign language or two units in each of two foreign languages.

GROUP C: HISTORY AND SOCIAL SCIENCES—Continued

American Government, one-half or one unit
Elementary Economics, one-half unit
Commercial Geography, one-half or one unit
History of Commerce, one-half or one unit
Economic History of England, one-half unit
Economic History of the United States, one-half unit

GROUP D: MATHEMATICS

Elementary Algebra, one unit
Plane Geometry, one unit
Higher Algebra, one-half unit
Solid Geometry, one-half unit
Trigonometry, one-half unit

GROUP E: NATURAL SCIENCES

Physics, one unit
Chemistry, one unit
Botany, one-half or one unit
Zoology, one-half or one unit
Physiology, one-half unit
Astronomy, one-half unit
Geology, one-half unit
Physiography, one-half unit

GROUP F: VOCATIONAL SUBJECTS

Not to exceed four units may be offered from the following list of vocational subjects:

Business Subjects—

Business Law, one-half unit
Business Arithmetic, one-half unit
Elementary Bookkeeping, one unit
Advanced Bookkeeping, one unit
Stenography and Typewriting, two units

Manual Subjects—

Freehand Drawing, two units
Mechanical Drawing, two units
Domestic Art and Science, four units
Shop work, two units
Modeling and Wood Carving, one unit

Normal Training Subjects—

One to three units from schools giving normal courses approved by the State High School Board, provided the applicant has had one year of subsequent teaching experience.

Agriculture—

One to four units from schools receiving special state aid for Agriculture and also from other schools in which such course in Agriculture is approved by the State High School Board, as fast as the said schools are prepared to offer work in Agriculture.

DESCRIPTION OF COURSES

AGRICULTURAL BOTANY

A. Agricultural Botany. A practical study of the flowering plant is made; weeds, weed seeds, and seed testing are studied. Plant diseases are included in the course and the best preventive methods are discussed. Oswald.

B. Agricultural Botany. The work is pursued according to the following outline: (1) the flowering plant; (2) economic plants; (3) moulds, yeast, mushrooms, vegetable rots, etc.; (4) bacteria in dairy, foods, diseases of man. Oswald.

C. Plant Diseases. A short course laying emphasis on the recognition of the plant diseases common in Minnesota and the practical methods for combating those diseases. Tolaas.

D. Seed Testing. Practical work in making purity and germination tests of crop and grass seeds, also vegetable seeds. Students will learn to identify different weed seeds commonly found in crop seeds. Seed adulteration will also be studied. Dahlberg.

AGRICULTURAL CHEMISTRY

A. Chemistry. The fundamental principles of chemistry necessary for an understanding of common daily phenomena. The scope of agricultural chemistry and the help which the farmer may expect from the chemical laboratories of the State are outlined. Willaman and Assistants.

B. Chemistry. Planned to give an understanding of the general principles of chemistry which are of every-day importance. Particular attention is given to human foods, textiles, dyeing and cleansing agents. Willaman and Assistants.

AGRICULTURAL ENGINEERING

A. Agricultural Physics. The questions pertaining to the nature of matter and force in its application to the affairs of the farm are considered. Special stress is laid on matters pertaining to draft, road construction, lightning protection, and drainage. Ewing.

B. Blacksmithing. Instruction is given in the management of the forge, in bending, shaping, and welding iron and steel, and tempering steel tools, thus familiarizing the student with the operations necessary for blacksmith repair work on the farm. Johnston.

C. CARPENTRY. The care and use of tools is taught by means of shop exercises. Each student is required to sharpen his own tools and is given instruction in painting, estimating building materials, and farm building construction. WHITE.

D. DRAWING. Prepares the student to make working drawings of broken parts of machinery, to design farm buildings, and to interpret plans and specifications. The latter part of the course is devoted to architectural design. WHITSON.

E. FARM MOTORS. This course offers theory and practice on steam, gasoline, water, and electric motors and their application to farm uses. MOWRY.

F. MECHANICS LABORATORY. Instruction and practice in rope splicing and halters, belt lacing, soldering, pipe fitting, and cement work. Actual work in the laboratory will be done in each of these lines. CLEWORTH.

AGRONOMY AND FARM MANAGEMENT

A. FARM CROPS. A study of the history, culture, judging, and preservation of corn and corn products. OLSON.

B. FARM CROPS. A study of the classes and varieties of grass, legume, root, and forage crops; their history, culture, and adaptability. CURRAN.

C. FARM CROPS. Studies of the cereal crops, including a study of the history, culture, judging, and use of each. CURRAN.

D. FARM RECORDS AND ACCOUNTS. Lectures, recitations, and practice in keeping farm records. Junior students will be required to make an inventory of their business on the home farm as a basis for their work in record keeping. BENTON.

E. FARM MANAGEMENT. Farm management, dealing with types of farming, cropping systems, cost of producing farm crops, farm labor, marketing of farm produce, and the general business management of the farm. BENTON.

F. FARM IMPLEMENTS. Studies and discussions of the selection, operation, and care of farm machinery; also the cost, depreciation, efficiency, and adaptability of the various machines to the work to be accomplished. BASSETT.

H. ADVANCED FARM MANAGEMENT. An advanced course in farm management dealing with the business problems of the farm. Particular attention will be paid to the investment of capital, to the equipment and to plans for organizing and operating farms. BENTON.

I. ADVANCED FARM CROPS. This course will supplement Courses B and C, taking up in detail the productive areas devoted to the various crops in the United States and in other countries and the economic use of the crops and by-products. OLSON.

BEE CULTURE

A. Bee Keeping. Bees and their nature. The reason for keeping bees and how to manage them from a scientific and business point of view. The production of honey by the latest methods with the least labor and expense. Jager.

DAIRY AND ANIMAL HUSBANDRY

A. Study of Breeds. The market classes and breeds of horses, cattle, sheep, and swine are taken up briefly to bring out the form, quality and condition desirable and common to the different classes adaptable to this State. Ashby and Warner.

B. Dairy Breeds. The origin, formation, and characteristics of the breeds of dairy cattle kept in America. The particular adaptations of all the breeds are set forth. Washburn and Gehrand.

C. Feeding and Management of Live Stock. The principles of feeding and preparation of foods with special consideration of the needs of each class of animals. Economic methods of production, housing, and water supply. Montgomery and Ashby.

D. Stock Judging. Score cards are used and special efforts are made to do systematic and closely critical work in the selection of animals representative of the breeds and for breeding purposes.

E. Dairy Feeding and Management. Feeding, management, and development of the calf intended for the dairy. Particular emphasis is laid upon the balance and adjustment of food to milk production. Rations are calculated, discussed, and corrected in class. Haecker and McGuire.

F. Dairy Manufacture. Milk, its composition and properties. The care of milk and its creaming; the handling of the separator and care of the cream for market or butter on the farm and the making of butter. Washburn and Hanson.

G. Dairy Manufacture. Milk, its composition and properties. The care of milk and its creaming; separation and care of the cream for market or butter on the farm. The making of butter, cheese, and ice-cream are also taught. Washburn and Hanson.

H. Dressing and Curing of Meats. Demonstration lectures on the preparation of meat for farm use. Paterson.

I. Meats. Pertains to the selection and value of different classes of meat and to the best methods of curing and preserving. Paterson.

J. Dairy and Animal Husbandry Practicums. Designed to encourage keeping records on the farm during summer vacations. One of several problems dealing with the management of horses, cattle, sheep, swine, or poultry may be selected. An outline will be furnished.

K. POULTRY. History and characteristics of poultry varieties, management of flocks, marketing, house construction, incubation, brooding, common ailments and their treatment, and principles of feeding. Practice in pen management will be required of all students. A. C. SMITH and LANE.

L. DAIRY STOCK JUDGING. A continuation of Course B. Particular attention is paid to breed type. The student is taught to work without the score card. Special emphasis is given to the reasons for placement. MCGUIRE and GEHRAND.

M. ANIMAL BREEDING. Principles that govern breeding and influences that affect heredity. Students become familiar with methods of keeping live stock records. MAJOR.

N. DRESSING AND CURING MEATS. Practice work in dressing and curing meats. PATERSON.

O. STOCK JUDGING. Continuation of Course D. Blank cards for written reasons as to why one animal is given a rating above another are used in place of score cards. Oral discussions follow the handing-in of cards. MONTGOMERY, ASHBY and WARNER.

P. LIVE STOCK MANAGEMENT. Arranged for those who wish to make a specialty of meat production. Feed requirements, kind of stock, number of each, and the crops best suited to the type of live stock farming under consideration. MONTGOMERY and ————

Q. ADVANCED DAIRY HUSBANDRY. Relation of dairying to soil fertility and the utilization of fodders and by-products; reviews the adaptations of cows to certain purposes; devotes much time to the development and feeding of the dairy cow. WASHBURN.

R. POULTRY—INCUBATION AND BROODING. Affords both study and practice in the best methods of incubation and brooding, natural or artificial, for students who intend to rear poultry either as a side line on the farm or as a specialty. A. C. SMITH.

ENGLISH

Applicants for admission to the School who are deficient in the knowledge of elementary grammar are required to follow a course in the subject for which no credit will be given.

A. BUSINESS ENGLISH. Practice in spelling, punctuation, note taking, and letter writing based on Mayne's *Modern Business English.* Oral composition. HAUSE and MOHL.

B. ENGLISH CLASSICS. Reading and analysis of the works of Whittier, Scott, Irving, and Tennyson. HAUSE, COOK, and EATON.

C. COMPOSITION. The whole composition, the paragraph, and the sentence. Both oral and written themes. Each student has practice in public speaking. EATON, MOHL, and HAUSE.

D. COMPOSITION. Prerequisite, Course C. Narration and description. The analysis of good prose models. Theme writing and speaking as in Course C. EATON, MOHL, and HAUSE.

E. COMPOSITION. Prerequisite, Course D. Exposition and argument. Gathering and outlining material. Methods of development and presentation. EATON and MOHL.

F. COMPOSITION. Prerequisite, Course E. Argumentation and Debating. Thesis writing. Instruction and guidance in the writing of the senior thesis. Those excused from School courses in English are still required to write their theses under the supervision of an instructor in English. EATON, MOHL, and COOK.

ENTOMOLOGY AND ZOOLOGY

COURSE A. FARM ZOOLOGY.—A study of the parasitic protozoa, worms, snails, frogs, salamanders, toads, lizards, snakes, birds, and mammals of importance to the farmer, and their control. WM. MOORE.

COURSE B. ENTOMOLOGY.—Life history and habits of injurious and beneficial insects, insecticides; a collection of 25 different kinds of insects, with a statement of the host plant, place, and date of capture. WM. MOORE.

COURSE C. BIOLOGY.—A study of the structure and life of animals, the interdependence of organisms, and the relation of man to his environment. WM. MOORE.

NOTE.—Courses A and B offered to senior boys. Course C offered to freshman girls. For the years 1915-16 and 1916-17, offered to both freshman and senior girls. A full six months course (two terms).

FARM MATHEMATICS

A. ARITHMETIC. Drill for accuracy, speed in the simple processes of mathematics, and applications of principles to problems where measurements of material, extension, capacity are required. Assists in the mathematics of the technical courses in the School,

B. ELEMENTARY ALGEBRA. This work covers Wells' New Higher Algebra, or equivalent texts, through simple equations of one unknown quantity. Special attention is given to literal notation, negative numbers, factoring, fractions, and the simple equation.

C. PLANE GEOMETRY. The course in geometry covers Gore's Geometry, from Book I to VIII, or equivalent texts except the work in symmetry, maxima and minima.

FORESTRY

B. FORESTRY. A study of the place of the wood-lot in farm management; how the tree grows; the use of windbreaks, including species and methods of planting; the preservative treatment of fence posts; wood-lot products. CHEYNEY and WENTLING.

GYMNASIUM

The gymnasium work has for its object to better health conditions on the campus, and to make the farm boys more agile. The first part of the hour is given over to calisthenics with dumb-bells, wands, bar-bells, Indian clubs, and free arm movement; then light apparatus work on the parallel bars, side horse, buck, and the mats followed by some game or running on the track. Shower baths and a swimming pool will be provided.

CIVICS AND ECONOMICS

A. Civics. Origin, necessity, nature, and various forms of government. The legislative, judicial, and executive departments and the functions of each. The relations of the state to the federal government. Mayne.

B. History. Meyer's *General History* is used as the text. Daily outlines are required; also a general outline covering each week's work. The histories of Greece and Rome, besides medieval and modern events, are briefly covered.

C. Agricultural Economics. The interpretation of economic principles which have to do especially with the modern business of farming. The fundamental principles of economics. Weekly reports from current magazines are required. Smart.

D. Rural and Economic Problems. Social and economic phases of the home, the church, the school, coöperative organizations among farmers, and the importance of the state as constructive agencies for the betterment of country life conditions. Smart.

HOME ECONOMICS

FOODS—MANAGEMENT

A and B. Foods and Cookery. (a) Production, manufacture, and composition of typical foods, their classification into food principles, and the study of their food values. (b) A study of fundamental scientific principles underlying and controlling cookery processes and their application in the cooking of typical foods; and of the sanitary principles underlying the control and handling of food supplies. The laboratory exercises deal with the large topic of carbohydrates, involving the cookery of starch, sugar, cereals, and vegetables, and the application of leavening agents in batters and doughs; with the household methods and practices concerned with the selection, purchase, and care of food; with the social customs which are a part of the serving of meals. Weigley, Morton.

C and D. Foods and Cookery. (a) A continuation of Courses A and B, involving the study of proteins and fats; together with a study of the changes in food as undergone in digestion; their functions in nutrition; and the value and the place of each group in the die-

tary. (b) The laboratory exercises are concerned with the cookery of eggs, milk and milk products, meats, fish, gelatine, and the preparation of beverages; with the study of fermentation and the application of the principles to the process of food preservation, and to the making of breads; advanced cookery processes involving the use of leavening agents; freezing mixtures and frozen dishes; infant feeding and invalid dietaries. McDowell, Morton.

E. House Planning and Furnishing. This course includes a consideration of the location of farm buildings; of types and plans of dwellings suitable for farm homes; the drawing of floor plans and sketches of plumbing and heating equipment; with some questions of interior finishing. Furniture, wall and floor coverings, curtains, pictures, ornaments, and general equipment are studied with reference to their suitability and cost. Practical work in color harmony given. Tuttle, McDowell.

F. Home Management. This course is designed to emphasize the function and responsibility of the homemaker. It deals with the distribution of the family income; the purchasing of supplies; the planning and serving of meals, the cost bearing a definite relation to the income; the importance and cost of sanitary cleanliness and its application in the laundry and in the care of a house; the use and economic importance of labor-saving devices; equipment. Weigley, Morton.

CLOTHING—DRAWING AND DESIGN

G and H. Elementary Garment Making. (a) The study of the qualities and prices of standard muslins, and washable fabrics; of the principles involved in the selection of fabrics and of designs for garments; the construction and care of the sewing machine. (b) The laboratory work includes; the hand work stitches and machine sewing as applied to household articles and simple garments; the drafting of simple patterns; the use of commercial patterns; the making of under garments, and of tailored "wash" waists. MacComber, Tuttle.

I and J. Elementary Dressmaking. (a) A study of standard cotton, linen, and wool fabrics; of design in tailored dresses; of the processes involved in the construction of dresses, of the conditions under which ready-to-wear clothing is manufactured. (b) The laboratory work includes: designing, cutting, fitting waists and dresses, in cotton and wool materials, following tailor designs. Brown, MacComber.

K. Textiles. A study of the names, kinds, widths, and prices of standard materials used for clothing and house furnishings; of cotton, linen, wool, and silk fibres from which they are made; of tests used to identify pure fibres, and to detect adulteration. Brown.

L. Dressmaking. (a) The study of clothing in relation to health; its care and cost in relation to durability, suitability, and the income; the clothing budget. (b) The use of the model figure for fitting and draping; the making of a lingerie dress; decorative needlework, as applied to dressmaking, household linens, and furnishings Brown.

M and N. DRAWING AND DESIGN. The course treats of the fundamental principles in design and color harmony, with special emphasis upon design as expressed in clothing, house-furnishing, and articles in common use. TUTTLE.

O and P. DRAWING AND DESIGN. This course teaches the principles developed in courses M and N by means of more advanced problems and illustrations. TUTTLE.

HYGIENE AND HOME NURSING

A. PERSONAL HYGIENE. The course aims to inspire each pupil with a desire to reach and to maintain the highest possible physical efficiency. Specific directions in regard to the care of the body and simple rules for avoiding infection are given. MOORHEAD.

B. FIRST AID. This course follows the work planned by the American National Red Cross Society. MOORHEAD, MOTL.

C. HYGIENE AND HOME CARE OF THE SICK. (a) Communicable diseases, means of prevention, control, disinfection; hygienic requirements during infancy, childhood, womanhood, maturity. (b) Home nursing equipment and methods practicable in the household. MOORHEAD, MOTL.

SOCIAL SCIENCE

A. ELEMENTARY SOCIOLOGY. The course deals with the basic principles underlying society. A study is made of the rural social institutions, the home, the school, the church, voluntary farmers' organizations, and the function of the state toward rural interests. The work is correlated with life in the country.

B. THE FAMILY. A brief study of the family as an institution; of its economic relation to industry, property, education, population; the standard of living in relation to the efficient home and family; the relation of the home to the State. BOUTELLE.

C. WOMEN IN THE HOME AND IN INDUSTRY. A brief survey of the status of the homemaker and of women in industry; their duties and responsibilities in the home and in civic life; a study of the proper conservation of mental, moral, and physical power. BOUTELLE.

HORTICULTURE

A. FRUIT GROWING. Fruit growing is taught with reference to the raising of fruit for market and in the home garden. Methods of culture, pruning, marketing, etc., are studied. DANIELS and Assistant.

B. VEGETABLE GARDENING. Vegetable gardening embraces the study of garden tillage, irrigation, and rotation of crops, transplanting, formation and care of hotbeds, study of garden insects, and the growth of vegetable crops. DANIELS and Assistant.

C. Plant Propagation and Ornamental Horticulture. This course consists of lectures and laboratory studies in propagation and growth of plants by seeds, bulbs, cuttings, grafting, budding, etc. The development of the farmstead as regards ornamental planting and care of same is studied. Cady and Assistants.

D. Home Gardening. A study of the growing of vegetables, fruits, and flowering plants; the propagation or seed handling of these plants; the requirements of the different crops as to location, soils, fertilizers, management of crops, harvesting, and marketing. Daniels.

MILITARY DRILL

Under the provisions of the Act of Congress of 1862, establishing the Land Grant Colleges of the United States, instruction in Military Science and Tactics is required to be given at all colleges which are its beneficiaries. For this purpose the United States Government furnishes the Department of Agriculture with the necessary arms and equipment, and details an officer of the regular army to take charge of military science and tactics.

All male students of the freshman and junior classes, not physically unfit, are required to attend Military Drill. For the senior class, drill is an elective.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor, and obedience to lawful authority, as well as to familiarize students with batallion manoeuvres, guards, and the theoretical and practical use of firearms.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment, and able to pass a creditable examination in drill regulations.

In general, the officers are selected from the senior class; sergeants and corporals from the junior class.

MUSIC

The course in music includes elementary sight singing, definitions of musical terms and practice in solfeggi with suggestions of musical history from time to time, and is required of all freshman two terms two hours per week, unless they have equivalent entrance credits. Pease.

Advanced work is classed as Glee Club. Part songs for separate choirs of men and women occupy the fall term, two rehearsals per week. The two clubs join in the winter term and perform a standard Opera with adequate staging and costume. Pease.

The School Orchestra plays a standard repertoire of popular and classic numbers. Dent.

The School Band is a regular feature of the Military Drill, and also appears at chapel, athletic games, etc. Dent.

For students whose voices and training will admit them, there is offered a chorus class, consisting of a mixed chorus, a women's chorus, and a male chorus. This offers special advantages for musical development and experience.

A student orchestra is maintained which assists in public exercises given by the School.

PHYSICAL TRAINING

The aim of this department is to maintain the health of the students; to give gymnastic exercise and deep breathing; to stimulate functional activity and to give coördination and poise.

A. PHYSICAL TRAINING. Free-hand gymnastics, aiming to produce correct posture and to counteract faults of posture; aesthetic movements aiming at grace; folk dances, games and elementary exercises on the Swedish boom, stall-bars, vaulting box, and horizontal ladder. DENNY.

B. PHYSICAL TRAINING. Advanced free-hand gymnastics; light apparatus, wands, dumb-bells, elementary Indian club exercises, aesthetic and folk dances, games, the Swedish boom, rings, vaulting and rope climbing.

C. PHYSICAL TRAINING. Advanced light aparatus, bar-bells, fencing sticks, Indian clubs and bounding balls, aesthetic and folk dancing. Rings, rope-climbing, vaulting, parallel bars, etc. DENNY.

The department offers opportunities for the following sports: swimming in the new gymnasium swimming pool, cross country tramps and skating. DENNY and Assistant.

SOILS

A. SOIL FERTILITY. Minnesota soils, their formation, composition, properties, and characteristics. Causes of sterility in different soil types. Farm manures, green manures, and commercial fertilizers.

VETERINARY SCIENCE

A. VETERINARY MEDICINE. Elementary anatomy, pathology, sanitation, and medicine. Clinical cases are provided for practical study. Specimens of diseased organs are demonstrated in classroom to acquaint the student with the various pathological changes. BOYD.

B. PERSONAL HYGIENE. This course consists of lectures on the care of the person, including baths, regulation of diet, rest and recreation, kinds of exercise, clothing and the effects of habit-forming drugs on the body. PALMER.

D, E. PHYSIOLOGY. This course consists of the study of the human body and its functions. It is taught by means of lectures, charts, and models. Davison's *Human Body and Health* is the textbook used. PALMER.

DEPARTMENT OF AGRICULTURE

OTHER SCHOOLS OF AGRICULTURE IN THE STATE

NORTHWEST SCHOOL OF AGRICULTURE, CROOKSTON

The School of Agriculture at Crookston, Minnesota, established by the Legislature in 1905, is in active operation and offers to the young men and women of the Red River Valley a three years' course in practical farming and home-making. The school year opens early in October, and closes the latter part of March. For further information, address the Northwest School of Agriculture, Crookston, Minnesota.

WEST CENTRAL SCHOOL OF AGRICULTURE, MORRIS

The 1909 session of the Minnesota legislature accepted from the national government the gift of the Morris Indian School and appropriated funds for its maintenance as an agricultural school. The control of the institution was placed in the hands of the Board of Regents of the University of Minnesota. The courses of instruction are made to conform as closely as possible with those of the school at St. Anthony Park. The term opens the last of September and closes about the middle of March. For further information address the West Central School of Agriculture, Morris, Minnesota.

SHORT COURSES

BOYS' AND GIRLS' WEEK

One week during the last of March or the first of April is Boys' and Girls' Week at University Farm, St. Paul. The mornings are devoted to a study of some of the most interesting and important phases of agriculture. In the afternoon excursions are taken to points of interest in and about the Twin Cities. The cost to each student after arriving is about $3. Special efforts are made by all at University Farm to crowd this week full of pleasure and profit to the boys and girls. There is no educational requirement for admission. For detailed information, write Extension Division, University Farm, St. Paul.

SHORT COURSE IN TRACTION ENGINEERING

The growng use of traction engines in general work has made it advisable to offer a special course in the use of power machinery as one of the short courses in the Department of Agriculture of the University of Minnesota.

The course is complete in itself, covering four weeks of study and practice in May and early June. The mornings are devoted to lectures

and classroom work, and the afternoons to actual practice in the various departments under the supervision of the instructors of the School.

Such a course offers an opportunity to the young man interested in mechanics, who has had some practical experience in the handling of engines, enabling him to acquire in a short time valuable training in the theory and practice of traction work.

SUMMER SESSION AND STATE TEACHERS' TRAINING SCHOOL

During six weeks of the summer, beginning immediately after the close of the regular University session in June, two short courses are offered at University Farm of interest to teachers and others. The regular summer session of the College of Agriculture offers regular college courses in agriculture and home economics, including courses in agronomy, farm management, soils, dairy and animal husbandry, agricultural chemistry, agricultural education, botany and plant pathology, horticulture, entomology, and home economics. These courses give regular college credit upon their completion and the fulfilling of entrance requirements. At the same time and place the State Teachers' Training School offers courses in all of the teachers' certificate subjects and also special courses in agriculture, home economics, manual training, music, drawing, school management, and physical education, and similar subjects for teachers.

RURAL LIFE CONFERENCE

Immediately following the Summer Session, there is held at University Farm, for one week, a conference of those who are interested in the social welfare of the people in the country. Ministers of country and village churches, Sunday school workers, leaders of farmers' clubs, and any others interested in work along these lines are cordially invited to attend.

A circular giving further particulars will be sent to those who request it.

DAIRY SCHOOL

A four weeks' course in creamery butter-making and factory cheese-making is offered each fall, beginning about the 10th of November. The forenoons are spent in classrooms where lectures and talks are given by practical creamery men on all phases of the dairy business. The only requirement for the course is six months' experience in a creamery or cheese factory. Following the regular dairy school a one-week course in commercial ice-cream-making is offered.

FARMERS' AND HOME-MAKERS' WEEK

The week immediately following New Year's is devoted to the Farmers and Home-Makers of the State in their annual conferences at the College of Agriculture, University Farm, St. Paul. Regular class work occupies a portion of each day, at which the most vital and recent agricultural knowledge is presented by the faculty of the College of Agriculture and others. Conferences are held from day to day of those having a

special interest in some particular problem of agriculture. Many of the State Agricultural Associations hold their meetings during this week. An interesting and instructive evening program is furnished for each day. Men of national agricultural reputation from Minnesota and other states participate in the programs. Lectures and demonstrations in farm crops, farm management, soils, dairy and animal husbandry, horticulture, farm engineering, poultry, bees, veterinary science, and home economics are given daily. There is no educational requirement for admission.

POSTGRADUATE SHORT COURSE FOR VETERINARIANS

This course is given late in January and covers about one week. Different phases of veterinary practice are specialized each year. For 1915-16 therapeutics and general practice will be featured with the help of prominent specialists of national reputation.

THE COLLEGE OF AGRICULTURE

The College of Agriculture provides a four-year course parallel with other colleges of the University. It opens in September and closes in June.

The course in Agriculture is designed to give the student a broad education in the sciences and arts relating to Agriculture, and to fit him for the work of the agricultural specialist.

HOME ECONOMICS

The courses in Home Economics are planned to meet the needs of three groups of young women:

1. Students electing to major in Home Economics as a type of General Arts education for women.
2. Students preparing for teaching in the general field of Home Economics.
3. Students preparing for teaching in the special field of Home Economics, viz., Textiles and Clothing.

Upon the completion of the prescribed courses and the electives provided for in one of the following schedules, in all 136 credit hours, the candidate is recommended for graduation with the degree Bachelor of Science (Home Economics).

The College of Forestry offers a four-year course leading to the degree of Bachelor of Science. In addition to the work given at the University Farm, six months' work is given at Itasca State Park where a well equipped demonstration forest is available as a laboratory. The college also controls a Forest Experiment Station at Cloquet, which offers a good field for graduate students and original research. Provision is made for graduate work in all of the various lines of silviculture and utilization.

INQUIRIES

Anyone desiring further information in regard to these courses may apply to J. M. Drew, Registrar, University Farm, St. Paul, Minnesota.

MINNESOTA FARMERS' INSTITUTES

Farmers' Institutes in Minnesota are under the direction of a board composed of three members of the Board of Regents, and the Presidents of the State Dairymen's Association, Minnesota Horticultural Society, and Minnesota Agricultural Society. The direct supervision of institute work is given to a superintendent, chosen by this board, who has his offices at the School of Agriculture.

Institutes are held in rural schools, town halls, and in cities and villages wherever sufficient interest is shown to warrant. For information regarding Institutes, and to secure dates, address the Secretary of the Farmers' Institute, University Farm, St. Paul, Minnesota.

FARMERS' CLUBS

Farmers' Clubs, as now organized in Minnesota, are local organizations of farmers. Each club usually represents a small territory, as a rural school district or township. The Agricultural Extension Division aids in organizing these clubs and in helping them to continue effectively. Extension Bulletin No. 46 describes the work of these clubs and the methods of organization, and Extension Bulletin No. 56 gives a report of progress and suggested programs for 1915. Speakers are sent from the Extension Division and Institute force as often as practicable to help with the local program. A list of timely topics is sent by the Division to each club each month, and also blanks on which the clubs may report. Over eight hundred such clubs are organized in the State, and many more are needed. Students of the School of Agriculture can be very helpful in this work by acting as leaders in their local communities.

OFFICE OF PUBLICATIONS

The public receives the benefit of the work of the Department of Agriculture through numerous publications. The research work of the Experiment Station is recorded in a series of bulletins printed in editions of from 3,000 to 20,000 copies. A popular series known as the *Minnesota Farmers' Library* is issued for the Division of Agriculture Extension. Each edition is 60,000. Of this number about 50,000 are mailed at once to farmers and others interested in the distinctly practical phases of agriculture. Arrangements have been made also to supplement these series by the Experiment Station and the Extension Division with "Special" bulletins designed to convey information of practical value to persons likely to be particularly interested. The *University Farm Press News* is issued twenty-four times a year. It is made up of short agricultural articles prepared primarily to be copied by the papers of Minnesota and adjoining states. The edition is 3,800 copies. *Rural School Agriculture,* issued monthly through the school year, outlines from month to month work in cooking, sewing, nature study, and agriculture. A list of the publications will be sent upon request.

THE AGRICULTURAL EXPERIMENT STATION

The Agricultural Experiment Station of the University of Minnesota was established by national and state legislation in 1887. The function of the Experiment Station as set forth in the Hatch Act is "to aid in acquiring and diffusing among the people the useful and practical information on the subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." The funds provided by the national government have been supplemented recently by the Adams Act which provides $15,000 annually, and appropriations for special lines of experimental work have also been made by the state legislature.

The Experiment Station is located at University Farm, St. Paul, and is one of the Divisions of the Department of Agriculture; the officers of the Station are also professors and instructors in the School and College of Agriculture. The chief executive officer of the Station is the Director, who is also Dean of the College of Agriculture. Affiliated with the main station are a score or more of trial stations maintained by the State Horticultural Society. The Experiment Station also carries on coöperative tests and investigations with the United States Department of Agriculture and with farmers in various parts of the State. Experiments are conducted in the following lines of work: Agronomy, Farm Management, Agricultural Chemistry, Soils, Entomology, Horticulture, Veterinary Science, Dairying, Animal Nutrition, Animal Husbandry, Plant Pathology, and Agricultural Engineering.

NORTHWEST EXPERIMENT STATION

To give special consideration to local conditions in the northwestern part of the State an experiment farm was established at Crookston in 1895. The farm contains four hundred and fifty acres and is one mile north of the city. It has a well-equipped poultry plant from which much good breeding stock is being distributed among the farmers. With aid from the United States Office of Experiment Stations the farm is taking an active part in testing surface and tile drainage for the Red River Valley region. It is also encouraging a more extensive growing of clover. The School of Agriculture is operated in connection with the farm.

NORTH CENTRAL EXPERIMENT STATION

The Legislature of 1895 provided for a second experiment farm to make possible a more thoro study of the agricultural conditions of the north central portions of the State. This farm was located at Grand Rapids, April 6, 1896, and lies two miles east of the village. It contains approximately three hundred and seventy-five acres of land, with the necessary farm equipment consisting of dwelling house, barns, machinery, live stock, etc.

WEST CENTRAL EXPERIMENT STATION

In connection with the West Central Agricultural School at Morris, three hundred and sixty-five acres of land (a portion of which is rented)

is being farmed as an experiment and demonstration farm. As that section of the State is at this time changing from grain farming to more diversified forms, the most vital problem to be solved is the adaptation of the farm to a definite system of crop rotation. This problem is being taken up from both a practical and experimental standpoint. The promotion of the organization of local extension work is also being given special attention.

SOUTHEAST DEMONSTRATION AND EXPERIMENT FARM

By Legislative Act in 1911, a fund was appropriated for the purchase of a Demonstration and Experiment Farm at Waseca. In 1912 two hundred and forty-six acres were obtained just southeast of the city. The farm is being developed along practical lines as a live stock farm. The value of good management is being demonstrated. The superintendent is coöperating with the farmers in the vicinity in the management of their farms and with the schools and other organized bodies in the development of the agriculture of that section of the State.

NORTHEAST DEMONSTRATION AND EXPERIMENT FARM

The State Legislature of 1911 authorized an appropriation for the purchase of a Demonstration and Experiment Farm at or near Duluth. Two hundred and forty acres were obtained and active operations started in March, 1913. The farm is to be developed as a combination dairy, poultry and truck farm demonstrating so far as possible the kind of farming that should be conducted in northeastern Minnesota. Experiments will be carried on to determine the best types and varieties of crops for the vicinity.

FRUIT-BREEDING FARM

The Fruit-Breeding Farm is located at Zumbra Heights Station about thirty miles west of Minneapolis on the Minneapolis & St. Louis Railroad. Its purchase was authorized by the Legislature of 1907 for the purpose of breeding and developing fruits adapted to Minnesota. It consists of nearly eighty acres of land in a good fruit district and is equipped with a greenhouse, storage cellar, barn, and two residences. Thousands of apples, plums, strawberries, raspberries, etc., are fruited each year and selections of desirable seedlings made for propagation and distribution. This farm furnishes excellent material for advanced work in horticultural plant breeding.

CLOQUET FOREST EXPERIMENT STATION

This Station covers an area of twenty-six hundred and forty acres located four miles southwest of Cloquet, Minnesota, and is used by the College of Forestry as a forest experiment station for the investigation of the fundamental principles of forest growth and management. Among the important studies now being carried on at this Station are those covering the effects of the various climatic and physical factors upon forest growth; the best methods of reforesting denuded areas due either to fires

or logging; and the determination of the age at which white and Norway pine may be expected to yield the most valuable lumber.

This Station is also coöperating with the United States Forest Service, which is carrying on studies along similar lines in other parts of the country.

ITASCA STATE PARK

The Legislature of 1907 authorized, with the consent of the Forestry Board, the use of a part of Itasca State Park by the College of Forestry as a demonstration ground and experiment station. Experiments in reforestration are being carried on at this Station. The summer headquarters of the College have also been established there.

DEMONSTRATION FARMS

This phase of Agricultural Extension work has been organized with the idea of bringing to those communities coöperating in the work some demonstrational features that will exemplify up-to-date truths of agricultural practices and research work. It consists at present of twenty or more coöperating farms that are owned, financed and operated by private parties, and to which the State furnishes supervision through the means of frequent visits of regularly employed representatives of the University. The work with these farms consists in a general reorganization and subsequent management along the lines of practical farm management as adapted to that particular community. This work concerns itself with every phase of the farm work and is intended to effect improvement in all enterprises of the farm. These farms are always open to public inspection and at stated times the general public is invited to visit the farm and attend public demonstrations.

Another phase of demonstrational work has already been planned along the line of small demonstrational plots in coöperation with several farmers in certain communities. This phase of the work will deal in each case with some specific problem, such as growing alfalfa, killing quack grass, or seed improvement.

COUNTY AGRICULTURAL WORK

The County Agricultural agent work in Minnesota, in which the state and federal government and the Council of Grain Exchanges are coöperating, was started September 1, 1912. This work is correlated with the other work of the University by having a practical agriculturist located in each of several counties to assist in general work in farm management and all lines pertaining to agriculture in the county. He reports directly to the Agricultural Extension Division of the University of Minnesota.

The County Agricultural Agent helps in organizing Farmers' Clubs, securing pure seed grains and good live stock; encourages the growing of clover and alfalfa where practical; assists in the planning of farmsteads and farm buildings, orchards, windbreaks, crop rotations, helps in the organization of buying and selling associations, and makes himself generally useful along all lines of agricultural development in his county.

SUMMARY OF ATTENDANCE

Department of Agriculture, 1914-15

	Men	Women		Total	
College of Agriculture:					
Graduate Students	33	7	40	40	
Agricultural Course—					
Senior Class	46	.....	46		
Junior Class	60	.....	60		
Sophomore Class	105	.....	105		
Freshman Class	138	.....	138		
Special Students	11	.....	11		
Total	360	.....	360	360	
Forestry Course—					
Senior Class	8	.....	8		
Junior Class	7	.....	7		
Sophomore Class	4	.....	4		
Freshman Class	22	.....	22		
Special Students	.....	.....	.....		
Total	41	.....	41	41	
Home Economics Course—					
Senior Class	.....	42	42		
Junior Class	.....	50	50		
Sophomore Class	.....	69	69		
Freshman Class	.....	89	89		
Special Students	.....	23	23		
Total	.....	273	273	273	
College Summer Session:					
Total Registration	56	33	89		
Duplicates registered 1914-1915	26	6	32		
Net Registration	30	27	57	57	
Total in College	431	300	731		
School of Agriculture:					
Fourth and Fifth Year Class	14	13	27		
Senior Class	102	65	167		
Junior Class	191	87	278		
Freshman Class	284	109	393		
Special Students	6	4	10		
Total	598	277	875	875	
Dairy School—					
Butter and Cheese Makers Course	99	1	100		
Ice Cream Makers Course	39	.....	39		
Total	138	1	139		
Duplicates	25	.....	25		
Net Total	113	1	114	114	
Farmers' Week	540	87	627		
Junior Short Course	279	124	403		
Traction Engineers' Short Course	20	.....	20		
Teachers' Training School	89	941	1,030		
Total of Short Courses	1,041	1,153	2,194	2,194	
Total at University Farm	2,216	1,738	3,954		3,954
Northwest School of Agriculture	124	55	179		
Farmers' Short Course	1,412	406	1,818		
Junior Short Course	24	22	46		
Teachers' Training School	5	140	145		
Total at Crookston	1,565	623	2,188	2,188	
West Central School of Agriculture	76	57	133		
Teachers' Training School	9	155	164		
Total at Morris	85	212	297	297	
Total in Department of Agriculture	3,866	2,573	6,439		
Less Duplicates *	—2	.....	—2		
Net Total	3,864	2,573	6,437		

*Two Traction Engineers who were also registered in the School Course.

The University of Minnesota

CERTIFICATE OF ADMISSION
TO
SCHOOL OF AGRICULTURE

TO BE FILLED OUT BY PROSPECTIVE STUDENT

Date.....

I hereby apply for admission to the School of Agriculture.

My full name is.....

My post-office address is....., State.....

Rural Route or Street and Number....., County of.....

I live in the township of....., County of....., State of.....

I was born on the.....day of.....in the year.....

Nationality of father....., Mother.....

Name and address of parent or guardian.....

Occupation of parent or guardian.....

TO BE FILLED OUT AND SIGNED BY TEACHER OR SUPERINTENDENT

THIS IS TO CERTIFY THAT.....has received the standings written opposite the subjects given below.

	Standing	Number of Months Studied	In What Grade Credit Was Obtained
Arithmetic			
Botany			
Grammar			
English			
General, or Ancient History			
Physics			
Algebra			
Geometry			
Physiology			
Civics			
Zoology			
Chemistry			
Music			
Sewing			
Cooking			
Manual Training			
Mechanical Drawing			

Is the student, in question, of good moral character?.....

Has he (or she) been regular and punctual in attendance?.....

Do you recommend this person as a desirable student for the School of Agriculture?..... How many months (or years) of actual farm experience has he had?.....

.....

(Signed).....

Principal

Date..... .....School

The University of Minnesota
SCHOOL OF AGRICULTURE

NOTICE TO PROSPECTIVE STUDENTS

Please read the catalogue carefully, noting the paragraphs headed "Information," "How to Get to the School," "Admission," "Home Life on the Campus," and "Expenses." If you plan to enter the school, have the admission blank which you will find on the opposite side of this sheet filled out, the first half by yourself, the second half by your teacher or superintendent, and send it to the Registrar, University Farm, St. Paul. If for any reason you can not have your teacher or superintendent fill out the blank, State Board certificates or school report cards will be accepted. Please do NOT send DIPLOMAS. In case you have had any work of HIGH SCHOOL grade be sure to have it recorded on the blank or send certificates covering the work done.

If you desire a room in the dormitory, send with your admission blank to the registrar a money order or draft for $2.00 made payable to Harriet Matthews, Cashier. In case your application is received after all space in the dormitories is spoken for, your money will be returned to you. In case you decide after making application that you can not enter the School, you should notify the Registrar as soon as possible. If this is done prior to ten days before the opening of school, the money which you sent to reserve a room will be returned to you, otherwise it will not. ROOMS WILL NOT BE HELD AFTER THE OPENING DAY OF THE TERM FOR THOSE WHO ARE NOT PRESENT TO CLAIM THEM.

New students should not depend upon obtaining work at the institution to pay expenses. The regular work of the course takes so much time that a student should not do any outside work unless compelled to by necessity. Practically all of the work at the institution for which pay is given is spoken for a year ahead, so none is left for new students. Any able-bodied student ought to be able to earn enough during the six months of vacation to pay his way through the school year.

Students who for any reason cannot enter the School on the opening day or very soon thereafter should wait until the opening of the second term before coming.

Bulletin of The University of Minnesota

DEPARTMENT OF AGRICULTURE

NORTHWEST SCHOOL AND STATION

CROOKSTON, MINNESOTA

1915-1916

VOL. XVIII, NO. 17. MAY 1915

Entered at the Post-Office
in Crookston as second-class matter
Crookston, Minn.

SCHOOL CALENDAR

1915-16

October	5	Tuesday	First term opens; organization of classes
November	25	Thursday	Thanksgiving Day
December	18	Saturday	Christmas recess begins
January	4	Tuesday	Second term opens; organization of classes
January	18	Tuesday	Beginning of Short Course for Farmers
January	28	Friday	Closing of Short Course for Farmers
February	12	Saturday	Lincoln's Birthday
March	31	Friday	Second term closes
April	3	Monday	Junior Short Course begins
April	8	Saturday	Junior Short Course closes

THE NORTHWEST SCHOOL AND STATION

FACULTY

George Edgar Vincent, Ph.D., LL.D., President
Cyrus Northrop, LL.D., President, Emeritus
Albert F. Woods, M.A., D.Agr., Dean
Edward M. Freeman, Ph.D., Assistant Dean
C. G. Selvig, M.A., Superintendent
J. P. Bengtson, Preceptor
Faith S. Brown, B.A., Preceptress
O. L. Buhr, Registrar
Bernice B. Smith, Librarian

AGRICULTURAL ENGINEERING

T. R. Sewall, Carpentry and Drawing
Carl A. Berg, Blacksmithing and Machinery

AGRONOMY

F. L. Kennard, B.S.A., Agronomy and Farm Management
———— Assistant, Farm Crops

ANIMAL HUSBANDRY

William Dietrich, B.S.A., Animal and Dairy Husbandry
———— Assistant, Live Stock
C. E. Brown, Poultry

HOME ECONOMICS

Mrs. T. R. Sewall, B.A., Domestic Science and Art
Anna S. Olsen, Domestic Science
Alice E. Glise, Dressmaking

HORTICULTURE

Thomas M. McCall, B.S.A., Botany and Horticulture

SCHOOL

J. P. Bengtson, Mathematics and Civics
Faith S. Brown, B.A., English and Public Speaking

A. H. LARSON, Advanced Subjects and debating
BERNICE B. SMITH, Assistant Preceptress and English
O. L. BUHR, Gymnasium
GRACE GUNDERSON, Music and Physical Training
MARTIN STENSETH, Military Drill

ADVANCED COURSE

GRACE B. SHERWOOD, Normal Training

OFFICERS OF ADMINISTRATION

N. G. MALIN, Field Foreman
A. C. MCMILLAN, Stock Foreman
T. R. SEWALL, Superintendent of Buildings
ETHEL KADLEC, Matron
————, School Nurse
CORA PAULSBERG, Accountant
OLGA NETTUM, Office Clerk

COMMITTEES

Executive—Superintendent SELVIG, KENNARD, DIETRICH, MISS SHERWOOD, MRS. SEWALL, MCCALL, BENGTSON
Catalog.—The Registrar and Heads of Departments
Entertainment.—Superintendent SELVIG, Miss BROWN, BENGTSON, Miss SHERWOOD, Mrs. SEWALL.
Short Course for Farmers.—KENNARD, DIETRICH, BROWN, Mrs. SEWALL.
Athletics.—MCCALL, BUHR, Miss GUNDERSON, BENGTSON
Students' Work.—BENGTSON, Miss BROWN, MCCALL, BUHR, Miss SHERWOOD, SEWALL.

GENERAL INFORMATION

TIME OF OPENING

The Northwest School of Agriculture opens October 5, 1915, and closes March 31, 1916. The fall term closes Friday, December 17, 1915, and the winter term begins Tuesday, January 4, 1916.

Registration at the beginning of the second term will begin Monday, January 3, 1916, and should be completed by Tuesday, January 4, 1916. All former students entering later than January 6 will be charged a special fee of twenty-five cents a day for each day's delay in registering, unless prevented by illness from entering on time.

Instruction begins promptly at the opening of each term, and students should be present from the first day of the term until the close of the term.

INFORMATION

Students are advised to correspond with the Superintendent of the School, C. G. Selvig, Experiment Farm, Crookston, Minnesota, and make the necessary arrangements for registration. The earlier the student comes to the School, the better the chance of getting a room at the institution. No student will be admitted late except upon presentation of a reasonable excuse.

LOCATION

The Northwest School of Agriculture is located at the Experiment Farm, one and one-half miles north of Crookston, Minnesota. Directions for reaching the School are given below. The Northwest School of Agriculture is a part of the University of Minnesota and is governed by the University Board of Regents.

PURPOSE

The Northwest School of Agriculture was organized in 1906. It offers a practical course of study designed to fit young men and young women for successful farm life, and aims to give its students the necessary preparation for useful citizenship.

The work of the School aims to interpret for the young men and the young women from the farms, the life with which they are familiar. It gives reasons for the various farm operations, and makes a scientific basis for the proper management of the farm and the home.

COURSE OF STUDY

The course of study offered covers a wide range of subjects and is largely technical in character, but provision is made for some instruction in English and Mathematics. The course is briefly outlined on pages

12 to 31. Instruction is given in the work shop, laboratories, barns and fields, as well as in the classroom. The course requires three winters of six months each for completion, and is coeducational. Much of the work is taken in common by the young men and the young women. Some of the subjects, such as blacksmithing, carpentry, field work, handling grain and machinery, are taken by the young men, while the young women pursue courses in cooking, sewing, laundering, and household art. The methods of instruction tend to educate students toward the farm instead of away from it, to develop in them a love for farm life by showing them its possibilities. In this respect the School has been very successful, as nearly all of its graduates continue agricultural pursuits.

How to Get to the School

Check all baggage to Crookston and bring checks to the School. A charge of ten cents is made by the school teams for transporting trunks at the opening of school. The same charge is made for the return of the baggage at the close of school, provided it is ready to go on the days assigned. A charge of twenty-five cents is made for transporting trunks at any other time.

Monday and Tuesday, October 4 and October 5, members of the School wearing lettered badges will be at the Great Northern and Northern Pacific Stations at Crookston to meet and direct new students.

HOME LIFE ON THE CAMPUS

The life of the student while attending the School is subject to supervision. Students residing in the school dormitories are not allowed to leave the grounds without permission. The home life of each student is carefully guarded and everything done to promote a healthful and moral atmosphere. The use of tobacco or spirituous liquors of all kinds is strictly forbidden. No person will be admitted as a student who is known to have the cigarette habit. Any one not in accord with these restrictions and not willing to lend a hand toward a strong moral growth should not come to the School of Agriculture.

ADMISSION

Applicants who have completed a common school course in English Grammar, Arithmetic, History of the United States, and Geography will be admitted without examination, provided they can furnish the certificates of high schools or of county superintendents, and boys must have had six months' practical experience on a farm.

Applicants for admission who do not have state certificates or county diplomas showing completion of eighth-grade work should send to the Superintendent for certificates of admission which, when properly filled out by former teachers or superintendents, will be accepted in place of entrance examinations.

Students who are deficient in English Grammar and Arithmetic will be required to take special work in those subjects at the School before

completing the course. Instructions regarding this special work will be given upon admission. All are urged to prepare in all common branches before applying for entrance.

Students over twenty-one years of age who can not pursue the full course, either from lack of time or proper preparation, may make special arrangements for taking such subjects as may be most helpful to them. Students taking special work are required to take enough work to occupy their time while in school.

Parents are advised not to send pupils under sixteen years of age.

Students from city or grade schools will not be admitted before finishing eighth-grade work or until their former school records have been passed upon by the Superintendent. These records must be presented at least three weeks prior to the opening of school.

State High School Board certificates are accepted for work in English, Physiology, Algebra, Geometry, and Civics, or credits of 75 per cent or more, received on state teachers' examinations.

REQUIREMENTS FOR GRADUATION

(1) The completion of the prescribed course of study with an honorable standing in deportment.

(2) An essay of not less than one thousand words upon a topic connected with Agriculture or Home Economics, typewritten on paper of approved size for binding and filing in the library.

(3) For young men, practical experience in farm work during each of the two summers that come between the freshman and senior years. Students will register for the study of some definite farm problem to be studied each summer and report at stated intervals during the summer the progress made. A satisfactory standing in this summer work, or its equivalent in practical work done at the School, is required for graduation. See Summer Practicums, page 27.

FEES AND EXPENSES

The necessary expenses for the year do not exceed $110. This amount does not include the cost of the required military suit for the young men, traveling and personal expenses.

Residents of Minnesota are charged an entrance fee of $5 per school year; non-residents of the State, $10.

The cost to the student for board, heat, light, and laundry is the actual cost of maintaining the table (including management) and caring for the buildings. Each month's board is paid in advance. The sleeping rooms are each furnished with a bedstead, mattress, dressing bureau, chairs, and table. They are all lighted by electric light and warmed by steam.

Each student should come provided with four sheets, one pair of blankets, one quilt, one bed spread, one pillow, three pillow cases, towels, napkins, comb, brushes, one glass tumbler, and one teaspoon.

Choice of rooms will be given in the order of application up to the opening of school. After that no rooms will be held. Rooms will then

be assigned to the students as they come to the School. There will be no deviation from this rule.

No deduction in charge for board is made for absences of less than three days. If students are compelled to be absent for that length of time, they are allowed half rates if they make arrangements before leaving.

Textbooks are furnished at a rental of $2 per year to students who do not desire to purchase.

A gymnasium fee of twenty-five cents per term is charged all students.

Each student is required to pay for losses of, or damage to, apparatus used in practical work.

For the purpose of supplying, calcimining, and painting the sleeping-rooms, a reserve fund is created by assessing each one occupying them $2 for the school year, or $1 per term.

A competent nurse is kept on the ground to care for the sick. To meet this expense each student pays $1 per term.

A deposit of $5 is required of each student as a guaranty for the return of all books and other articles borrowed. This deposit is not returned until the student severs his connection with the School.

On entering the School the student, if he is a resident of Minnesota, makes a payment of $5 entrance fee; $1 book rent and reading room; $15.50 to $16.00 board and room; $5 deposit; $1 reserve fund; $1 maintaining nurse; 25 cents gymnasium fee; total, $28.75 to $29.25.

All the boys are required to provide themselves with the prescribed uniform, which consists of cadet gray blouse, trousers, and cap and is as neat and economical a dress as the student can obtain. The suit complete, to measure, is furnished under special contract for $15.50. A better quality of cloth costs $16.50.

Each girl is required to provide herself with at least two large white aprons with bibs to wear while at work in the Domestic Science Laboratory. A gymnasium suit is also required for work in gymnastics. Suitable material is black serge or mohair for bloomers and white Indian Head for middy blouse.

Each student in attendance at the School who expects to return the following year and who desires to room in the dormitory will, at the time the assignment of rooms is made before the close of the spring term, make a deposit of $2 with the Cashier as evidence of good faith that he expects to return on the opening day of the following school year. Dormitory rooms will be assigned to new students in the order in which their applications are received.

The cost of the rooms in all of the dormitories has been graded in price according to the location of the room. The cost of room and board for a month varies from $15.50 to $16.00, depending on the location of the room, as some rooms are slightly more desirable than others. These prices include flat laundry only. Flat laundry includes bed linen, towels, and napkins only. Full information regarding available rooms will be given upon request.

In the case of a former student, the two-dollar deposit for a room will be forfeited if the student does not appear for registration within the first

week of the school year, unless he has signified in writing to the Registrar at least ten days before the opening that he does not intend to return.

HOSPITAL FUND

The Hospital Fund will be expended under the general direction of the School Nurse. This fund insures, for those contributing to it, the care of regular nurses and such medicines and materials as the regular nurses may use.

It does not provide medical treatment by physicians or fees of special nurses.

It does not provide hospital expenses of students rooming off the campus or away from the institution. Students rooming off the campus are not expected to contribute to this fund.

The regular hospital fee is collected from the dining-room help as well as from students, and this help is then entitled to nurse-care on the same basis as the students.

STUDENTS IN DORMITORIES

The Preceptor of the School of Agriculture has charge of the boys in their dormitory and social life, and the Preceptress has charge of the girls in their dormitory and social life, under such regulations as may be approved by the Superintendent. Students are required to be correct in their habits and to observe pleasantly all directions for their government.

From 8:15 a.m. to 4:30 p.m. students not at recitation or chapel are expected to be in their rooms or in the library studying or reading; also after 7:30 in the evening. The rooms shall at all times be quiet, especially in the evening, so that no student may be disturbed.

RULES AND REGULATIONS

No student shall be considered a senior whose name does not appear on the list prepared at the close of the first term of the senior year, giving the names of candidates for graduation.

No student with incomplete preparatory work, or more than one incomplete freshman subject, excepting high-school graduates, will be classified as a junior.

No student with incomplete freshman or preparatory work will be made a commissioned military officer.

An incomplete mark, if not removed before the end of the first month of the next term, becomes a condition. A condition not removed by the beginning of the corresponding term of the next year becomes a failure and must be taken again in class. Time for the removal of incomplete, may be extended by the Students' Work Committee.

No person shall be permitted to graduate who has an unremoved incomplete, condition, or failure.

Any student who has two failures standing against him shall not be eligible as a member of the school basket-ball or other athletic teams, literary or class plays, or boards of student publications.

No student shall be admitted without a pass from the Superintendent's office into any class from which he has been absent.

Reports showing the nature of the student's work will be mailed to his parents at the close of every six weeks' period.

HOLIDAYS

Lincoln's birthday, February 12, and Washington's birthday, February 22, will be observed as holidays. On Thanksgiving Day no classes will be held, but school will continue as usual on the Friday and Saturday following. It is expected that students will remain at the school on Thanksgiving Day and participate in the accustomed activities provided for that day.

ASSEMBLY

On each school day at 11:40 a.m., the students assemble in the chapel, a commodious room seating five hundred people. After the opening exercises brief talks are given by the Superintendent, members of the Faculty, or invited guests.

During the year the list of speakers includes prominent men, state and national officials, business men, particularly those connected with the agricultural industries, professional men, prominent clergymen of all denominations, educators from other institutions, and successful farmers. The address are of great interest and value to the students.

LECTURE COURSE

During the school year a lecture and entertainment course, consisting of lectures and musical programs, will be given at a low cost. It is hoped to provide high-grade lectures and programs which will furnish a pleasant relaxation from school work and be instructive as well.

A course of lectures on the following subjects will be given beginning the second week of each semester at the regular assembly period. All students will be expected to attend these lectures.

The Aim of the Northwest School—Superintendent
How to Study—Head of Teachers' Training Department
Use of Library—Head of English Department
Personal Conduct—To be appointed
Good Citizenship—Preceptor of Boys' Dormitory
Value of An Education—Superintendent

The following lectures on Hygiene will be given to freshmen by the head of the Home Economics Department, or Physical Director of the School. All freshmen are required to attend these lectures

General View on Health Problem
Diet
Dress
First Aid to Injured
Care of the Sick
Special lectures: Two, one for young men and one for young women.

STUDENTS' LITERARY SOCIETIES

Societies for the purpose of improvement in elocution and debate, and for obtaining instruction in the form of lectures give excellent opportunities for entertainment and culture. Practice in parliamentary procedure is given which will greatly benefit the students. Each student is expected to associate himself with one of these societies as early in his course as possible.

STUDENTS' CHRISTIAN ASSOCIATIONS

Young Men's and Young Women's Christian Associations have been formed having for their objects social fellowship and moral and spiritual development. Bible classes will be held Sunday morning at 8:30. The associations are non-sectarian. Religious exercises are held at the School each Sunday afternoon at 3 o'clock. Various pastors and business men address the students at these meetings. The Christian Associations conduct the exercises and secure the speakers.

BUILDINGS AND EQUIPMENT

The School has seven brick buildings: the Kiehle Building, containing the offices, library, book store, gymnasium, and assembly room; Stephens Hall, containing fifty bedrooms, dining-room and kitchen; Senior Hall, with thirty rooms; Robertson Hall, with thirty-eight rooms; Home Economics Building, containing the kitchen, sewing-rooms, class rooms, model kitchen and dining-room for serving meals; Owen Building, containing the dairy room, carpentry shop, farm machinery and cement work shop, blacksmith shop, stock judging room, and drawing class rooms; and Hill Building, which gives adequate quarters for the work in Agronomy, Horticulture, Botany, and Agricultural Science departments. The farm building, herds, and machinery are used to give the students the best current ideas regarding methods of farming.

LIBRARY AND READING ROOM

The School of Agriculture Library is being equipped to supply the needs of students. It contains books of general and technical literature, government reports, pamphlets, and bulletins. The general subject and author card index and the index of publications of the state experiment stations are always at the disposal of all students to aid them in locating the various sources of information which the library affords.

There are complete sets of encylopedias and dictionaries and files of fifty popular and technical magazines and periodicals.

The Librarian is always ready and glad to give whatever assistance she can to those doing reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

SCHOOL MUSEUM

A room has been fitted up in the Hill Building as a zoological museum and as an exhibit room for farm products and appliances. The School desires donations from friends of the institution.

COURSES OF STUDY

BOYS

FRESHMAN YEAR

First Term	Class period	Laboratory period	*Second Term*	Class period	Laboratory period
English (A)	4	..	English (A)	4	..
Physiology (A)	3	..	Arithmetic (A)	4	..
Botany (A)	5	3	Agronomy (B)	3	2
Agricultural Chemistry (A)	3	2	Carpentry (B)[2]	..	8
Blacksmithing (C)[2]	..	8	Study of Breeds (A)	3	2
Engineering (A)	1	..	Engineering (A)	1	..
Public Speaking (D)	2	..	Poultry	2	..
Music	1	..	Public Speaking (D)	2	..
Gymnasium	2	..	Music	1	..
Drill	2	..	Gymnasium	2	..
			Drill	2	..

JUNIOR YEAR

English (B)	4	..	English (B)	4	..
Cereal Crops (D)	3	2	Forage Crops (E)	3	2
Fruit Growing (D)	3	..	Farm Accounts (F)[3]	..	4
Dairy Chemistry (C)	3	..	Mechanical Drawing	..	2
Dairy Practice (B)[1]	..	3	Vegetable Gardening (C)	3	..
Poultry	1	..	Dairy Judging (—)[3]	..	2
Mechanical Drawing (D)[3]	..	4	Farm Practice (G)	..	3
Engineering (A)	1	..	Dairy Husbandry (A)	3	..
Physics (A)	2	2	Poultry	1	..
Public Speaking (D)	2	..	Machinery (A)	1	..
Music	1	..	Public Speaking (D)	2	..
Gymnasium	2	..	Music	1	..
Drill	2	..	Gymnasium	2	..
			Drill	2	..

SENIOR YEAR

English (C)	2	..	Engineering (A)	2	..
Engineering (A)	5	..	English (C)	2	..
Soil Management (G)	3	2	Civics (A)	5	..
Forestry (E)	2	1	Animal Breeding (C)	3	..
Entomology (F)	3	..	Stock Feeding (B)	2	..
Stock Judging (D)[3]	..	2	Plant Propagation (B)	2	2
Animal Hygiene (F)	3	..	Poultry	2	..
Public Speaking (D)	1	..	Farm Management (G)	3	2
Music	1	..	Meats (E)	1	..
Gymnasium	2	..	Butchering (E)[3]	..	2
Farm Practice (A)	..	3	Animal Hygiene (F)	3	..
			Public Speaking (D)	1	..
			Music	1	..
			Gymnasium	2	..

[1] Subjects extend through three periods in the daily program.
[2] Subjects extend through four periods in the daily program.
[3] Subjects extend through double time in the daily program.

GIRLS

FRESHMAN YEAR

First Term	Class period	Laboratory period	*Second Term*	Class period	Laboratory period
English (A)	4	..	English (A)	4	..
Physiology (A)	3	..	Arithmetic (A)	4	..
Agricultural Chemistry (A)	3	2	Freehand Drawing (B)[2]	..	3
Poultry	1	..	Botany (A)	5	3
Cooking (A)[1]	..	6	Cooking (A)[1]	..	4
Sewing (E)[1]	..	4	Sewing (E)[1]	..	4
Theory Cooking (B)	3	..	Theory Cooking (B)	3	..
Public Speaking (D)	2	..	Public Speaking (D)	2	..
Physical Training (A)	2	..	Physical Training (A)	2	..
Physical Training (B)	1	..	Physical Training (B)	1	..

JUNIOR YEAR

English (B)	4	..	English (B)	4	..
Fruit Growing (D)	3	..	Vegetable Gardening (C)	3	..
Public Speaking (D)	2	..	Public Speaking (D)	2	..
Freehand Drawing (B)[2]	..	3	Field Agriculture (C)	3	..
Cooking (A)[1]	..	4	Cooking (A)[1]	..	4
Food Assimilation (C)	2	..	Sewing (E)[1]	..	4
Sewing (E)[1]	..	4	Household Chemistry (G)	2	2
Home Sanitation (F)	3	..	Textiles (E)	1	..
Household Physics (G)	2	2	Home Decoration (F)	2	2
Laundering (I)	1	2	Home Etiquette (F)	1	..
Physical Training (A)	2	..	Physical Training (A)	2	..
Elective (Millinery)	..	4	Home Art (L) Elective	..	4

SENIOR YEAR

English (C)	2	..	English (C)	2	..
Cooking (A)[1]	..	4	Cooking (A)[1]	..	4
Food Study (D)	2	..	Food Study (D)	2	..
Sewing (E)[1]	..	4	Sewing (E)[1]	..	4
Home Nursing (F)	3	..	Household Economy & Marketing (F)	1	..
Invalid Cookery (F)	..	2	Health and Dress (F)	1	..
Needlework (I)[1]	..	2	Home Accounts (F)[1]	..	4
Bacteriology (K)	2	2	Physical Training (A)	1	..
Physical Training (A)	1	..	Millinery (M) Elective	..	4
Dairy Husbandry (A)	3	..	Plant Propagation (B)	3	..
Dairy Practice (B)[2]	..	3	Civics (A)	5	..
Public Speaking (D)	1	..	Public Speaking (D)	1	..

[1] Subjects extend through double time in daily program.
[2] Subjects extend through three periods in daily program.

ADVANCED COURSES

A number of courses of a more advanced nature than those taught in the School are offered to graduates and other qualified students of the School of Agriculture.

TEACHERS' TRAINING COURSE

This course at the Northwest School of Agriculture is designed to prepare teachers for rural one-room schools and for rural consolidated schools. The work will extend through a period of twelve months, including two summer terms of six weeks each and one year of nine months. The young women will have the opportunity of preparing to direct the household art and science work in such schools. An ungraded model school will be maintained in connection with this course. Ample opportunities for practice in rural schools of this vicnity will be given. After 1915 special preparation will be required of all teachers in Minnesota. This course will afford training to graduates of this school and other qualified students of equivalent preliminary training. A Training Department certificate will be issued to each graduate recommended to receive it.

OUTLINE OF COURSE

Preliminary work to be done at Summer Sessions

First Session

Arithmetic (2 periods each day)
Grammar (2 periods each day)
Physiology (2 periods each day)

Second Session

Reading (1 period each day)
Primary Methods (1 period each day)
Rural School Methods (1 period)
Electives (3 periods each day)

Work for regular school year, nine months

First Term

	Class period	Laboratory period
History and Civics (B)	5	..
Prep. for Model School (E)	5	..
General Methods and Construction (D)	3	..
English, Grammar, Composition (E)	5	..
Domestic Science (N)	1	2
Music and Drawing (C)	2	..
Nature Study and Agriculture (C)	2	..
Shop Work (—)	..	2
Group Teaching and Observation (F)	3	..

Second Term

	Class period	Laboratory period
Geography (A)	5	..
Prep. for Model School (E)	5	..
General Methods and Construction (D)	3	..
English, Grammar, Composition (E)	5	..
Domestic Science (O)	1	..
Music and Drawing (C)	2	..
Nature Study and Agriculture (C)	2	..
Shop Work (—)	..	2
Rural School Problems (G)	3	..
Group Teaching and Observation (F)	3	..

For description of subjects, see page 27.

ADVANCED COURSE

For graduates of the School of Agriculture

The work offered in this course is arranged to fit young men and women to enter the College of Agriculture. A second year's work similar in character to the first year's work outlined below must be completed before the college entrance requirements are complied with. Advanced subjects for the second year's work will be offered later but for the present this course and the Courses for Teachers are all that can be given.

The work of this course will cover a period of six months, beginning and closing at the same time as the regular school classes. Students capable of carrying satisfactorily all the subjects required will be granted a certificate.

OUTLINE OF COURSE

(One Year)

First Term	Class Period	*Second Term*	Class Period
Elementary Algebra (B)	5	Elementary Algebra (B)	5
Plane Geometry (C)	5	Plane Geometry (C)	5
English (E)	5	English (E)	5
Elementary Economics (C)	2	Rural Sociology (D)	2
General History (B)	5	General History (B)	5

DESCRIPTION OF COURSES

AGRICULTURE

A. Agricultural Chemistry. The work in this subject covers the principles of elementary chemistry and the application of these principles to the elements and their compounds most important to plant and animal life, with a view to acquainting the student with the characteristic chemical and physical properties of elements and compounds common in water, air, soils, fertilizers, and foods. Kennard.

B. Agronomy. This work consists of a study of the sources of plant food; how plants feed; agents and processes of soil formation; classification of soils; drainage; tillage; humus in the soil; bacteria in the soil; legumes and crop rotation. Kennard.

C. Field Agriculture. This work consists of a study of geology as related to soil formation; effect of the glaciers on the soils of Minnesota; origin of soils in the various agricultural regions of Minnesota; classification of soils; soil moisture and soil tillage; land areas and the plannng of fields and farms; the classes of field crops as grain, grass, and cultivated crops; the relation of these crops to each other in a systematic rotation and in their relation to soil fertility; the origin, distribution, and uses of cereal crops and other field crops. McCall.

D. Cereal Crops. A study of the classes of field crops with special study of the most important cereals, as to history, habits, varieties, planting, harvesting, storing, uses and values, pests, including insects, diseases, and weeds. Kennard.

E. Grasses and Forage Crops. This course is devoted especially to the kinds, methods of storing, methods of handling, uses, value, and adaptability of grasses and forage crops. All field crops will be studied from actual specimens in the laboratory. Kennard.

F. Farm Accounts. This is bookkeeping, but for the farmer rather than for the merchant. The principle of debits and credits is the same. The course aims to help the farmer in keeping his records that he may know where his profits and losses come from. Bengtson.

G. Farm Management. This course takes up soil management; adaptation of crops; systems of farming; selection of farms; rotation of crops and the planning of rotation suitable to the students' home farms and to farms operated under different systems; the cost of producing farm crops; marketing farm products; business methods applied to the farm and a statement of the farm business are given.

An accurate plan of the home farm showing fields (with crops raised on each and yields), farmstead, and buildings is required of students entering this course. Before leaving for home at the close of the first year students should consult with the instructor on this subject and obtain from him directions and blanks so that the work required upon entering may be performed at home during the summer, where it may be easily and accurately completed. KENNARD.

H. FARM PRACTICE. This course will consist of practical work in the laboratory and the seed-house in judging, grading, testing, treating, storing, and cleaning seeds of all the common grains and grass crops. KENNARD.

LIVE STOCK

ANIMAL HUSBANDRY

A. STUDY OF BREEDS. The different breeds of cattle, horses, sheep, and swine are studied as to origin, quality, and general adaptation to conditions in the State. The work is made practical by frequent illustrations with stock kept at the Experiment Farm for that purpose. DIETRICH.

B. STOCK FEEDING. The principles of feeding as applied to the production of horses, beef cattle, hogs, and sheep are taught. Instruction is given in the compounding of rations for the different classes of stock, special attention being given to the use of home-grown feeds. Practical lessons in feeding are given at the barns under the direction of an experienced feeder. DIETRICH.

C. ANIMAL BREEDING. In this class the boys learn the laws that govern breeding and the principles to be considered in the breeding of horses, cattle, sheep, and swine. The importance of the male in the herd and the value of good blood are emphasized. They are taught what a good pedigree means, as well as how to build up a herd from grade stock. They are required to become familiar with methods of keeping live-stock records of all kinds. DIETRICH.

D. STOCK JUDGING. Instruction is given on types and breeds of live stock, attention is called to desirable and undesirable qualities in each. Practice is given in judging animals, the standard score card being used as a guide. DIETRICH.

E. DRESSING AND CURING MEATS. Practice in slaughtering is given to the young men, while both young men and women learn the name and value of the different cuts. Both get lessons in simple methods of preserving meats for future use. DIETRICH.

F. ANIMAL HYGIENE. This course is designed to enable the student to diagnose a disease from the outward symptoms and to fit him for the intelligent care of his live stock. The anatomies of the different classes of domestic animals are carefully studied and practice is given

in filing the teeth and trimming the hoofs of horses and in treating the common diseases found among the farm stock. DIETRICH.

G. FARM PRACTICE. Practical work in care, handling and feeding of the station stock. DIETRICH.

DAIRY HUSBANDRY

A. FARM DAIRYING. A course of lectures is given in farm dairying, including instruction in the care of milk and utensils, explaining the principles involved in creaming milk by the gravity and centrifugal processes and giving full instruction in regard to running farm separators and the manufacture of butter and cheese in the farm dairy. During the last half of the first term students receive instruction in regard to the characteristics of the various breeds of dairy cattle, their origin and comparative adaptability for the dairy. Lectures are given upon the points desirable in animals intended for the dairy. The students have practice work in judging dairy stock. During the second term lectures are given covering both the scientific and practical phases underlying the principles of feeding. Practice work is given in compounding rations and estimating the comparative value of foodstuffs.

Commencing the first Tuesday in February, lectures in bacteriology are given the girls in place of dairy feeding. This work treats in an elementary way the subjects of bacteria, yeast, and molds in the home. It is the purpose of this course to familiarize the young women with the growth and character of fungi commonly met in household and dairy management. A microscopic examination and study of the more common forms of fungi is made and special stress is laid on the practical application of the subject to the home. DIETRICH.

B. DAIRY PRACTICE. Students receive instruction in the most advanced methods of creaming milk, ripening cream, churning, working, and packing butter, the manufacture of sweet curd cheese, and measuring the value of milk by the Babcock test and lactometer. This practice work begins the third week of the first term. DIETRICH.

C. DAIRY CHEMISTRY. The chemical and allied changes which take place in the handing of milk and its manufacture into butter and cheese, and the application of these principles to the production of milk and its products form the basis of this work. DIETRICH.

POULTRY HUSBANDRY

The instruction in this subject for the first-year students will include the following topics: the study of breeds; planning and arrangement of poultry houses; feeds and feeding. In the junior year incubation and brooding, feeds and feeding, and killing, dressing, and packing fowls for the market will be taught. In the senior year work in poultry farm management, judging fowls, etc., will be given. Students will be given practice in the care and management of fowls, operating incubators and brooders, and fattening fowls. BROWN.

BOTANY AND HORTICULTURE

A. Agricultural Botany. This subject is taught with special reference to plants that are of interest to the Minnesota farmer and gardener. Illustrations are used whenever they can be secured from greenhouse and field. Weeds are examined and classified, seeds are tested, and life and growth as possible. Plant-life diseases such as rusts, smuts, potato diseases, etc., are studied, and the best preventive methods are discussed. McCall.

B. Plant Propagation. The work in plant propagation includes a study of the development of seeds, the planting of seeds, commercial seed growing, seed storing and testing, and the propagation of plants by means of cuttings, grafting, budding, and layering. Lectures are given in plant selection and breeding. A large part of the laboratory work of the course is done in the Experiment Station greenhouse. McCall.

C. Vegetable Gardening. In this subject the value of the home vegetable garden is emphasized; the preparation of the ground and the selection of plants and seeds are given attention. Tillage, rotation, transplanting, preparation, and care of hotbeds, and insects dangerous to the garden are also given due consideration. McCall.

D. Fruit Growing. Fruit growing is taught with special reference to the raising of such fruits as may be successfully grown in the northwest section of the State for the home or the market. McCall.

E. Forestry. Why, how, when, and where to plant windbreaks and wood-lots are taught; also characteristics and adaptability of the more common trees; methods of propagation, and the conservation of planted and natural forests. McCall.

F. Economic Entomology. The work in this subject, as in all others, is primarily to aid the student in his work on the farm. It includes classification of insects, habits and life-histories of both beneficial and injurious forms, especially those in Minnesota; rabbits, gophers, birds; also insecticides and their application. McCall.

HOME ECONOMICS

The aim of this department is to arouse interest in the work of the home by giving familiarity with its common processes and their underlying principles, and to show the relation of the home to the community. The study of food, shelter, and clothing affords an opportunity to present some of the problems involved in the management of the household. By showing the direct application of science to the work in the home, scientific management of the home is explained. Above all, the aim is to awaken the girls' interest in the wider questions of sound bodies, wholesome dwellings, and real homes.

The subjects covered in each term are as stated below:

A. COOKING

Freshman year: complete equipment of modern home kitchen; best methods of managing kitchen work, caring for kitchen and dining room utensils, etc.; the study of kinds and comparative costs and fuel value of fuels; the preparation and serving of vegetables, cereals, dried fruits and legumes; use of various leavening agents in the making of batters and doughs; study of milk, eggs, and cheese dishes; beverages; canning of fruits and vegetables; desserts; salads; serving a breakfast and luncheon.

Junior year: making of preserves, pickles, jelly and experiments with different methods of canning; selection and cookery of meats, fish, and poultry; plain pastry; making of cakes; large quantity cooking and serving given in preparation of foods in dining hall; demonstration cooking—each girl will demonstrate the cooking of one dish before her class; planning, cooking, and serving of a dinner by groups; computation of cost of all recipes.

Senior year: During the first semester a general review of cooking is given. Each girl collects recipes which she tries out and corrects, if necessary, so that by the end of the semester she has a complete set of recipes which are virtually her own. Class work consists of a review of principles of cooking and preparation of various foods in more elaborate form.

The work of the second semester is termed practical cookery. Mrs. SEWALL.

B. THEORY OF COOKING

A study of foods by classes covering: kind, cultivation or growth, distribution, and preparation of the various foods, from the raw state to the finished product in marketable forms. U. S. bulletins are used for reference work. Mrs. SEWALL.

C. FOOD ASSIMILATION

Review of structure of human body, composition, necessary foods, digestion of foods, absorption, metabolism, and excretion. Mrs. SEWALL.

D. FOOD STUDY

More technical study of fundamental principles of human nutrition with a view to correct feeding in health and disease. The uses and metabolism of mineral substances in food are carefully considered. Formulation of dietaries for various people in different occupations and at different ages and application to practical problems with special reference to limitation in cost. Mrs. SEWALL.

E. SEWING

Freshman year: Making of gymnasium suit; making of a few models to teach the fundamental stitches and seams; drafting patterns for and making of three undergarments; stocking darning; darning of table linen; simple lingerie waist.

Junior year: Tailored shirt waist; outside skirt (cotton or wool); wash dress; silk or woolen dress; study of textiles.

Senior year: Petticoat; wool dress and silk waist or tailored suit; slip; commencement dress.

F. HOME MANAGEMENT. This course extends throughout the junior and senior years and includes those subjects which aim to place the home on a more business-like basis and to make it more beautiful in every way. It includes home sanitation, home decoration, home nursing, invalid cookery, care of children, care of finances in the home, personal hygiene, and home and social etiquette.

Home Sanitation includes a study of location, surroundings and construction of the house; the hygiene of the home; heating, lighting, ventilating; house planning with exercise in making plans. Much practical work is done in cleaning, etc.

Home decoration consists of a practical course in the decoration and furnishing of the entire home; the problem of artistic and economical furnishing; the cost of labor and material. The latter part of the semester is devoted to complete schemes for house decoration worked out by each student.

Home Nursing gives instruction in simple methods in the home care of the sick, care of children and aged, first aid in emergencies, simple sick room procedures, and food for the sick.

Household Economy and *Marketing.* Discussion of such topics as the systematic planning of daily routine; family income and its expenditures; methods of buying; how to judge of quality, cost, etc. Health and Dress notes are of especial interest to girls. Personal hygiene, proper clothing and allied subjects are discussed.

Home Accounts. This is home bookkeeping. The aim of this course is to teach the girls the business side of housekeeping and home-making. The courses in Household Economy and Marketing and Food Study furnish practical problems.

Home Etiquette is a simple course given the girls to answer a few of the many questions which arise as they try to adapt themselves to different social environments. Mrs. SEWALL.

G. HOUSEHOLD PHYSICS is taken up applying the principle of statics, dynamics, heat, light, sound, electricity, etc., to various home processes.

H. HOUSEHOLD CHEMISTRY which includes a study of: air—properties, oxidation; water—composition, analysis, purification; food—composition of five food principles, and analysis of milk, adulteration of foods, composition of baking powders, etc. Mrs. SEWALL.

I. LAUNDERING. The student has actual practice in the best methods of washing cotton, woolen, linen, and silk fabrics, in plain and fancy ironing, and in removing all common stains. Lectures are given on soaps, washing compounds, dry cleaning, and utensils used in laundry.

J. NEEDLEWORK. This course is planned to give knowledge and skill in fine needlework for the finishing and decoration of articles of clothing

and house furnishing. The work includes the making of a table runner, hand bag, initialing, embroidering and crocheting an edge for commencement slip.

K. BACTERIOLOGY. This course is given for the study of bacteria, yeasts and molds. Practical laboratory work is done showing the causes and effects of mold, yeasts, and bacteria in butter, cheese, milk, cream and all dairy products. Careful study of processes involved in preservation of foods.

L. HOME ART. A brief study of design in its relation to the home. Study and design of objects for the home as curtains, table and pillow covers, lamp and candle shades. A few other arts and crafts subjects are taken as leather work, basketry, and pottery. Elective. Optional with juniors and seniors.

M. MILLINERY. The students will be allowed to go into the regular millinery class for four hours a week. Elective. Optional with juniors and seniors.

TEACHERS' TRAINING COURSE

N. Three hours each week during the first semester are devoted to Domestic Science. Practical work is given in sewing and cooking adaptable to rural and consolidated schools, as patching, darning, and making of complete set of garments for a doll, preparation and serving of noon lunches, preparation of dishes suitable for domestic science club work.

O. One hour each week in the second semester is given to lecture work and discussions on subjects along the following lines: value of domestic science work to rural community, and teacher's attitude on subject; value of domestic science to the child, personal hygiene, home sanitation, simple home remedies, first aid to the injured, proper balancing of meals, composition of foods, organization of mothers' and girls' domestic science clubs, and decoration of rural schools and homes.

FARM MACHINERY, SHOP WORK AND DRAWING

A. FARM MACHINERY AND ENGINEERING. The course in engineering in the first year includes the following subjects: making waxed thread and sewing harness leather, soldering, babbitting, brazing, installing plumbing, concrete work, farm sewage disposal, belt lacing, and rope splicing.

The second-year work consists of gasoline engineering, leveling and laying tile drains, care of farm machinery, and road and bridge building.

The senior year is taken up with gasoline engineering. Steam engineering optional second term senior year. SEWALL.

B. CARPENTRY. Lectures are given on the care and use of the common carpenter's tools, on the construction of farm buildings, framing, lay-

ing out rafters, braces, etc., on estimating building material, such as stone, brick, concrete, lumber, paint, and hardware. In the shop the student makes such models as will give him practice in the use of tools. The making of mortise joints, splices, drawing boards, hammer handles, cupboards, and book racks, and the laying out of rafters are among the exercises. Each student files his own saws and sharpens his planes, chisels, and any other tools he may use. SEWALL.

C. BLACKSMITHING. In the blacksmith shop lectures are given on the care and management of the forge and fire, on the different methods of bending, shaping, and welding iron and steel, and in shaping and tempering steel tools. The students are required to make chains, hooks, rings, bolts, clevises, tongs, cold chisels, drills, and hammers, thereby getting practice in shaping and welding iron and steel and in tempering steel tools. After returning home they should be able to make most of the tools required in the shop and do the light repair work on the farm. BERG.

D. DRAWING. Students are given instruction in drawing for the purpose of teaching them the use of the tools and the practical value of drawings in designing buildings and machinery. They make drawings of the carpentry exercises and afterwards work from the drawings in the shop, thereby getting direct application. They design dwellings, barns, sheds, and other farm buildings, estimating the quantity of material needed and the cost of the building when completed. SEWALL.

ENGLISH

A. FRESHMAN ENGLISH. The principles of grammar that guide one in the choice of words are emphasized and the application of these principles is insisted upon. Drills for the purpose of eliminating errors are given each day. Much attention is directed to spelling and punctuation. A few selected classics furnish material for literary study and composition work. SMITH.

B. JUNIOR ENGLISH. Selected classics are studied and much work in description, narration, and explanation is given. Practical business English, based upon Mayne's *Business English,* is taught in the second semester. BROWN.

C. SENIOR ENGLISH. Practice in the four forms of composition is given with emphasis upon the principles of English previously studied and upon the necessity of fluency and correctness of expression. Carefully chosen classics are studied with the view of increasing the student's pleasure in good reading. BROWN.

D. PUBLIC SPEAKING. Required courses in Public Speaking are given during the three years. The aim of these courses is to make the students pleasing readers and to enable them to appear at ease before an audience. There is an effort made to have this work correlate with the other work of the School. Classics that are studied in English

are read aloud and short talks on topics from different studies are outlined and given by the students. Clear articulation, correct pronunciation, and distinctness are insisted upon. Public recitals are given to furnish students opportunity of appearing before a larger audience than the class affords. BROWN AND SMITH.

E. ENGLISH, LITERATURE AND RHETORIC. A survey of English literature and a study of some of the more important literatory productions are included. Rhetoric with oral and written themes in the various forms of discourse. BROWN.

LITERARY SOCIETIES

Students are encouraged to carry on their literary work independently in their third year that they may gain initiative for such work in their home centers. For this purpose literary societies are maintained by the maturer students who have gained ability in their public speaking courses.

HISTORY AND CIVICS

A. CIVICS. The school district, the township, the county, and the state government are given special attention, for here is where the many participate. The national government is also considered, but not so extensively. BENGTSON.

B. GENERAL HISTORY. A survey of the world's history with particular emphasis placed on the development of institutions, states, and organizations that have influenced to the greatest degree the progress of civilization. BENGTSON.

C. ELEMENTARY ECONOMICS. Special emphasis will be placed on rural economics. SELVIG.

D. RURAL SOCIOLOGY. The problems of rural communities, of rural health and sanitation, and of rural social institutions will receive attention. SELVIG.

GYMNASIUM WORK

The gymnasium is a large, well-lighted, two-story brick building. It is well supplied with apparatus for general gymnasium and athletic exercises, together with such appliances as are necessary for the development of a symmetrical body. Besides being fitted up with the finest apparatus it possesses space and equipment for sprinting, pole vaulting, hurdling, high and broad jumping, shot putting, etc. Class work in physical training is required of all undergraduate young men not excused on account of physical disability. Courses are offered on the heavy apparatus, in corrective work, class drills, and athletic training. In addition to the regular class drill, a certain part of which consists of training in athletic sports, the School is represented by a strong basket-ball team, a track athletic team, and a hand-ball team. BUHR.

MATHEMATICS

A. ARITHMETIC. This work is made especially practical by the application of its principles to the common every-day problems which come up on the farm, such as measurements of material, extension, capacity, etc.; the marketing of grain, stock, and other farm products; and the purchase of machinery and other supplies. BENGTSON.

B. ELEMENTARY ALGEBRA. This work covers Wentworth's Algebra, or equivalent text, through simple equations of one unknown quantity. Special attention is given to literal notation, negative numbers, factoring, fractions, and the simple equation. BENGTSON.

C. PLANE GEOMETRY. The course in Geometry covers Wentworth and Smith's Geometry, from Book I to VIII, or equivalent texts, except the work in symmetry, maxima and minima. BENGTSON.

MUSIC AND DRAWING

A. PIANO AND VOCAL. Piano.—The instruction of each student is adapted to his capacity or needs. The course of study includes technical exercises for the development and control of the fingers, hands, and arms. Studies and compositions by the best composers are given. A special fee is charged for this work.

Voice.—This course embraces the following work: exercises in breathing, tone placing, for relaxing the throat, for the formation of vowels and consonants, and for sight reading. Songs by American and foreign composers are studied. This work also requires a special fee.

Chorus work.—A glee club, chorus, and quartettes are organized during the year. Students with the best voices are admitted to these. No special fee is charged. GUNDERSON.

B. FREEHAND DRAWING. Drawing of plant forms and landscape in pencil, charcoal, and water color, the study of perspective and still life, and design, with the view of their application to home decoration. Elective in Teachers' Training Course.

C. MUSIC AND DRAWING. The music and drawing will be adapted to rural schools, and an outline in these subjects, that will fit into the rural school program, will be given. GUNDERSON.

D. MUSIC (Required). In the regular course of study, there will be given one hour per week of required work in music of all the students in the three years. This will consist of work in ear training; vocal development; sight reading and chorus; outlines of history, appreciation of music, etc. GUNDERSON.

MILITARY DRILL

The United States Government furnishes this School with the necessary arms and equipment for military drill.

PHYSICAL TRAINING.

The aim of this department is to maintain the health of the students, to give outdoor exercise and deep breathing, to stimulate functional activity, and to give coördination and control.

A. PHYSICAL TRAINING. Free hand gymnastics, aiming to produce correct posture and to counteract faults of posture; aesthetic movements aiming at grace; folk dances and games. GUNDERSON.

B. PHYSICAL TRAINING. The following lectures on Hygiene will be given to freshmen by the head of the Home Economics Department; all freshmen are required to attend: General view on health problem; diet; dress; first aid to injured; care of the sick; special lectures—one for young men and one for young women. Mrs. SEWALL.

PHYSIOLOGY

A. COMPARATIVE PHYSIOLOGY. An effort is made to show the student the importance of a proper care of the human body. Special attention is given to nutritious and unnutritious foods, effects of narcotics, and the relation of bacteria to the common diseases. Special attention is given to the organs of circulation, digestion, respiration, and the nervous system. Matters of home and personal hygiene are also given careful attention. The class work is illustrated by means of large charts, skeletons, manikins, and dissection. Important points of difference between human and animal physiology are pointed out in preparation for the third year's work in Animal Hygiene.

PHYSICS

A. AGRICULTURAL PHYSICS. This subject is taught more with a view to its application in every-day life than as a redemonstration of old laws, as has been the custom in many schools. The elementary principles of the science are brought to the students largely by demonstrations for the events of the farm and home. For example, from their knowledge of the relation of weight to bulk in grain, soils, and water, they are led to a knowledge of volume, mass, density, weight, force, draft, specific gravity, and fluid pressure. In the laboratory they make definite determinations along these lines. Likewise the somewhat vague and indefinite notions the young people have from their use of pulleys, eveners, and other farm machinery, form fitting stepping-stones to definite mathematical results readily reached by them under proper guidance. The varied questions of soil physics, soil formation, the movements of water and air through soil, soil temperature, soil grains, the granules, and pore space are matters studied from the practical side and used as avenues to far-reaching laws. BENGTSON.

FARM PRACTICE

A certain degree of efficiency in farm operations is required of every young man before graduation. Farm practice is therefore a definite part

of the course and is so planned as to supplement the previous experience of the students and the theoretical instruction of the class room. Every farm reared boy through experience in fundamental operations on the farm has a working knowledge of such things as harnessing horses, milking cows by hand, plowing, planting, and harvesting, but does not always know the best way of doing them. Practice in such fundamentals is to give a fund of "helpful hints" to make the work easier and better.

The practice in operations which constitutes an essential part of an agricultural course includes such exercises as running gasoline engines and tractors, spray rigs, cream separators, incubators, preparing poultry for shipment, packing of eggs, judging animals and crops, testing and selecting seed grain, laying out drainage systems, grafting and pruning fruit trees, testing cows, feeding for milk and beef production. It includes two distinct phases: (1) practice during school course—work in laboratory, barn and field; (2) vacation work on home farms—summer practicums.

SUMMER PRACTICUMS

Summer practicum work is a part of the regular school course and must be taken by all freshman and junior boys during the two summers intervening between the freshman and senior years. The work consists of practical work on their home farm in following up studies taken at the School during the winter. The projects selected must be submitted to the Station Council for approval before March 1. Regular reports of the progress of the summer work are required each month. Some one connected with the School and Experiment Station will, if possible, inspect the work at least once during the summer. Suggestions regarding the work will be given and the progress being made will be noted. Students will receive credit for this work to apply on the work required for graduation. Those students who are unable to carry on the summer practicum work at home during the two summers will be expected to do extra work in some department of the Northwest Experiment Station to supplement their class work. Two hours of credit will be given for the work satisfactorily completed each summer. The reports of the best summer practicum work will be published in a School circular with the rank secured by each student.

TEACHERS' COURSES

A. Geography. A review of the general subject matter in geography will be given, and suggestive methods for teaching the subject will be discussed. The geography of Minnesota will receive special attention. Sherwood.

B. History and Civics. This course will consist of a review of United States history and methods for teaching it in the rural schools. The history of Minnesota will be given particular attention. It civics the work will consist of the government of the school district, township, and county, as well as that of state and nation. Sherwood.

C. NATURE STUDY AND AGRICULTURE. This course will consist of the study of birds, insects, flowers, weeds, grasses, trees, corn, corn breeding, soils, etc. An outline suitable for use in rural schools will be suggested. McCALL.

D. GENERAL METHODS AND CONSTRUCTION WORK. This period will be devoted to discussing general methods in teaching the various subjects from the rural standpoint and in discussing the work observed by the student pupils in the model school and other rural schools. The construction work will consist of basket and rug weaving, paper cutting and folding, and all industrial work suitable for rural schools. SHERWOOD.

E. PREPARATION FOR MODEL SCHOOL. An hour each morning will be devoted to the preparation of the class work for the ungraded model school. SHERWOOD.

F. GROUP TEACHING AND OBSERVATION. Besides having charge of the ungraded model school the student pupils will do group teaching. These groups will be composed of pupils who for various reasons need extra help in certain subjects. The student pupils will observe the teaching in the model school and other rural schools, taking notes in the work. SHERWOOD AND SMITH.

G. RURAL SCHOOL PROBLEMS. This course will embrace the following:

Rural Sociology.—The problems of rural communities, of rural health and sanitation, and of rural social institutions will receive attention. SELVIG.

Rural School Administration.—The general problems of rural school administration will be considered in this course. SHERWOOD.

Psychology and Rural School Methods.

SUMMER SESSION

The subjects of Arithmetic, Physiology, Grammar, and Reading will be pursued as credit subjects at the regular summer sessions. Full outlines may be obtained upon request.

SHORT COURSES

FARMERS' SHORT COURSE

The Short Course for Farmers was organized at this School in 1911 to meet the needs of men and women who wish to study the problems of the farm and the home. Ten days are given to this work at the present time. The most important farm problems are selected for discussion, which, with practical demonstrations and actual practice in various farm operations, make the work of great value to those who attend. Special attention is given to the judging of grains, soils, and animals.

A special circular describing the Sixth Annual Short Course will be ready for distribution by December, 1915, and will be mailed to any one upon request. The course will be held during January, 1916.

Requirements for admission.—There is no entrance examination, and no age limit is prescribed. Any man or woman interested in farming is welcome.

Expense of course.—There will be a registration fee of one dollar for the entire course or any part of it.

Train service.—The morning and evening local trains, Great Northern Railroad, stop at the School spur during the Farmers' Short Course.

JUNIOR SHORT COURSE

The Fifth Annual Junior Short Course will follow the regular school course, April 3 to April 8, 1916. It is open to boys and girls from 12 to 18 years of age. With the exception of $2 for board, there is no expense connected with the course. The course will include work in corn, grain, and stock judging for the boys, and cooking and sewing for the girls. Illustrated lectures will be given. Excursions to places of interest and to stock farms will be taken. The boys and girls will occupy the school dormitories with experienced teachers in charge.

The special Junior Short Course circular will be ready in January, 1916, and will be sent upon request.

SUMMER TRAINING SCHOOL FOR TEACHERS

A State Teachers' Training School will be held at the Northwest School of Agriculture from June 13 to July 24, 1916.

The School has been organized by the authority of the Department of Education and will be conducted under its supervision. The buildings, apparatus, and library of the School are available for the use of the teachers of northwestern Minnesota.

The general aim of the School is to offer a review of the elementary and high-school subjects that are required for the first- and second-grade

state teachers' certificates. Particular attention will be paid to the organization and conduct of rural schools. Besides the instructors provided by the state department, the members of the agricultural school faculty conduct some of the classes affording particular opportunities for the study of industrial work.

A circular describing this course may be obtained by addressing the Superintendent, Northwest School of Agriculture, Crookston, Minnesota.

SPECIAL COURSES

I. TRADE DRESSMAKING

The aim of this course is to give girls, who do not wish to take the regular Home Economics Course, an opportunity to acquire skill in the designing, planning, cutting, fitting and finishing of garments, with a view to becoming dressmakers. Each student drafts, cuts, bastes, fits, and finishes woolen and cotton dresses, silk, woolen, and lingerie waists, tailored skirts and suits, and any problems that may be brought to the school. Lectures are given on costume design—study of lines and harmony; fabrics, suitability, and utility; kinds and uses of trimmings. This course in dressmaking takes three months for completion—a new course begins October first and January first. Two subjects in regular school curriculum may be studied at the same time, if desired.

II. MILLINERY

Designing, making, trimming, and decorating of fall and spring hats with a view to developing originality, skill, and artistic tastes are the aims of this course. Old materials are renovated and individualty is secured by the making of flowers, ornaments, and other trimmings. Wire and buckram frames are made and straw sewing is taught. Two months each term.

III. STUDENTS' SHORT COURSE

The Students' Short Course begins after the holidays to meet the demand for this work by young men who could not take the entire three years' course.

Subjects Offered: Gasoline engine work, including the problems that a person meets in operating a tractor, a smaller engine, or an automobile; Agriculture, including farm crops, rotations, soil study, clovers, alfalfa, and other related topics; Study of Farm Animals, including a study of the different breeds, their feeding care and management, and breeding; Blacksmithing, giving a thoro practice in iron work; Carpentry, including farm buildings; English, including letter writing; Farm Bookkeeping and accounts.

Time Schedule. In Gas Engineering, at least 15 class hours weekly will be given with opportunity open for additionnal time if students so desire. Two afternoons a week devoted to Blacksmithing will give sufficient time to enable the students to become proficient in the simpler

forms of iron work. In English, Agriculture, and Animal Husbandry, strong courses will be offered.

School and Station Equipment. The school has excellent facilities for thoroly interesting and practical work in all of these lines. There are over two hundred head of horses, cattle, sheep, and hogs there. These animals furnish practical work for all the classes in feeding, care and management, as well as specimens for judging work. The Station has a gas tractor, several gasoline engines, modern farm machinery, all of which give the students practical farm advantages. The blacksmithing and carpentry shops are well equipped.

Credits Offered. Credits will be given to all who do satisfactory work which will be accepted in the regular school course.

Expenses. Total expenses for one term amount to about $60.00, Board and room in the school dormitories are furnished at an average price of $15.75 per month. The rooms are steam heated, electric lighted, with modern bath room on each floor. Fees for three months including book rent, entrance fee, etc., total $8.25, plus a $5.00 deposit which is returned at close of term. Bedding is furnished by students themselves.

NORTHWEST EXPERIMENT STATION

Substation, Department of Agriculture, University of Minnesota

STATION CORPS

C. G. SELVIG, M.A., Superintendent
O. L. BUHR, Secretary
N. G. MALIN, Farm Foreman
WILLIAM DIETRICH, Animal and Dairy Husbandry
F. L. KENNARD, Agronomy and Farm Management
T. R. SEWALL, Farm Buildings
C. E. BROWN, Poultry
T. M. MCCALL, Horticulture
CORA PAULSBERG, Accountant

The Northwest Experiment Station was established in 1895 to investigate agricultural conditons in northwestern Minnesota and to acquire and diffuse among the people of this section practical results from these investigations. Up to the present time funds have not been provided to enable the Station corps to do a great deal of investigational work. The Station is taking on more and more work each year, and results of great value are being secured.

The Station contains 480 acres and is one mile north of the city. The land is extremely low and presents a drainage problem of more than usual difficulty. With aid from the U. S. Office of Experiment Stations the Station is taking an active part in testing surface and tile drainage for the Red River Valley region. Much valuable data upon the subject of farm drainage is being secured.

The Station has well-equipped barns and yards. From a small beginning the Station has acquired valuable stock which is distributed to farmers in every section of the State. The dairy stock, hogs, and poultry from the Northwest Experiment Station have started an interest in high quality stock in many places. Beef cattle, sheep, and horse-breeding work is gradually being brought to the point where the Station can do more along these projects than heretofore. Various feeding experiments are conducted.

With the aid of the Federal Department of Agriculture, the Minnesota Experiment Station, St. Paul, and in coöperation with experiment stations in other states and in Canada, the Northwest Station is actively engaged in the production and distribution of pure seed grain, grasses, corn, and potatoes. This work has already demonstrated its value and will grow to be of the greatest importance to this section of the State. Pure, pedigreed seed will be distributed to farmers who agree to maintain its purity and quality. The entire area of the Station is devoted to this work. This Station has begun work which will make it an important corn-and seed-breeding center.

Experiments with various systems of crop rotations, methods of tillage, alfalfa, disease-resistant plants, methods of growing grasses, the eradication of weeds, fiber flax (in coöperation with the U. S. Department of Agriculture), winter wheat, rate of sowing grains, and with various fertilizers have been begun and are yielding valuable results.

Extensive projects embracing horticultural and vegetable gardening work have been started. Many varieties of small fruits are being tested as to their adaptability to this climate.

The Poultry Department has maintained its work of investigating the housing, feeding, and breeding of chickens. Valuable results have been secured and since the publication of the first bulletin other important investigations now under way are showing valuable results.

The Northwest School of Agriculture is maintained in connection with the farm with Station men as instructors.

BULLETINS OF THE NORTHWEST EXPERIMENT STATION

Bulletin 110. Installation of an Experimental Drainage System at Crookston.

Bulletin 119. Poultry.

Report of Northwest Experiment Station for 1911 and 1912. Published February, 1913.

Extension Bulletin 41. Two Types of Silos at Northwest Experiment Station.

SUMMARY OF ATTENDANCE

1914-1915

	Men	Women	Total	
Regular School Course				
Advanced Course	3	7	10	
Seniors	17	7	24	
Juniors	28	20	48	
Freshmen	73	24	97	
Total, regular school course				179
Summer Session, 1914	4	141	145	145
Junior Short Course	19	28	47	47
Farmers' Short Course and Farm Crops Show	1,608	216	1,824	1,824
Total				2,195

Bulletin of
The University of Minnesota

DEPARTMENT OF AGRICULTURE

WEST CENTRAL SCHOOL AND STATION

MORRIS, MINNESOTA

1915-1916

VOL. XVIII, NO. 18. JUNE 1915

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Original Series. Containing the reports of the President and of the Board of Regents, the Register, the Bulletin of General Information, the annual announcements of the individual colleges of the University, etc.

General Series. Containing announcements of departments of instruction, reports of University officers, etc.

These bulletins will be sent gratuitously to all persons who apply for them. The applicant should state specifically which bulletin or what information is desired. Address

The REGISTRAR,
The University of Minnesota,
Minneapolis, Minnesota.

Research Publications. Containing results of research work. Papers will be published as separate monographs numbered in several series.

School of Mines Experiment Station Series. Containing results of investigations conducted by the Station.

Current Topics Series. Containing papers of general interest in various lines of work.

These publications are free to residents of the State. To others a small charge is made. They are offered for exchange with institutions publishing similar material. Address

The LIBRARIAN,
The University of Minnesota,
Minneapolis, Minnesota.

THE WEST CENTRAL SCHOOL AND STATION

FACULTY

George Edgar Vincent, Ph.D., LL.D., President
Cyrus Northrop, LL.D., President Emeritus
Albert F. Woods, M.A., D.Agr., Dean
Edward M. Freeman, Ph.D., Assistant Dean
Edgar C. Higbie, M.A., Superintendent

O. O. Bye, Carpentry, Farm Structures, and Superintendent of Buildings
Joyce E. Fiero, B.A., English
Irma Hathorn, B.A., Household Art and Preceptress
Myrtle G. Johnson, Piano and Gymnasium
Philip Jordan, B.S., Animal Husbandry and Dairying
Mary E. King, B.A., Librarian
Henry E. Meyer, Piano and Chorus
Paul E. Miller, B.S., Farm Grains and Farm Management
Olive M. Potter, B.S., Domestic Science
Philip Schweickhard, Preceptor and Social Science
Martin J. Sorflaten, Violin and Band Instruments
June Van Winkle, Mathematics
Susan Wilder, B.S., Domestic Art
Arthur Woodman, B.S., Agricultural Engineering

SCHOOL CALENDAR

1915-16

October	4	Monday	First term opens: Registration
October	5	Tuesday	Organization of classes
November	6	Saturday	Field Day
November	25	Thursday	Thanksgiving Day
December	13	Monday	Inter-society Debate
December	18	Saturday	Christmas Party
December	22	Wednesday	First term closes
December	23	Thursday	Departure for Christmas vacation
January	3	Monday	Second term opens: Registration
January	4	Tuesday	Organization of classes
February	12	Saturday	Lincoln's Birthday
February	22	Tuesday	Washington's Birthday
March	15	Wednesday	Morris-Crookston Debate (Subject to change)
March	18	Saturday	Spring Party
March	22	Wednesday	Class Play
March	24	Friday	Commencement Day

GENERAL INFORMATION

PURPOSE

The West Central School of Agriculture is an institution established primarily for the training of young men and women for the profession of farming. The courses are planned and the subjects are taught with the purpose of making the students masters of this work. The courses are sufficiently extended to give, not only a fairly complete technical equipment in the business of production, but a working basis in the economic and sociological aspects of farm life. It is felt that the farmer of the future must have a broad grasp of his profession in its relationships with other callings, as well as a realization of the possibilities of its social development.

ADMISSION

At present the rural schools are unable to do much advanced work. It is hoped that they will improve their courses through consolidation and association and ultimately make it possible for the School of Agriculture to set higher standards of admission, but, until such is the case, the School must accept any mature young man or woman even tho he or she might find it hard to pass entrance tests. Students above sixteen years of age will be welcomed even tho they may not be able to show graduation from the usual eighth-grade work. Whenever possible, prospective students should present county or high school certificates in the common branches. These will admit to the regular work without conditions.

LOCATION

The School is admirably situated to serve about seventeen counties of the west central part of the State. The Great Northern Railway through connections with the Chicago, Milwaukee, and St. Paul Railway gives good service to the southeast, southwest, west, and northwest. The Northern Pacific Railway, through connections with the Soo Line and other roads, gives very satisfactory service to the portion of the State lying north and northeast of Morris.

The School itself adjoins the city of Morris and is situated upon a natural rise of ground overlooking the Pomme de Terre Valley. When the present plans are carried into effect, the campus will be a very beautiful place indeed with its fifteen or twenty buildings and pleasant drives.

TIME OF OPENING

The School of Agriculture will open Monday, October 4, and close Wednesday, December 22, for the fall term. It will reopen Monday, January 3, and close Friday, March 24 for the winter term. This gives

six months of school work at a time when the students can best be spared from home.

SPECIAL INFORMATION

Old or new students planning to attend the School of Agriculture should write early to the Registrar asking him to reserve a room. An advance deposit of $2.00 per person is required to reserve a room. No deposit for room will be returned after September 1. This deposit will be applied on first month's fees. Each dormitory room is furnished with two single beds, dresser, table, chairs, curtains, sheets, bed spreads, pillows and pillow cases. Each student should bring with him quilts or blankets for one single bed, towels, comb, brushes, and other toilet articles.

Preferences as to roommates should be stated early and will be considered so far as possible.

Students more than two weeks late in entering may not be able to complete all of the term's work without conditions. If a student can not enter before the middle of November, he should wait until January 3 for the new term and new classes to start.

All trains will be met by special committees Monday, October 4. If possible, be on hand the first day.

HOLIDAYS

Lincoln's and Washington's birthdays are legal holidays, and will be appropriately observed. On Thanksgiving Day no classes will be held, but school will continue as usual on the Friday and Saturday following.

DORMITORIES

Two new dormitories, one for young men and one for young women, are now in use. Each is in charge of one of the members of the Faculty. These buildings are modern, three-story structures, splendidly equipped and heated by a central heating plant. They will accommodate about one hundred and fifty students.

HOME LIFE ON THE CAMPUS

The life of the students while attending the School of Agriculture is subject to supervision. Everything is done to promote a healthful, moral atmosphere. The use of tobacco and spirituous liquors of all kinds is strictly forbidden. Anyone not in accord with these restrictions and not willing to lend a hand toward strong, moral growth should not come to the School of Agriculture.

EXPENSES

The expenses at the institution are made as moderate as feasible. They include the following items which are payable in advance:

Incidental fee (per year)	$5.00
Board (per week)	2.50
Room, light, heat and flat laundry (per month)	5.00

Laboratory fees for woodwork, forge, sewing, cooking, chemistry, corn studies, or dairying (per term)....	$1.00 to 3.00
Purchase of textbooks (per term).....	3.00 to 5.00
Deposit (per year).....	5.00
Hospital fee (per term).....	1.00

The five-dollar deposit is required as a protection against breakage, etc., and unless deductions are made it will be returned in full at the end of the year. The buildings are lighted by electric lights and warmed by steam. No deduction in board is made for any absence of less than seven days. No deduction in room is made while the room is held. A charge of twenty-five cents per meal will be made for guests. Guests' meal tickets should be purchased in advance. The price of board is put at $2.50 per week. This rate may be varied if advisable.

Students will buy their own stationery, drawing material, etc.

The policy of renting books has been found to be unsatisfactory, so it has been decided to require each person to purchase his own texts. A bookstore will be organized and many of the books can be had at second-hand rates and resold to other students at the end of the term if the student so desires.

STUDENT ORGANIZATIONS

Students are urged to unite with a literary society. These societies offer the students pleasure as well as profit. They afford a training in conducting meetings, parliamentary law, and public speaking obtainable in no other way.

The following societies hold regular weekly meetings during the school year: The Vincent Literary Society, the Agricolae Literary Society, the Ceres Club.

An Intersociety Debate cup for the promotion of interest in civic and political questions has been offered by the superintendent. This will become the property of the society winning it three successive years. The Vincent Literary Society now holds the cup, having won it the second successive time in the spring of 1915.

Attendance at gymnasium classes is required of all students. Both the young men and young women have basket-ball teams.

Both the Young Men's and the Young Women's Christian Associations have organizations. Sunday morning and Sunday evening services are conducted each week under the direction of these two associations.

Boys' and Girls' Glee Clubs are regularly organized and trained throughout the school year. These clubs appear separately or together at various school functions.

LIBRARY

The library is well equipped to supply the needs of the students. A large number of books have been selected to meet the requirements of the various departments. These, with the government and station reports, are all classified and available for use by instructors and students.

The Librarian is always ready to give whatever assistance she can in

directing students in the selection of the books they may need in the pursuit of their work.

LECTURE COURSE

During the school year a lecture and entertainment course, consisting of four or five members, is given at a cost of one dollar for the series. These entertainments are strictly high grade and furnish a pleasant relaxation from regular school work.

DEPARTMENT OF MUSIC

For those who are interested credit courses in piano instruction are offered. Ten half-hour and ten group lessons per term are given with special time for practice. Fees of ten dollars per term for the lessons and two dollars and a half per term for piano rental are charged. Special rooms are set aside for practice, making it possible to do good, thoro work. A class in musical theory meets once a week, and instruction is also given in the history of music, ear training, and the rudiments of harmony.

TEACHERS' TRAINING SCHOOL

The fourth annual session for rural school teachers will open June 14 and continue six weeks. The technical work will be offered by members of the regular faculty and the usual summer school courses will be in charge of a corps of ten instructors furnished by the Department of Education. The proper completion of any course will command certificate credit without the usual examinations.

SUMMER DRESSMAKERS' COURSE

A course in commercial dressmaking is offered in the Summer Session. Instruction is given in plain sewing, dress trimming, tailoring, and the study of standard dress materials and their manufacture. The aim of the course is to teach dressmaking as a trade.

SUMMER HOMEMAKERS' COURSE

The purpose of the Home Makers' Course is to afford a chance for those who desire it to obtain training in organizing and running a home. Everything offered is given with an idea of making a person an efficient home maker. This course is offered during the Summer Session.

A SHORT VACATION FOR FARM WOMEN

The second annual short vacation for farm women will be held during the Chautauqua week, making it possible for the ladies enrolled to have the opportunity of attending the splendid lectures and entertainments offered during the Chautauqua season. Beside this, there will be the usual talks and periods of visiting. The training school will also be in session and faculty members will help make the time pleasant and profitable. The fee for the course will be $4.00. This will pay for the board and all other local expense, including the Chautauqua tickets. This course is offered June 29 to July 2, 1915.

REQUIREMENTS FOR GRADUATION

(1) The completion of the prescribed course of study with an honorable standing in deportment. It is essential that the student should do some work of a practical nature during the vacations following the first and second school years respectively. Students will be given credit for this work just the same as for other school work. Blanks giving an outline of the work in detail and blanks for certification are furnished to all students.

(2) It is required that all the boys in the school devote their vacations to actual work or to some form of agricultural work.

The girls may choose their summer work in one of several lines that is mapped out for them.

THE ADVANCED COURSE

In addition to the regular three-year course a fourth year is being offered. All students who can should plan to take the full four years, as the work given in the added year will be of great value in completing the minimum training that farm young men and women should receive. Half of the time will be devoted to some one special line of work, such as Animal or Dairy Husbandry, Agricultural Engineering, Farm or Home Management, Horticulture, Music, or Home Nursing. Graduation from the three-year course will continue for the present.

EXPERIMENT STATION

The plans for the Experiment Station work are as yet in the making. Lack of funds and local conditions have prevented much, if any, constructive work. The main activity so far has been in the line of preparation for the future. Elimination of weeds, building up of soil fertility, fencing, reconstruction of buildings, etc., have demanded most of the attenton up to the present time.

AGRONOMY DIVISION

Three hundred acres of land are laid out for experimental and demonstration purposes. At present four main lines are followed.

1. *Crop Rotation and Farm Management.*—One hundred acres are divided into a five-year rotation with a dairy herd in connection. This is to demonstrate what seems to be the ideal for the newer agriculture, namely, smaller farms intensively handled with live stock to help maintain soil fertility.

2. *Nitrogen-Gathering Crops.*—Clovers, alfalfas, and other leguminous crops are receiving attention in order to restore the nitrogen content of the soil, to improve the physical texture of the land, and to give a source of excellent stock food.

3. *Corn Improvement.*—Variety test work with corn has been started for the purpose of adapting varieties and securing a higher yield and earlier maturity.

4. *Alfalfa.*—Several varieties and strains of alfalfa are on test at the present time and these will be increased as rapidly as possible. Because

of the growing importance of this crop in western Minnesota, the variety test work will receive much attention. Cultural data are being gathered throughout the section with a view towards ascertaining the most successful methods of growing and handling the crop.

ANIMAL AND DAIRY HUSBANDRY DIVISION

The Animal Husbandry Division is conducting demonstrations in feeding hogs and beef cattle. Pure-bred herds of hogs and poultry are being established with the threefold object of providing teaching illustrations for the students, demonstrations for the community, and sources of supply for pure-bred stock upon the farms.

The Dairy work so far has consisted entirely in building up a common herd. In 1910 twelve common cows were purchased. These were given balanced rations and put under yearly tests for butter-fat production. At the same time a registered dairy sire was placed over the herd. The herd now consists of three of the original herd, seven half-blood, and three three quarters heifers and calves that will take their place in the herd at the proper time. The original sire has been replaced by another animal having a considerably better record behind him.

Registered cows of beef and dairy breeds are being purchased and will be available for use in instruction work the coming winter.

COURSES OF STUDY REQUIRED FOR GRADUATION

BOYS

FIRST YEAR

First Term	Class period (40 Min)	Laboratory period (80 Min)	*Second Term*	Class period (40 Min)	Laboratory period (80 Min)
English (A)	5	..	English (B)	5	..
Corn (A)	3	2	Grain (B)	3	2
Farm Acct (J)	5	..	Physiology (B)	5	..
Feeds & Feeding (A)	5	..	Indus Geog (A)	5	..
Forge (C)	..	3	Forge (D)	..	3
Woodwork (A)	..	3	Woodwork (B)	..	3
Milk Test Work (J)	..	1	Milk Test Work (K)	..	1

SECOND YEAR

English (C)	5	..	English (D)	5	..
Types & Breeds (B)	5	..	Farm Forestry (H)	5	..
Industrial History (B)	5	..	Farm Structures (G)	5	..
Garden & Orchard (I)	5	..	Physics (F)	5	..
Drainage (E)	3	2	Chemistry of Milk (L)	..	1
Grain Judging (C)	..	2	Forage Crops (D)	..	2
Stock Judging (C)	..	1	Stock Judging (D)	..	1

THIRD YEAR

English (E)	5	..	English (F)	5	..
Farm Management (F)	5	..	Farm Management (G)	5	..
Principles of Breeding (E)	5	..	Soils (E)	3	..
or			or		
Algebra	5	..	Algebra	5	..
Dairy Practice (M)	1	2	Farm Mechanics (H)	3	2
Stock Judging (F)	..	1	Stock Judging (G)	..	1
Chemistry (A)	3	2	Dairy Barn Work (N)	..	4
Government (C)	5	..			

FOURTH YEAR

Literature (G)	5	..	Literature (G)	5	..
Farm Acct (J)	5	..	Farm Management	5	..
or			or		
Geometry	5	..	Geometry	5	..
Economics (D)	5	..	Sociology (E)	5	..
or			or History	..	..
History	5	..	Legal Forms and Organization (F)	5	..
Veterinary Practice (H)	5	..			

Electives for Fourth Year:

Agricultural Engineering (I)
Agricultural Engineering (J)
Animal Husbandry (I)
Dairy Husbandry
Horticulture

GIRLS

FIRST YEAR

First Term	Class period (40 Min)	Laboratory period (80 Min)	*Second Term*	Class period (40 Min)	Laboratory period (80 Min)
English (A)	5	..	English (B)	5	..
Nature Study (C)	5	..	Sanitation (I)	5	..
or			Physiology (B)	5	..
Music (A)	1	3	Indus. Geography (A)	5	..
Home Accounts (D)	5	..	or		
Laundry (G)	1	2	Music (B)	1	3
Sewing (A)	..	3	Sewing (B)	..	3
Cooking (A)	2	1	Cooking (B)	2	1

SECOND YEAR

English (C)	5	..	English (D)	5	..
House Pl. & Dec. (E)	5	..	Home Nursing (F)	5	..
Indus. History (B)	5	..	Bacteriology (G)	3	1
Garden & Orchard (I)	5	..	Household Physics (H)	5	..
or			or		
Music (C)	1	3	Music (D)	1	3
Sewing (C)	..	3	Sewing (D)	..	3
Cooking (C)	1	1	Cooking (D)	1	1

THIRD YEAR

English (E)	5	..	English (F)	5	..
Chemistry (E)	3	2	Food Chemistry (F)	3	2
Government (C)	5	..	Poultry & Dairy	..	..
or			or		
Music (E)	1	3	Music (F)	1	3
Textiles (H)	5	..	Home Management (J)	3	1
or			or		
Algebra	5	..	Algebra	5	..
Sewing (E)	..	3	Sewing (F)		3
Cooking (E)	1	1			

FOURTH YEAR

Literature (G)	5	..	Literature (G)	5	..
Economics (D)	5	..	Sociology (E)	5	..
or			or		
History	5	..	History	5	..
Art Studies	..	..	Legal Forms and Organization (F)	5	..
or			or		
Child Development	..	..	Nursery Literature	..	..

Electives for Fourth Year:

Music (G)
Music (H)
Dressmaking
Home Nursing
Home Management

DESCRIPTION OF COURSES

AGRICULTURAL ENGINEERING

Course A. WOODWORK. This course deals primarily with the use, care, and adjustment of the tools which every man should have on the farm. Practice is given in bench work, in the oiling and staining of woods, etc. BYE.

Course B. WOODWORK. This course is a continuation of Course A. Special attention is given to the finer problems of finishing and joining and to the selection and cutting of rafters. BYE.

Course C. FORGE WORK. This course includes the working with iron and steel, practice in forging, welding, and tempering. The student becomes familiar with the use of tools, processes of drawing, up-setting, and methods of making hooks, staples, chains, clevises, etc.

Course D. FORGE WORK. This course is a continuation of Course C. Special attention is given to the working of steel, and the methods of forging and tempering. Instruction is also given in the forging of tools, sharpening, polishing, etc., as well as in general repair work.

Course E. DRAINAGE. An elementary course in farm drainage, taking up the best methods of leveling, ditching, locating, and the laying of tile, etc. Special stress is placed upon the cost and methods of estimating. Part of the time is devoted to the more simple problems of farm surveying; running of lines, areas, staking-out of buildings, etc. WOODMAN.

Course F. PHYSICS. The work as taken up gives the student a simple and practical course in physics. It includes the mechanics of solids, fluids, heat, and sound; also a few assignments from the subjects of light and electricity. WOODMAN.

Course G. FARM STRUCTURES. This course takes up the design, location and erection of farm buildings, proper methods of lighting and ventilating, study of proper pitches, roof trusses, barn frames, estimates of cost, etc. Emphasis is placed upon the need for better farm buildings, the methods of planning them with a view to convenience and comfort, and the necessity of adapting them to their surroundings. BYE.

Course H. FARM MECHANICS. This course includes the study of farm machinery and farm motors. Instruction is given in the selection, use, and care of all lines of agricultural implements, including tillage, seeding, harvesting, threshing, and fertilizing machinery. Work is given in pumping and grinding machinery, transmissions of power, grading machinery, etc., in gas and oil engines, their operation, use,

and care. In the laboratory the student is required to become familiar with the construction and operation of the more common machines. WOODMAN.

Course I. GAS ENGINES. This course is elective for the fourth year. It consists of an elementary course in gas engines. It treats of the gas and oil engines for stationary and vehicle use, their construction, design, management, care, operation, repair, and installation. The course is designed to fit the need of the owner or operator of an engine, one who is not a mechanic or an engineer. WOODMAN.

Course J. LIGHTING AND SANITATION OF FARM BUILDINGS. This course is also elective for the fourth year. It includes a study of lighting materials, lighting systems, sewerage, sewage disposal, etc. Attention is given to the design, method of installation, and cost of the different systems. Stress is placed upon the necessity of having modern lighting and modern plumbing in the farm home. WOODMAN.

AGRONOMY AND FARM MANAGEMENT

Course A. CORN GROWING. This course consists of a complete study of the corn plant and its relationship to the agriculture of western Minnesota. The work includes a botanical study of the corn plant; its relation to soil and climate; the selection and testing of seed corn; soil preparation and care of the crop; harvesting; diseases and insects; silage and fodder; varieties, corn judging, and corn breeding. All class and lecture work is supplemented as far as possible with laboratory practice. MILLER.

Course B. GRAIN GROWING. This course consists of a study of the principal small grain crops. Seed selection and preparation; soil and cultural requirements; harvesting; marketing; insects and diseases and other related subjects are given due consideration both in the classroom and laboratories. MILLER.

Course C. CORN AND GRAIN JUDGING. This is an advanced course following Courses A and B. Score-card practice, commercial grading, and judging work are given with a view towards making the student proficient in the judging of corn and grain. The aim of this work is to fit the students for the intelligent production of pure-bred seeds upon the farm. MILLER.

Course D. FORAGE CROPS. In this course clover, alfalfa, and the other leguminous crops, the grass crops including timothy and the other native and tame pasture and hay grasses, millet, rape, and the other forage crops are studied. The course deals largely with a study of their cultural requirements and their importance in the general farm management scheme. MILLER.

Course E. SOILS. This course is applied to the needs of western Minnesota. Soil formation, soil types, soil physics, soil chemistry, soil tillage, and the use of fertilizers are given chief attention. MILLER.

Course F. FARM MANAGEMENT. This subject deals with types of farming, cropping systems, cost of producing farm products, farm labor, marketing of farm products, and the general business management of the farm. The students are required to draw plans of their home farms, to change the plan into one adapted to rotation systems and to make supplemental plans which illustrate distinct features in farm management. The second term's work consists in a complete study of farm accounts. The student keeps books on an entire year's work from taking the inventory to closing the accounts at the end of the year. MILLER.

Course G. ADVANCED STUDIES IN FARM MANAGEMENT. This course will consist of advanced work in some of the more important problems of farm management, including farm labor, cost of production, marketing, and similar subjects. MILLER.

Course H. FARM FORESTRY. This includes a study of the general principles underlying the growing of trees; the study of the details of laying out, planting, and caring for windbreaks and farm woodlots; demonstrations of practical methods for the preservative treatment of timbers and fence posts; discussions and illustrations of the general principles underlying ornamental planting around the farmstead.

Course I. GARDEN AND ORCHARD. This course is a brief general course for those interested in making the garden and orchard a success on the home farm; plans for garden layouts with a consideration of kinds and amounts of vegetables to plant, with their cultural requirements; the value of an orchard; kinds of fruits to attempt, including their cultural needs.

Course J. FARM ACCOUNTS. This course introduces the regular ledger account form. Cash accounts, accounts with neighbors and townsmen, together with forms for use in determining value of various farm operations, are taught. Much drill is given in making accurate computation in the various types of examples that might arise in farm management. VAN WINKLE.

ANIMAL AND DAIRY HUSBANDRY

Course A. FEEDS AND FEEDING. This course is devoted to the study of the general composition of the animal body. Composition and digestibility of foods; feeding standards; methods of feeding all classes of animals; influence of foods on animal form and quality of animal products. JORDAN.

Course B. TYPES AND BREEDS. This course is devoted to the study of the history and development of the several breeds of horses, cattle, sheep, and swine; characteristics and adaptability of improved breeds. Accompanied by Course C. JORDAN.

Course C. STOCK JUDGING. This course is devoted to the study and practice of the score card, showing the relation of body structure to economical production. JORDAN.

Course D. STOCK JUDGING. This course is devoted to comparative and competitive judging of all classes of live stock. Must be preceded by Course C. JORDAN.

Course E. PRINCIPLES OF BREEDING. This course is devoted to a study of the theory and practice of animal breeding; variation; heredity; selection; effect of pure-bred animals in improving types of stock; pedigrees. JORDAN.

Course F. STOCK JUDGING. Continuation of Course D. JORDAN.

Course G. STOCK JUDGING. Continuation of Course F. JORDAN.

Course H. VETERINARY PRACTICE. This course is devoted to the study of the causes and prevention of animal diseases; emergency treatment. JORDAN.

Course I. ADVANCED ANIMAL HUSBANDRY. This course is devoted to the study of feeding and breeding experiments of other stations. JORDAN.

Course J. MILK TEST WORK. Principles of milk testing. Each student tests and keeps a record of a herd of dairy cows. JORDAN.

Course K. Continuation of Course J. JORDAN.

Course L. CHEMISTRY OF MILK. This course includes milk and cream testing, acidity testing, sediment testing, moisture testing, bacteriology of milk, and the chemical changes occurring in milk. JORDAN.

Course M. DAIRY PRACTICE. This course consists of home butter-making, home cheese-making, home ice-cream-making, and the proper methods of handling dairy products. JORDAN.

Course N. DAIRY BARN WORK. Each student will be required to feed, milk, and care for a group of cows for six weeks or a half semester. At the same time a feeding demonstration will be conducted so that each student will be able to make observations. JORDAN.

Course O. POULTRY AND DAIRY. This course is designed for girls in the Senior Year and includes the subjects of housing problems, incubating, brooding, feeding, and winter egg production; also milk and cream testing, butter-making, proper care of dairy products and the principal characteristics of the dairy breeds of cattle. JORDAN.

DOMESTIC ART

Course A. SEWING. This term's work in sewing includes the making of a cooking outfit, gymnasium suit, kimono, fancy apron, and sheets and pillow cases. WILDER.

Course B. SEWING. A four-piece suit of underwear is made in this semester. The kinds of material suitable for underwear, their wearing and laundering qualities, the trimmings, and the cost of the completed suit are discussed. WILDER.

Course C. SEWING. A shirt waist and a wool dress are required for this term's work. The proper style, line, and material for these garments are brought out in class discussions. WILDER.

Course D. SEWING. The work of this semester has to do with the making of summer dresses. Cotton cloth of plain design and durable material is used almost enitrely. WILDER.

Course E. SEWING. In the senior year the girls learn how to cut and fit a coat or suit. The standard colors, line, and material for outside garments are worked out. WILDER.

Course F. SEWING. An inexpensive graduation dress is made in the last semester. WILDER.

Course G. LAUNDRY. The student is shown the best way to prepare water, soap, and starch for laundering purposes; how to iron and fold a garment, to revive colors, remove stains, and wash delicate fabrics. Some time is given to the study of the different dry-cleaning processes. WILDER.

Course H. TEXTILES. Under textiles is included the study of the different kinds of cloth manufactured from wool, cotton, silk, and flax fibre, together with their adulterations and substitutions. The comparative value of standard materials according to the purpose for which they are to be used is discussed and illustrated with samples of cloth. Harmony in color and design in garment-making is also emphasized. WILDER.

DOMESTIC SCIENCE

Course A. COOKING. The laboratory work consists of practice in cooking fruits, vegetables, soups, and cereals and in the making of muffins, pancakes, baking-powder biscuits, etc. The lecture work deals with the digestibility of foods, the source of our food products, and the theory of cooking. POTTER.

Course B. COOKING. The laboratory work includes the cooking of meats and eggs, and the making of bread, pies, cakes, and simple desserts. The lecture work is a continuation of the first semester. POTTER.

Course C. COOKING. The laboratory work is largely canning and preserving and a continuation of general cooking. In the second semester a portion of the time is given to invalid cookery. The lecture work is a continuation of that of the first year's work. POTTER.

Course D. COOKING. The work of this year includes a study of foods and the planning of meals for people under varying conditions of age, health, and occupation. The planning and preparation of balanced meals, school lunches, etc., will receive attention during laboratory hours. POTTER.

Course E. FOOD CHEMISTRY. This course gives an introduction to simple chemistry in its application to every-day life. POTTER.

Course F. FOOD CHEMISTRY. This course continues the work of the previous semester, applying the general principles of chemistry to food in all of its uses. POTTER.

ENGLISH

Course A. ENGLISH. This course consists of the principles of grammar, spelling, and reading. Considerable time is devoted to letter-writing and simple composition, correlating the work with other departments. VAN WINKLE.

Course B. ENGLISH. Continuation of Course A. VAN WINKLE.

Course C. ENGLISH. In the junior year the work is continued in spelling and reading, the text for the latter being one of the standard stories. To inspire self-confidence and to encourage self-expression some time is given to elementary public speaking. Written work takes the form of short themes and letters.

Course D. ENGLISH. Continuation of Course C.

Course E. ENGLISH. Advanced work is given in this course in written composition, illustrating the principles of narration, description and exposition. In addition, word study takes up the derivation, usage and meaning of words. Two standard books are read outside of class each semester. Written or oral reports are required.

Course F. ENGLISH. Continuation of Course E.

Course G. LITERATURE. This is a six-months course for fourth-year students. It includes a survey of English literature and a study of the important literary productions, leading to an appreciation of good literature. Two standard books are read outside of class each semester. Written or oral reports of these are required.*

* Juniors and Seniors are required to speak before the assembled school several times a year. The purpose of this work is to prepare the students to address farm clubs and other public gatherings.

MUSIC

PIANO MUSIC

Course A. PIANO PLAYING. Exercises for hand position and control; two- and three-finger exercises; five-finger exercises; scale formation exercises. Studies: Gurlitt, *Technic and Melody,* or Tapper, *First Piano Book* or *Graded Studies,* Grade 1. Solos: Pieces from Gurlitt, Sartorio and others. JOHNSON.

Course B. PIANO PLAYING. Thumb exercises, major and minor scales, one and two notes, 80 mm.; five-finger exercises and transposition of same, two- and three-finger exercises in C. Studies: Streabbog's *Twelve Very Easy Studies,* Czerny *Anthology,* vol. I. Solos: Graded pieces, Grade II. JOHNSON.

Course C. PIANO PLAYING. Scales with different touches, one and two notes, 80 mm.; Herz exercises; broken chords. Studies: Concone *Twenty-four Melodious Studies,* or Streabbog, vol. II; Czerny, *Anthology,* vol. II. Solos: Beethoven *Minuet in G,* Heller, *Petite Tarentelle in E Minor,* etc. JOHNSON.

Course D. PIANO PLAYING. Scales with different touches, 1, 2, 3, and 4 notes, 80 mm. Herz exercises; broken chords; block chords with pressure and drop arm; simple arpeggio. Studies: Foote, *First Year Bach;* Czerny; Williams, *Wrist and Forearm Studies.* Solos: Graded pieces, Grade III; at least two selected sonatinas. JOHNSON.

Course E. PIANO PLAYING. Exercises for muscular independence, suppleness, rhythm, precision, and free use of fingers, hands and arms; further study of control of the various qualities of touch; arm and wrist exercises on double notes and common chords. Studies: Lynnes, *Key Circle Exercises,* Book I; Bertini, *Opus* 100, or Heller, *Opus* 47; Bach, *Little Preludes,* or *First Year Bach.* Solos: Easy sonatas by Haydn and Mozart. Graded pieces, Grades III and IV. Tapper, *Graded Pieces,* Grade III. Classes in Musical History and Music Theory. MEYER.

Course F. PIANO PLAYING. Review of technical principles thus far studied. The control of accent. Schmitt finger exercises; the major and minor scales, hands separate, legato and staccato in varied rhythms. Studies: Doring, *Octave Studies.* Solos: Pieces by Schumann, Mendelssohn, Jensen, Scharwenka, and others. Easier Beethoven works. Classes in Musical History and Music Theory. MEYER. For the completion of the above outlined course a certificate of graduation with the honor of Proficiency in Music will be conferred.

TEACHERS' COURSE. A postgraduate course for teachers of music in rural communities.* Exercises in all keys for development of velocity and

*Any student desiring to undertake the fourth year work in music with a view to satisfactorily completing this work and qualifying as a certified teacher of music must have completed the courses A to F previous to entering upon the postgraduate course. A degree of advancement equivalent to that required for graduation from the regular music course will be accepted for entrance upon the Teachers' Course.

equality of touch; embellishments, trill exercises; thoro drill in demonstration of correct principles of technic; various qualities of staccato and legato touch, portamento; major and minor scales, hands together in octaves, tenths, sixths, thirds and contrary motion; chord exercises common and seventh chords, arpeggios of the same, in varied rhythms.

Studies: Isidor Phillip, *Complete School of Technic;* Heller, *Opus* 45; Smith, *Octave Studies;* selected Cramer studies. Solos: Bach, *Two Part Inventions;* Mendelssohn, *Songs Without Words;* Schumann, *Scenes from Childhood.* Pieces by Chaminade, Godard, Raff, MacDowell, and others.* MEYER.

VIOLIN MUSIC

The violin instruction will comprise a thoro teaching of the correct principles of violin playing. Solo playing will be encouraged and a class in orchestra playing will be a part of the regular study of violin pupils.

Registration for violin lessons will be regulated by the rules governing all musical instruction given at the school. Candidates for either a certificate of graduation or a teacher's certificate must fulfill an equivalent of the requirements laid down for piano pupils. SORFLATEN.

BAND INSTRUMENTS

Instruction in the various instruments such as cornet, clarinet, trombone, etc., will be given. SORFLATEN.

*At least three hours a day for the two terms (6 months) will be required for the satisfactory completion of this course.

SOCIAL SCIENCE

Course A. INDUSTRIAL GEOGRAPHY. This course is designed to show the relationship of farm work to other occupations, the relationship of the farm to the rest of the world. Wheat, butter, and beef are taken as important farm products and studied in their progress from producer to consumer. Competitive agricultural regions and market demands and their effect upon local conditions are considered. SCHWEICKHARD.

Course B. INDUSTRIAL HISTORY. This course is planned to show the place of present-day agriculture in industry and history. A view of the past shows how far civilization has advanced and gives a basis for future hopes in agricultural improvement. Primitive agriculture, followed by a partial view of European and English progress, leads to a closer study of American agriculture from colonial times to the present. SCHWEICKHARD.

Course C. GOVERNMENT. This course begins with the study of the rural school district. From this simple introduction the students are led successively through township, county, state, and national govern-

ments. The course is completed by a consideration of a few modern political institutions, such as primaries, initiative, referendum, etc. SCHWEICKHARD.

Course D. ECONOMICS. This course is a study of production, transportation, and consumption from the agricultural standpoint. It aims to give the student an idea of the place of farming in industry. Prerequisites: Courses A and B. HIGBIE.

Course E. SOCIOLOGY. This course is a study of rural life including its relationships with other social classes. The churches, schools, clubs, and home life are considered. Lines of community coöperation and betterment are considered. Prerequisites: Courses A, B, and D. HIGBIE.

Course F. LEGAL FORMS AND ORGANIZATION. This course includes a study of contracts and the various legal papers that a farmer may have occasion to use. It also covers work in organization of clubs, associations, etc., together with practice in conducting such gatherings as farmers participate in. HIGBIE.

GENERAL

Course A. CHEMISTRY. This course includes a general survey of chemistry. It deals with the study of the common elements, simple chemical action, and the laws of chemistry applicable to farm life. POTTER.

Course B. PHYSIOLOGY AND HYGIENE. This course includes a study of the structure and functions of the human body; the hygiene of hair, teeth, skin, nose, throat, lungs, ear, eye; digestion and the nervous system; rest, recreation, sleep, work. HATHORN AND SCHWEICKHARD.

Course C. NATURE STUDY. This course is designed to interest girls in the natural environment of rural life. Trees, rivers, clouds, flowers, bees, birds, and many other interesting things of the country are studied. Nature literature and its connection with nature study are a part of the work. VAN WINKLE.

Course D. HOME ACCOUNTS. The course in home accounts is given to prepare a girl to keep accurate records of the cost of conducting her home. As in the boys' course, the ledger account form is used as a basis for the work. VAN WINKLE.

Course E. HOUSE PLANNING AND DECOCATION. This course includes the history of the house; the location, structure, plans for country dwellings; consideration of the problem of heat, light, water-supply; treatment of walls, floors; selection of furnishings; study of light and color. HATHORN.

Course F. HOME NURSING. This course includes a study of the more common forms of illness, the proper care of the sick, and the use of simple remedies. POTTER.

Course G. BACTERIOLOGY. The course includes a study of molds, yeasts, and bacteria, and the conditions under which they grow and thrive. The work is closely connected with the preservation of foods and the care of the sick. POTTER.

Course H. HOUSEHOLD PHYSICS. This course is designed to give girls an understanding of certain physical principles and phenomena that are directly connected with their work as home managers. This includes the simple principles of liquids and solids, the nature of color, light, and sound, and a brief consideration of lighting and heating systems for farm houses. WILDER.

Course I. SANITATION. Sanitation has to do with the study of the different germ diseases such as tuberculosis, colds, pneumonia, typhoid fever, diphtheria, and their prevention. Since many of the disease germs that attack the human body come from the body of those who already have the disease, it is necessary that the student have some knowledge of the ways to guard against infection. The public side of the question is also discussed. WILDER.

Course J. HOME MANAGEMENT. This course includes a thoro study of the most suitable things for the house, the care of kitchen utensils and furnishings of all kinds; the serving of meals and the best arrangement for carrying on the work of the home. It is a combination and continuation of the work of the previous years. POTTER.