

The University of Minnesota

THE COLLEGE OF AGRICULTURE

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA
VOL. XV, NO. 9. JULY, 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college and one for the Summer Session is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota

TABLE OF CONTENTS

For alphabetical index, see page 79

The University.....	7-8
Calendar.....	4-6
Colleges and Schools.....	7
The Board of Regents.....	8
Executive Officers.....	8
The College of Agriculture.....	9-78
The Faculty.....	9-11
Faculty Committees.....	11
Enrollment.....	13-18
Administration.....	19-25
General Information.....	26-28
Graduate Work and Degrees.....	26
Scholarships and Prizes.....	26-27
Student Organizations.....	27-28
The Library.....	28
Divisions and Equipment.....	29-34
Courses of Study.....	35-38
General Agriculture.....	35
Special Senior years.....	36
Home Economics.....	37-38
Departmental Statements.....	39-72
Agriculture.....	39-41
Agricultural Chemistry and Soils.....	41-44
Agricultural Engineering.....	44-46
Dairy and Animal Husbandry.....	47-51
Domestic Art.....	51-53
Domestic Economics.....	53-54
Domestic Science.....	54-55
Entomology.....	55-56
Horticulture.....	57-58
Library Methods.....	58-59
Pedagogics.....	59
Physical Training.....	59
Rhetoric.....	60
Vegetable Pathology and Botany.....	60-61
Veterinary Science.....	61-62
Courses of Study in Other Colleges.....	63-72
Students.....	73-78
Index.....	79

1912							1913													
JULY							JANUARY							JULY						
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST						
..	..	..	..	1	2	3	..	..	..	..	..	..	1	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..	..	..
SEPTEMBER							MARCH							SEPTEMBER						
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	..	..	..	..	..	..	30	31	..	..	..	..	..	..	..	..	..	..	..	..
OCTOBER							APRIL							OCTOBER						
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	1	2	3	4	
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER						
..	..	..	..	1	2	..	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..
DECEMBER							JUNE							DECEMBER						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
Sept. 30 - Oct.	5	Week	Second semester condition examinations
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
March 31-Apr.	5	Week	First semester condition examinations
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday,	Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
		2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday,	Sept. 11	9 a. m.	English
		2 p. m.	German, French, Latin, Scandinavian
Thursday,	Sept. 12	9 a. m.	Elementary Algebra
		2 p. m.	Higher Algebra
Friday,	Sept. 13	9 a. m.	Plane Geometry
		2 p. m.	Solid Geometry

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.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery
ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
GEORGE F. JAMES, Ph.D., Dean of the College of Education
HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
ADA L. COMSTOCK, M.A., Dean of Women

THE COLLEGE OF AGRICULTURE

FACULTY

- GEORGE EDGAR 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., Dean
1199 Raymond Ave., St. Paul
- EDWARD M. FREEMAN, Ph.D., Professor of Vegetable Pathology and
Botany, Assistant to Dean
2196 Carter Ave., St. Paul
- THEOPHILUS L. HAECKER, Professor of Dairy and Animal Husbandry
1205 Raymond Ave., St. Paul
- MYRON H. REYNOLDS, B.S., D.V.M., M.D., Ph.G., Professor of Veterinary
Medicine and Surgery
2145 Knapp St., St. Paul
- ANDREW BOSS, Professor of Agriculture
1443 Raymond Ave., St. Paul
- FREDERICK L. WASHBURN, M.A., Professor of Entomology
1112 6th St. S. E., Minneapolis
- JOHN T. STEWART, C.E., Professor of Agricultural Engineering
2223 Knapp St., St. Paul
- DEXTER D. MAYNE, Professor of Agricultural Pedagogics
University Farm, St. Paul
- EDMUND L. BUTTS, Major U. S. Army, Professor of Military Science and
Tactics
Plaza Hotel, Minneapolis
- ARCHIE D. WILSON, B.S. in Agr., Chief of Extension Division
1466 Raymond Ave., St. Paul
- RALPH HOAGLAND, B.Agr., Professor of Agricultural Chemistry and Soils
2080 Commonwealth Ave., St. Paul
- HOWARD R. SMITH, B.S., Professor of Animal Husbandry
University Farm, St. Paul
- FREDERICK H. STONEBURN, Professor of Poultry Husbandry

ASSOCIATE PROFESSORS

- COATES P. BULL, B.Agr., Associate Professor of Agronomy
2137 Commonwealth Ave., St. Paul
- LE ROY CADY, B.S. in Agr., Associate Professor of Horticulture
2081 Buford St., St. Paul
- ROBERT M. WASHBURN, M.S.A., Associate Professor of Dairy Husbandry
2122 Knapp St., St. Paul

ASSISTANT PROFESSORS

- LOUIS B. BASSETT, Farm Management
2095 Dudley Ave., St. Paul
- ROBERT C. LANSING, M.A., English
2237 Knapp St., St. Paul

- CHARLES C. LIPP, D.V.M., Veterinary Medicine and Surgery
1460 Raymond Ave., St. Paul
- JOSEPH S. MONTGOMERY, B.S. in Agr., Animal Husbandry
1391 Raymond Ave., St. Paul
- ARTHUR G. RUGGLES, M.A., Entomology 1465 Raymond Ave., St. Paul
- WILLIAM H. TOMHAVE, B.S. in Agr., Animal Husbandry
2121 Langford Ave., St. Paul
- RICHARD H. WILLIAMS, M.S., Animal Husbandry
1391 Raymond Ave., St. Paul

INSTRUCTORS AND ASSISTANTS

- WALTER C. ANDERSON, E.M., Drawing 2366 Ellis St., St. Paul
- ALBERT C. ARNY, B.S. in Agr., Agriculture 2115 Dudley St., St. Paul
- CLARA AUST, B.S., Domestic Science 320 17th Ave. S. E., Minneapolis
- CLYDE H. BAILEY, Chemistry 251 15th Ave. N., Minneapolis
- BESSIE BEMIS, B.S., Domestic Science 2130 Carter Ave., St. Paul
- MARGARET J. BLAIR, Domestic Art 1403 Cleveland Ave., St. Paul
- FANNIE C. BOUTELLE, Domestic Economics University Farm, St. Paul
- WILLARD L. BOYD, D.V.S., Veterinary Medicine and Surgery
2221 Langford Ave., St. Paul
- ELIZABETH BROOKS, Domestic Art 1212 Raymond Ave., St. Paul
- ALVAH M. BULL, Farm Structures 2240 Langford Ave., St. Paul
- ESTELLE COOK, English University Farm, St. Paul
- GRACE DENNY, Physical Training 1836 Dayton Ave., St. Paul
- GEORGIA BELLE ELWELL, B.S., Domestic Art
907 7th St. S. E., Minneapolis
- WILLIAM H. FRAZIER, B.S., Soils 937 17th Ave. S. E., Minneapolis
- JENNESS B. FREAR, M.E., Mechanics 1319 7th St. S. E., Minneapolis
- HARRIET GOLDSTEIN, Free Hand Drawing
800 4th St. S. E., Minneapolis
- EDWIN O. HANSON, Dairy Husbandry 1475 Hythe St., St. Paul
- DE FOREST HUNGERFORD, B.S., Soils University Farm, St. Paul
- ALBERT L. HUTCHINGS, Animal Husbandry University Farm, St. Paul
- ALLEN D. JOHNSTON, Blacksmithing 2111 Knapp St., St. Paul
- CORNELIA KENNEDY, B.A., Agricultural Chemistry
2504 4th Ave. S., Minneapolis
- ALFRED R. KOHLER, B.S.A., Horticulture 2130 Carter Ave., St. Paul
- DWIGHT J. LANE, Poultry, 1485 Cleveland Ave., St. Paul
- LOLA McCLURE, Domestic Science 2116 Carter Ave., St. Paul
- MAY McDONALD, B.S. in H.E., Domestic Science
5049 N. Lyndale Ave., Minneapolis
- CHARLES H. MATTHEWS, Poultry Husbandry
1485 Cleveland Ave., St. Paul
- MARTHA B. MOORHEAD, M.D., Lecturer in Domestic Hygiene
914 2nd Ave. S., Minneapolis
- JASON L. MOWRY, Mechanics 1057 13th Ave. S. E., Minneapolis
- WIELAND L. OSWALD, Agricultural Botany 1268 County Road, St. Paul

- MAUDE B. RICE, B.S. in H.E., Domestic Art
2095 Commonwealth Ave., St. Paul
- HARRY B. ROE, B.S., Mathematics 2105 Scudder Ave., St. Paul
- JUNIATA L. SHEPPERD, M.A., Domestic Science
1385 Raymond Ave., St. Paul
- ANNA M. SMITH, Librarian, Library Methods
1485 Cleveland Ave., St. Paul
- GRETA E. SMITH, Domestic Art 1070 14th Ave. S. E., Minneapolis
- E. C. STAKMAN, M.A., Plant Pathology
1485 Cleveland Ave., St. Paul
- RODNEY M. WEST, B.A., Agricultural Chemistry
2128 Knapp St., St. Paul
- FRANK W. WHITE, B.S. in Agr., Animal Husbandry
2082 Carter Ave., St. Paul
- HALL B. WHITE, B.S. in Agr., Carpentry University Farm, St. Paul
- LLOYD R. WHITSON, E.M., Drawing 1125 8th St. S. E., Minneapolis
- LOUIS E. WILLEY, D.V.M., Veterinary Science
2089 Carter Ave., St. Paul

THE COLLEGE OF FORESTRY

- EDWARD G. CHEYNEY, B.A., Professor of Forestry
2116 Knapp St., St. Paul
- AUSTIN CARY, M.A., Professor of Forestry 2219 Knapp St., St. Paul
- JOHN P. WENTLING, M.A., Assistant Professor of Forestry
2160 Carter Ave., St. Paul

FACULTY COMMITTEES

1912-1913

- Executive Committee.*—DEAN WOODS, BOSS, MAYNE, HAECKER, STEWART,
F. L. WASHBURN, REYNOLDS, HOAGLAND, FREEMAN, CHEYNEY,
CADY, WILSON
- College Council.*—Chiefs of Divisions and Sections
- Enrollment and Program.*—STEWART, C. P. BULL, MOWRY, LANSING,
CADY
- Curriculum and Catalogue.*—The Executive Committee
- Students' Work.*—FREEMAN, WEST, ROE, BEMIS, RUGGLES
- Military.*—BUTTS, WENTLING, HOAGLAND
- Library.*—MAYNE, REYNOLDS, ANNA SMITH, LANSING, WALKER, DORSEY
- Student Organizations.*—F. L. WASHBURN, BOUTELLE, DREW, WEST,
MAYNE, BLAIR
- Graduate.*—HAECKER, STEWART, RUGGLES, H. R. SMITH, F. L. WASH-
BURN
- Athletics.*—CHEYNEY, MOWRY, WILLIAMS, OSWALD
- Demonstration and Exhibit.*—C. P. BULL, FRAZIER, SHEPPERD, WILSON,
R. M. WASHBURN

Sanitation.—REYNOLDS, MAYNE, BOUTELLE, F. L. WASHBURN, A. M.
BULL, PEARCE

Grounds.—BOSS, CADY, STEWART

Rules and Records.—WEST, MOWRY, DREW

Publications.—WILSON, HAECKER, BOSS, DORSEY

Auditing Committee.—ROE, ARNY, LANSING

Registrar.—JAMES M. DREW

Secretary of Faculty.—EDWARD M. FREEMAN

ENROLLMENT

INSTRUCTIONS TO PROSPECTIVE STUDENTS

Read this bulletin carefully, giving particular attention to *Rules and Regulations*.

Students who are not graduates of accredited schools, and those graduates who have conditions as specified in the paragraphs under *Admission to Freshmen Class—By Certificate*, should report in time to take the entrance examinations in such subjects as may be required. The dates for entrance examinations are given on the sixth page of this Bulletin and examinations are given only on the dates scheduled.

New students should report in time to have their registration completed, and to enter classes on the date scheduled for the beginning of the semester, as new students cannot enter classes after they are once started.

Graduates of accredited schools should read carefully the conditions under which high school work can be accepted for entrance without examination.

Credentials.—All students upon entering this College for the first time shall submit their credentials to the Enrollment Committee.

ADMISSION TO FRESHMAN CLASS—ALL APPLICANTS

Admission is either by certificate (p. 15) or by examination (p. 17).

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.

(a) *Number of credits required*.—No candidate will be admitted with less than fifteen units of the required grade. The Enrollment Committee 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.

(b) *Character of credits required*.—Candidates must present:

(1) Four years of English, or three years of English accompanied by four years of one foreign language.

AGRICULTURE

(2) Mathematics, three units, including Elementary Algebra, one unit; Plane Geometry, one unit; Higher Algebra, one-half unit; Solid Geometry, one-half unit.

HOME ECONOMICS

Elementary Algebra, one unit;
Plane Geometry, one unit.

(3) A minor series of two units each, chosen from one of the admission groups, B, C, D, E.

A major series of three or more units each, chosen from one of the admission groups, B, C, D, E.

To form a language series at least two units of the same language must be offered.

(4) In both Agriculture and Home Economics, Physics, one unit, must be presented if it is not included in the group selected.

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

(c) *Admission Groups*—

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: Foreign Languages

Latin—

Grammar, one unit

Caesar, 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

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	Physiology, one-half unit
Chemistry, one unit	Astronomy, one-half unit
Botany, one-half or one unit	Geology, one-half unit
Zoology, one-half or one 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	Advanced Bookkeeping, one unit
Business Arithmetic, one-half unit	Stenography and Typewriting, two units
Elementary Bookkeeping, one unit	

Manual Subjects—

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

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 Subjects Accepted for Admission

A description of subjects accepted for admission to the University may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

ADMISSION TO FRESHMAN CLASS—BY CERTIFICATE

(a) General.—Certificates from the College Entrance Examination Board and from the State High School Board are accepted as satisfying the scholarship requirement.

(b) From Minnesota State High Schools or other accredited schools.—Graduates of a four-year course of a Minnesota State High School or other accredited school in Minnesota, provided they meet the general requirements stated above, and the following special requirements as to grades.

(1) The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were

counted toward graduation. All records shall be entered on this certificate as *passed*, *passed with credit*, or *passed with honor*.*

To facilitate the operation of this rule, each accredited school is expected to keep its record of standings in these three grades or else show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these grades.

(2) Candidates for admission on certificate must have an average record in the subjects counted for admission of *pass with credit*. For the purpose of this average a *pass* is offset by a *pass with honor*. Candidates are therefore admitted provided they have at least as many semester marks of *pass with honor* as they have semester marks of *pass*.

Candidates entering on certificate shall not be examined for admission on subjects which are lacking or below the required grade, except on presentation to the Enrollment Committee of satisfactory evidence that they have done adequate special work in preparation for the examination. A certificate from the principal of the last school attended, or other person approved by the Enrollment Committee, shall constitute satisfactory evidence; and adequate special preparation shall consist of not less than thirty 60-minute hours under competent instruction on each semester subject presented for examination. (See (d) below.)

(3) *List of Accredited Schools*.—A list of accredited schools, including state high schools and private schools, may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

(c) Graduates of the Advanced Latin and Advanced English courses of the Minnesota State Normal Schools.

(d) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state, provided such candidates satisfy all the requirements as to major and minor series, subjects, and grades demanded of the graduates of Minnesota high schools. (See (b) (2) above.)

(e) Graduates of the Schools of Agriculture† who have a grade of 75 per cent in all subjects and can present additional credits as follows:

(1) Before September, 1913:

The subjects prescribed in the Intermediate Course or fourth year provided no subject has a grade lower than 75 per cent.

(2) After and including September, 1913:

English, two years, in advance of that taken in the three-year course of the School of Agriculture.

Mathematics, three years, selected from Group D.

*In per cent, these three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, passed equals 65-75, passed with credit equals 75-90, passed with honor equals 90-100.

(2) In schools having 70 as a passing mark, passed equals 70-78, passed with credit equals 78-90, passed with honor equals 90-100.

(3) In schools having 75 as a passing mark, passed equals 75-80, passed with credit equals 80-90, passed with honor equals 90-100.

†Includes West Central School at Morris, Northwestern School at Crookston, and Central School at University Farm, St. Paul.

History, one or two years, selected from Group C.

One or two years each chosen from Groups B, C, D, or E.

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 *Entrance by Examination*.

ADMISSION TO FRESHMAN CLASS—BY EXAMINATION

(a) *General*.—Entrance examinations are offered at the University during the opening week of the University year. Candidates must pass examinations in all subjects specified above, except such as may be covered by College Entrance Examination Board or State High School Board certificates.

(b) *Candidates from Other States*.—In case the records of any candidate from another state cannot be translated into the grades used in this state, the Enrollment Committee shall order examinations in English and also in three other subjects chosen from three different admission groups. The results of such examinations shall be final.

(c) The examinations authorized under *Admission to Freshman Class by Certificate* (b) (2) and (d) shall be held at the same time and according to the same schedule as the regular entrance examinations mentioned under 1.

ADMISSION TO ADVANCED STANDING

1. *All Applicants*.—(a) 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 the qualifications to continue the second semester's work.

(b) Students who desire to obtain advanced standing must, within six weeks after the beginning of the semester, present their applications and certificates to the Enrollment Committee, who will consult departments concerned in determining the credit to be given. Applications presented after the six weeks have expired will be rejected or \$5.00 charged for the transfer made.

2. *By Transfer from Other Universities or Colleges*.—(a) Applicants transferring from other universities or colleges must furnish a certificate showing that they have no entrance conditions and are honorably dismissed.

(b) The College accepts records from other colleges for credit to advanced standing. Such records are accepted so far as they are equivalent to the work done in this college, subject to the approval of the divisions concerned. In bringing certificates from other institutions, the records must be on the official blank of the institution granting the certificates, and should show:

- (1) The subject studied and ground covered.
- (2) The time spent upon each subject.

(3) In the case of laboratory subjects a concise statement of the work done.

(4) *The result.* It is sufficient to state that the subject was creditably completed.

(c) Graduates of the Advanced Graduate Course of a Minnesota State Normal School are admitted, and may substitute for college work such normal work as will be approved by the Enrollment Committee after consulting with the divisions concerned.

(d) 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 certificates of special fitness from the President of the normal school, will be admitted with advanced standing under the same regulations and proviso.

3. *By Examination.*—(a) Any student upon first registration at the University, may, with the approval of the Enrollment Committee, be allowed without charge to take examinations toward advanced standing for which the student declares himself ready, such examinations to be taken within the first six weeks of the college year. (Cf. *Administration* B 3.)

(b) Students who desire advanced standing on subjects taken in accredited schools, and not used for entrance credits, will be required to take an examination.

(c) Students desiring credit for practical work must present a detailed statement showing the nature of the work done, and should give reference letters and recommendations, and take an examination.

(d) Applicants who have taken a college subject in their preparatory work may petition the Enrollment Committee to elect another subject in lieu of the one they have had. Before granting this petition the Committee may, if they desire, require the applicant to take an examination.

ADMINISTRATION

A. REGISTRATION

1. *Defined.*—Registration shall consist of a written application to the Registrar of the College of Agriculture for enrollment in some one course of study in that College and of payment of the required fees.

2. *Time for.*—(a) Registration must be indicated two weeks before the day set for classes to begin. The fees for any semester must be paid before the day set for classes to begin, and the Cashier's receipt must be returned to the Registrar as evidence of such payment before the registration is complete. Penalty for delay in either indicating registration or in payment of fees, \$1.00, and after the day set for classes to begin, 25 cents per day in addition for each day's delay. Fines for delayed registration will be considered a part of the regular fees for the semester.

(b) No student will be allowed to register after the semester opens except by permission of the Faculty.

(c) Cf. 13 below.

3. *Quantity of Work.*—(a) No student shall be permitted to register in any course for more than the regular schedule, nor for less than fifteen credit hours in any one semester, without permission of the Students' Work Committee.

(b) Students desiring to carry extra work shall notify the Committee on Students' Work at least one week before the beginning of the semester.

(c) Application for work in excess of the prescribed course shall be granted by the Committee only when the applicant has a record for good scholarship in all lines of his work for the previous year.

(d) No student who has been unable to carry successfully the regular work of any year shall be allowed to carry extra work in the succeeding year.

(e) Cf. 13 below and C 7.

4. *Preferred Classes.*—When the same course is offered both at the University Farm and in the Departments located on the Minneapolis Campus, students must register for the classes at the University Farm unless they have permission from the Students' Work Committee.

5. *Electives.*—(a) All students in the College of Agriculture must advise with the Chief of the Division concerning all electives.

(b) Not later than May 1st, each sophomore in the General Agricultural Course shall indicate to the Registrar the division in which he expects to specialize. This selection must be approved by the Chief of the Division concerned. The student will then be registered only for such electives as are approved by this division. After selecting a division in which to specialize, no change shall be made except by permission of the Students' Work Committee.

(c) The elective studies designated as Academic are to be chosen from the work offered in the College of Science, Literature, and the Arts,

the College of Law, the College of Medicine, and the College of Engineering; no student to take more than two semesters in either of the three last named colleges. The elective studies designated as Agricultural are to be chosen from the work offered at this College.

6. *Evidence of.*—The class card is the only evidence of registration to be accepted by any instructor. No student shall be admitted to class after the first week unless his card is in the possession of the instructor.

7. *Credit according to.*—(a) Students shall not receive credit for work for which they have not been registered, except as otherwise provided in these regulations.

(b) Cf. *Admission with Advanced Standing* and B 3 (b).

8. *Change of.*—(a) The Registrar has authority to grant change of registration from one subject to another any time during the first week of the semester without charge.

(b) Cf. 14 below.

9. *Suspension of.* Cf. B 2.

10. *Cancellation of.*—(a) When students leave the college and request the cancelling of their registration, the instructor shall send to the Registrar a report of such student's work up to the date of leaving.

(b) Cf. C 1, 2, and 4.

11. *Refusal of.* Cf. C 3 and 5.

12. *Re-registration.* Cf. C 6 and 10.

13. *Classification of Students.*—(a) In order to rank with a class, a student must have not more than three credits short of the number required in the outline of the course.

(b) Any student having not more than three credits short, but who has not completed the full work of the class with which he ranks, will be listed in the catalogue with a foot note reference preceding his name.

(c) Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions, four-fifths of the work during the first year must be taken from the subjects offered to freshmen. The Committee on Enrollment may allow exceptions in cases of persons of mature age, upon recommendation of the division concerned. A new application must be made each semester to the Enrollment Committee.

(d) Unclassed students shall not be admitted to the work of either semester after the fourth week.

14. *Fees.*—(a) *Incidental:* All students who are residents of the State of Minnesota are charged an incidental fee of fifteen dollars a semester. Non-residents are charged double the fee required of residents of the State, or thirty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester.

(b) *Deposit.*—Students are required to deposit five dollars which will be credited to them in settlement of their accounts.

(c) *Nurse.*—Students rooming off the campus have the privilege of taking nurse cards at \$1.00 each semester. These cards entitle the holder to office consultation and office treatment by regular nurses.

(d) *Post-Office*.—Fifty cents will be deducted from the five-dollar deposit as rental for a post-office box.

(e) *Condition Examination*. Cf. C 9.

(f) *Special Examination*. Cf. B 3.

(g) *Fines*. Cf. 2 above.

(h) *Change of Registration*.—After the first week of any semester no change of registration shall be made except by permission of the Students' Work Committee and on payment of two dollars and fifty cents change of registration fee. This fee will not be charged when the change is ordered by the Students' Work Committee.

B. CONTROL OF CLASSES

1. *Daily Routine*.—The daily session is divided into recitation periods of forty-five minutes each. The morning session begins at 8:00 and closes at 12:25. From 11:40 to 12:25 o'clock on Wednesday is reserved for a general assembly of the Faculty and students of the College of Agriculture, and, once each month, for an all-University Convocation meeting. The afternoon session begins at 2:00 and continues until 5:25 o'clock. Work extends through six days of the week.

2. *Absences*.—(a) Tardiness and absences shall be controlled by the divisions on the general principle that each student must do the full work of the class.

(b) Students shall be required to make up work lost through delay in registration just as in the case of any other absence.

(c) No student whose absences in any semester exceed four weeks in the aggregate shall be admitted to examination without special permission of the Faculty.

(d) When a student has been absent six times consecutively, the instructor shall notify the Registrar that the student has ceased to attend class. The Registrar shall then notify the Chairman of the Students' Work Committee and all instructors concerned that the student's registration has been suspended. Such student will be reinstated only on an order of the Students' Work Committee.

(e) *Leave of Absence*.—Any student intending to absent himself from college during any part of the college year must obtain a leave of absence from the Committee on Students' Work.

3. *Examinations and Reports*.—(a) Regular written examinations shall be held at the close of each semester in all classes in the freshman and sophomore years.

(b) All classes in the senior and junior years shall be examined at the close of each semester, either orally or in writing as the professor may direct; provided that in the special subjects requiring course examinations the regular semester examinations may be omitted with the approval of the Dean, in which case the time assigned for examinations shall be given to some form of recitation or instruction.

(c) The presentation of note-book or theme shall not be accepted in lieu of examinations.

(d) Cf. 2 (c) above.

(e) No examination shall be given by any instructor except for the work of the current semester, unless the student surrenders a permit for such examination signed by the Registrar. This permit must be returned to the Registrar with the record of the examination.

(f) *Examination for Credit.*—Students who have made up work by themselves may, by permission of the Committee on Students' Work, obtain credit for the same through examinations, on payment of five dollars, special examination fee. Cf. also *Admission with Advanced Standing—By Examination.*

(g) *Condition Examinations.* Cf. C 9.

(h) *Special Examinations.*—The Registrar will issue permits for special examinations on orders from the Students' Work Committee and the Cashier's receipt for payment of five dollars.

(i) *Cheating.*—In all cases of cheating in examination or written exercises, the offender may be reported to the Students' Work Committee for such action as the case may require.

C. DELINQUENTS

1. *Warned of Delinquency.*—Any student of the freshman class who has been warned that he is deficient in sixty per cent of his work at the end of the first eight weeks of either semester and whose work is similarly deficient at the end of the first twelve weeks, shall be immediately dropped from the rolls. He may be reinstated on probation by the Students' Work Committee subject to further action by the Faculty.

2. *Probation.*—Any student who has been placed on probation by the Students' Work or Enrollment Committees may be dropped from the rolls by the Students' Work Committee at any time when one-half of his work is reported below grade.

3. *Registration Refused.*—Each division shall report to the Registrar two weeks before the end of the semester the names of any students pursuing any continuous course of study who have been doing such poor work as to make it impracticable for them to do the work of the following semester and such students shall be refused registration for said course.

4. *Registration Cancelled.*—It is provided, also, that in case the final examination shows any student, who has not been previously reported, to be incapable of further pursuing the subject in a satisfactory manner, at the written request of the head of the division concerned, the Registrar shall cancel the student's registration for that subject.

5. *Dropped from the Rolls.*—Any student receiving conditions or failures in sixty per cent of his work in any semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the corresponding semester of the following year, and may be required to pursue again all the subjects of the semester unless excused by the Committee on Students' Work.

6. *Pursue Work Again.*—(a) Any student of the freshman class who fails to pass in one-half the prescribed work of the year shall be required

on re-entering the University to pursue again all the subjects of the year, unless excused by the Committee on Students' Work.

(b) Any student receiving a failure in any subject shall be required to re-register for this subject the following corresponding semester in preference to any advanced work, unless excused by the Committee on Students' Work.

7. *Work Limited*.—Students who receive a condition or failure in the work of the first semester shall not be allowed to elect another subject in the place of the subject in which the condition or failure was received, but shall be required to devote their full time to the remaining subjects of the course. Exceptions to the rule shall be made only by the Committee on Students' Work after a full investigation.

8. *Incompletes*.—(a) When a student's work in a subject is, in the main, satisfactory, but incomplete, owing to absence from class, or failure to do on time a certain definite portion of the work which is only a small part of the entire work, and the reason for such absence or failure is satisfactory to the instructor, the work shall be reported as incomplete.

(b) An incomplete not removed before the end of the first month of the following semester becomes a condition. The Committee on Students' Work may, in special cases, extend this time limit.

(c) Cf. 12 below.

9. *Conditions*.—(a) A condition not made up before the subject is offered again becomes a failure, subject to the rules governing failures.

(b) Students conditioned in the work of the first semester are given an opportunity to remove their condition in April. Students conditioned in the work of the second semester are given an opportunity to remove their condition in October. All condition examinations must be taken at the dates regularly set by the program for such examinations and at no other time.

(c) The Registrar will issue permits for condition examinations on receipt of the Cashier's receipt for the payment of one dollar, examination fee, provided that the student has taken no previous examination for the removal of this condition, and provided the condition is of not more than one semester's standing.

10. *Failures*.—(a) Failures must be taken over in class.

(b) Cf. 6 above.

11. *Eligibility Regulation*.—No student in this college with any condition or failure standing against him shall be eligible:

(a) As a competitor in intercollegiate debate, oratory, athletic or judging contests.

(b) For membership on the editorial board of any student publication.

(c) For membership in the Dramatic Club or in any student dramatic or musical organization which gives entertainments outside the University.

12. *Special Rules Governing Seniors*.—(a) *Excused from Examinations*: All seniors who have received no conditions or failures since the close of the freshman year shall be excused from their last semester final

examinations in all subjects in which their work and attendance have been satisfactory to the instructor concerned.

(b) *Second Semester Registration:* No senior shall be allowed to register for the second semester who has a condition back of the senior year. No student shall be considered eligible for graduation whose conditions and other deficiencies are not completely removed by May first.

D. REQUIREMENTS FOR GRADUATION AND DEGREES

1. *Number of Credits.*—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 and Home Economics courses, candidates will be recommended for graduation with the degree of Bachelor of Science.

Six months' practical farm experience is required of each candidate for graduation from the Course in Agriculture. See statement under Divisions and Equipment.

2. *Exempted from.*—Every student shall do the work of the class with which he graduates, except that the student shall be free from any additional requirements for any year of which he has already completed the full work without condition.

3. *Delinquencies.*—No person shall be permitted to graduate who has an incomplete, condition, or failure standing upon the books of the Registrar.

4. *Professional Certificates.*—Diplomas of graduates of the college who have taken specified educational courses are valid as first-grade professional certificates for two years, and at the expiration of two years of successful teaching, such diplomas, properly endorsed, have the force of first-grade professional certificates for life. For specified courses, see page 37 and page 38.

E. MISCELLANEOUS

1. *Faculty Meetings.*—The Faculty meets regularly at 9 a. m. on the second Monday of each month of the college year.

2. *Petitions.*—(a) Every petition to be acted upon at any particular meeting of the Faculty must be presented to the Dean and Secretary of the Faculty not later than forty-eight hours previous to the time set for such meeting.

(b) Every student who desires to be heard in regard to his petition shall be given such an opportunity by the Committee or Faculty.

3. *Excused from Drill.*—In military matters where persons ask to be excused from Military Drill, the matter shall go first to the Commandant. If he approves, the Committee on Students' Work may take such action as they please. If he does not approve, and the Committee does approve, the matter shall go to the President of the University for final decision.

4. *Disturbances.*—Class meetings are held to be solely for the class calling the said meeting, and in case of disturbance and damage to prop-

erty those who are known to be present and not members of the class, shall be held responsible for the damage done even though it may be shown that they did not do the actual damage.

5. *Class Parties.*—No class party or public entertainment held on the campus or for which members of the class shall be held bound in honor to contribute shall be given without previous permission of the Committee on Student Organizations.

6. *Student Organizations.*—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 semester to be audited by the auditing committee. Any group of students intending to form a new organization should first consult with the chairman of the Committee on Student Organizations.

GENERAL INFORMATION

GRADUATE WORK AND DEGREES

Special facilities are offered to graduate students from this and other colleges who wish to become familiar with methods employed in experiment station work, and to pursue further their collegiate studies. Courses for major and minor subjects may be arranged by consulting the professors in the different divisions. Students who enter for advanced degrees, register with the Graduate Committee of the College of Agriculture, and also in the Graduate School. They must take their major subjects in the College of Agriculture, but they may take one or both of their two minor subjects in the College of Science, Literature, and the Arts or in the College of Engineering and Mechanic Arts. Graduate students registered in the Graduate School may take one or both of their minor subjects in the College of Agriculture.

1. The degree of Master of Science will be conferred on a bachelor of this or any other college of equal grade who, not sooner than one year after graduation, if a resident graduate student at this agricultural college, shall pass an examination in certain prescribed lines of study and present a satisfactory thesis in accordance with the requirements of the Graduate School.

2. All general regulations of the Graduate School governing candidates for the master's degree, method of selecting work, amount of work required, degree of proficiency expected, and the time and manner of conducting the examinations, apply to candidates for master's degrees in the College of Agriculture.

3. The degree of Doctor of Philosophy will be conferred by the Graduate School for study in the College of Agriculture on bachelors of this or any other college of equal grade within not less than three years after graduation therefrom under conditions prescribed by the Faculty of the Graduate School.

SCHOLARSHIPS AND PRIZES

It is the policy of the University to establish scholarships in the different departments where extra help is needed for instruction under regulations somewhat as follows:

(1) The appointments are made by the Executive Committee of the Board of Regents upon the recommendation of the department in which the appointment is desired, after approval by the Faculty.

(2) Recipients of scholarships may be either graduate or undergraduate students.

(3) The scholarships are not intended as gifts or as benefactions from the State to the recipients, but as provisions under which services may be rendered the University.

(4) It is understood that these services are of a nature which shall assist the holder of a scholarship to attain the mastery of some line of work in the department in which he is appointed.

Armour Scholarship

Through the exhibits of live stock at the International Exhibition in 1908, the College of Agriculture has been awarded one of the J. Ogden Armour Scholarships, amounting to \$250.00, which is to be awarded to some worthy student in the Agricultural College. This scholarship will be available during the next college year.

Gideon Memorial Fund

In honor of Peter M. Gideon, the pioneer in developing new fruit and the originator of the Wealthy apple, the Minnesota State Horticultural Society has raised a fund of five hundred dollars, which has been placed with the Board of Regents for investment. The income from this fund is to be expended by the Professor of Horticulture of the University of Minnesota for prize essays on some suitable horticultural subject. This prize money will be awarded at the close of each year.

The Shevlin Fellowships

The late Thomas H. Shevlin, of Minneapolis, conveyed to the Regents of the University on May 17, 1910, \$40,000 of five per cent bonds for fellowships. The Regents have in accordance with the wishes of the donor established four graduate fellowships under the jurisdiction of the Graduate School to be awarded as follows: One in Medicine, one in Chemistry, one in Agriculture, and one in Liberal Arts, each being the income of \$10,000, and yielding \$500 each per annum. They are awarded annually.

Before appointment as fellow can take effect the applicant must have completed the course for the bachelor's degree.

Candidates for these fellowships will file their applications before May 1st with the Dean of the Graduate School, stating their previous education and attainments and the graduate work they desire to enter upon, and give suitable references.

ORGANIZATIONS

Philomathian Literary Society is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating, and parliamentary practice. The society is co-educational and its membership is limited to forty. Meetings occur weekly, and programs, including readings, recitations, debates, and speeches, are presented. Visitors are welcome.

Athenian Literary Society is an organization of the College of Agriculture having for its object the training of its members along the lines of public speaking and debate. The society is co-educational. Its membership is limited to fifty. A program is presented each Tuesday evening, and visitors are welcome.

The Agricultural Club is an organization of the men of the College of Agriculture. The membership is unlimited. Regular meetings are held bi-monthly. The object of the club is to keep its members up-to-date along the lines of general interest; first, by providing speakers of recognized ability, second, by provoking timely discussion. Especially are those subjects discussed upon which very little literature is available. The social side is not overlooked.

The Dairy Club is an organization of students especially interested in the subjects of dairying. Already a large and enthusiastic membership has been drawn from College and School. Meetings occur fortnightly and give the students a much needed opportunity to thresh out for themselves the theories of the classroom. The evenings are occupied by talks and debates. Enthusiasm is the only requirement for admission.

The Home Economics League is an organization of the women of the College of Agriculture. Membership is unlimited. The object of the association is to keep its members up-to-date on home economic movements throughout the country, as well as to give organized backing to any movement for the betterment of the College. It is the ambition of the association to have a building of its own in the very near future.

LIBRARY

The Agricultural library is well equipped for supplying the needs of both undergraduate and graduate students. It contains more than 19,000 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 students to aid them in locating the various sources of information which the library affords.

There are complete sets of all standard encyclopaedias and dictionaries and files of over 300 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 given whatever privileges the library can provide.

DIVISIONS AND EQUIPMENT

The courses in Agriculture are designed to give the student a broad education in the sciences and arts relating to agriculture and to fit him for the work of an agricultural specialist. The physical and biological sciences are made prominent. The work in these subjects is begun in the first or second year and may be continued throughout the course. For the first two years, the lines of study are prescribed, the subjects being chosen with a view of giving a good foundation for the work which follows. For the last two years, some elective work is offered, giving the student an opportunity to take work along certain lines for which he has a special aptitude and liking.

Six months' practical farm experience is required of each candidate for graduation. It is expected that the work be done on some accredited farm on which improved methods and appliances are in use. This work can be performed during the summer vacations under the guidance of the head of the division in which the student is specializing.

In the College of Agriculture a portion of the work is taken in the College of Science, Literature, and the Arts.

AGRICULTURE

Equipment.—The equipment for instruction in Agriculture consists of the following: Laboratories and classrooms with apparatus for all courses, collections of classes and varieties of all field and weed seeds; herbariums of weeds and grasses indigenous to the State; a germinating room which affords opportunity for a study of the vitality and strength of seeds; charts and models of various experimental data of crops together with bulletins on farm management, the cost of production, and other pertinent topics that supplement the daily lectures. Machinery used on University Farm and that generously loaned by the firms of the Twin Cities afford valuable opportunities for instruction work. The fields and plots of the Experiment grounds offer additional facilities and subjects for use in class work. The student's home and farm is at all times made the basis of his particular study.

The State Grain Inspection Department, elevators, mills, and farms adjoining the Twin Cities and vicinity furnish a study for the merchandising of grains and the planning of farms. An agricultural museum, now being equipped, will contain much material that will be instructive and historic, and serve to show the close relations of Agriculture and the modern industries.

Standard references upon Agriculture are provided for an exhaustive study of any branch of this subject and original research is a prominent factor of the agricultural course.

AGRICULTURAL CHEMISTRY AND SOILS

Equipment.—A special laboratory with modern apparatus for the analysis of foods and agricultural products is provided. The equipment contains a Berthelot-Atwater calorimeter for the determination of the caloric value of foods, vacuum ovens, apparatus for the chemical and microscopical analysis of foods, and the necessary facilities for human and animal food investigations. Special facilities are offered in testing wheat, flour, and cereal products for commercial purposes. Nutrition investigations, including the digestibility of foods, the chemical changes which take place in cooking, and the losses in the preparation of foods, form a part of the Experiment Station work. This offers an opportunity for students to study methods of investigation relating to human food problems. Laboratory practice is also offered to advanced students in the study of household problems in which chemistry is involved and investigation of special problems in Agricultural Chemistry. Special facilities are offered for the study of the organic matter of the soil and its influence upon the chemical and physical properties of soils. The laboratory is provided with apparatus for the physical and chemical analysis of soils and for the study of special problems in relation to soil fertility. The library contains many of the standard periodicals and reference books upon soils and fertilizers. As soil investigations and a study of the soil areas of the State form a feature of the Experiment Station work, opportunity is offered for practical experience in the study of soil problems in relation to crop production.

AGRICULTURAL ENGINEERING

This Division includes the work in Mathematics, Physics, Drawing, Shop Practice, and the general principles of engineering mechanics and frame construction as they apply to Agriculture, the object being to combine in each course such engineering features as will enable the student to perform the more simple engineering operations which will occur in the work of his chosen course, and will further prepare him to understand the principles underlying the more complicated problems of engineering and thus enable him properly to interpret plans and specifications and to carry on investigations in connection with engineers.

The division is fairly well supplied with apparatus, instruments, charts, and photographs for properly demonstrating the work.

DAIRY AND ANIMAL HUSBANDRY

A. ANIMAL HUSBANDRY

Equipment.—Representatives of some of the leading breeds of cattle, sheep, and swine are kept at University Farm and herds of blooded stock near the institution, and the annual show of live stock at the State Fair serve for extended observation of breeds and methods of management.

Each year a number of experiments are under way in the feeding of these classes of animals. Breeding experiments are also undertaken with sheep and swine, and theoretical experiments with the smaller animals. Experiments in summer feeding cattle, sheep, and swine wholly or in part on pasture are carried on each year. The live stock building affords excellent accommodations for class work in stock judging.

B. ANIMAL NUTRITION

The economic relation of foods to the kinds and character of energy expended by the animal body is a subject of vital importance to live stock owners. It is a subject which has received no small amount of time in experiment work from the Dairy Division of this institution. The facilities in the way of laboratory equipment, as well as numerous animals for experiment purposes, are adequate for giving students a thorough scientific training in this subject. The dairy herd and some sixty head of nutrition steers are constantly kept for investigation work. Great stress is laid on chemical, biological, and physical phenomena affecting these problems, and to this end a thorough training in this science is given.

C. DAIRY HUSBANDRY

Equipment.—Students in the college course have the advantages of the equipment of the Dairy School. The feeding and breeding experiment in the Dairy Division of the Experiment Station serves a most useful purpose in the collegiate instruction. The cordial relations existing between the Department of Agriculture and other state institutions are often advantageous to college students well advanced in dairy work.

Specimens of several breeds of cattle are kept for class use. Herds in the vicinity and those shown at the State Fair are useful to students in this course.

This course is designed to meet the needs of those desiring a thorough knowledge of dairying. It will equip graduates for responsible positions as managers of large butter and cheese factories, stock farms, or for positions as instructors in dairy schools. Applicants must have had at least three months' experience in a creamery or cheese factory, for which three credit hours are allowed.

D. POULTRY HUSBANDRY

The equipment consists of three laying houses with a capacity of 400 mature fowls, an incubator and brooder with a capacity of 1200 to 1400 chicks. New and enlarged equipment is soon to be added. Representatives of the various utility breeds are kept. The equipment affords students a fair amount of practice aside from the work given in class.

• ENTOMOLOGY

Equipment.—Well-lighted laboratories with modern equipment are at the disposal of college students for both undergraduate and graduate work. Instruction is further aided by an excellent series of charts and

lantern slides. The department is well equipped with museum specimens convenient to the lecture room, showing not only a large series of insects, injurious and otherwise, over 10,000 specimens, but also birds and other animals which have a direct bearing upon agriculture. A good museum is also a valuable auxiliary in instruction, and friends of the institution are urged to contribute specimens which illustrate the animal resources of the State. Excellent facilities for installing and caring for specimens are offered.

In economic work the student is brought into direct contact with spraying apparatus and insecticides. Practical work in bee keeping is offered in our apiary, and experiments in insect life can be carried on by advanced students in the insectary at nearly all seasons of the year.

A course in Insects and Diseases is offered in view of the fact that of late years various insects or insect-like animals have been found to play a very important and hitherto unrealized part as carriers and transmitters of disease, and thus have a very important bearing upon the health of man.

HORTICULTURE

Equipment.—The work in the Division of Horticulture is mainly carried on at University Farm. About twenty acres is here used for the field work in this line. The horticulture building furnishes excellent facilities for classroom and laboratory exercises. The special work in breeding and testing fruits is carried on at Zumbra Heights, Carver County, where eighty acres of land are devoted to this purpose and equipped with suitable greenhouse, storage cellar, barns, etc., affording excellent facilities for this line of investigation.

The campus of the Department of Agriculture is planted out with a collection of trees, shrubs, and herbaceous plants suitable for this section, the specimens of which are labeled with their common and botanical names. The parks, greenhouses, orchards, and nurseries of the near vicinity afford convenient and satisfactory illustrations of the best commercial methods and ornamental planting. Our facilities in this line are unexcelled, perhaps, by any other college in the country.

The greenhouses, laboratories, and classrooms of the Division of Horticulture are well equipped with modern apparatus. The division library contains a large number of horticultural works and is further supplemented by a card index to all its literature.

HOME ECONOMICS

The work in Home Economics offered in the College of Agriculture is a four-year course leading to the degree of Bachelor of Science. It is intended to bring to the vocation of home making the same kind of help which the course in Agriculture brings to the business of farming. Aside from the universal need of education of this character, there is a marked and increasing demand for trained women to fill institutional and adminis-

trative positions as competent supervisors of supplies and of hygiene where large numbers are cared for in collective housekeeping, as well as for special teachers in the several divisions of home economics.

MILITARY SCIENCE

All male students are required to take three hours' drill per week for two years. An encampment is held each fall and those attending are excused from two-thirds of the work of the first semester which follows. Officers are selected from those who have completed the two years required drill, the lieutenants from the junior, and the captains from the senior, class. A cadet grey uniform is worn which costs from \$15 to \$16.

Instruction is given in Drill Regulations, Manual of Guard Duty, Firing Regulations, and Field Service Regulations. A course in Military Science is held for two hours per week during the second semester. There is a gallery range for indoor shooting, and range practice is held at Fort Snelling during the encampment. Manoeuvres are held each year with the St. Thomas cadets during the visit of the War Department Inspector. Another manoeuvre is held with a regiment of the Minnesota National Guard.

Besides the benefit to the student from learning the rudiments of Military Drill he receives the benefits of the physical, mental, and moral training such as are bound to result from proper military training. It is impressed upon the student that he as an individual is benefitted by this work. Confidence in self and manliness are two traits which a knowledge of military life is bound to develop.

VEGETABLE PATHOLOGY AND BOTANY

Equipment.—The work of this Division is designed to assist the student in correlating the fundamental facts and theories of Botany and the practical problems of agricultural and horticultural work. The laboratories, library, and demonstration material are arranged and equipped to enable the student to accomplish this correlation. The greenhouse and the abundant opportunities for observing plant life on the grounds and station farm furnish further excellent facilities. The plant and seed collections, including especially the plant diseases, are made useful to the student. A special field for diseases and weed investigation is maintained on the Station farm. Problems of agricultural botany and plant disease work and examination of seeds and seed mixtures are features of the division.

Special courses in applied botany are provided to prepare graduates for special work along the following lines: Diseases of plants on the farm and in the forest, the botanical study of farm plants, and the examination of seeds and seed mixtures. Graduates will be prepared for investigational work in Experiment Stations, Federal Departments of Agriculture, commercial seed testing laboratories, and as instructors along applied botanical lines.

VETERINARY MEDICINE AND SURGERY

Equipment.—The veterinary building gives ample facilities for good work. The hospital furnishes cases for study and demonstration and the dissecting room affords material and opportunity for studying the digestive organs, anatomy of conformation and type, and locomotor apparatus. A large and well-stocked museum contains ample material for illustration.

Instruction is given by text-books, lectures, collateral reading, and by practice work. The lectures are illustrated by means of stereopticon, skeletons, manikins, charts, and by the living animal. Anatomy of locomotion, conformation, the digestive organs, and the higher physiology of digestion are given prominence.

Infectious diseases of domestic animals are studied with reference to causes, recognition, prevention, and methods of control. Certain medicines which the intelligent stockman should understand are studied with reference to uses and methods of administration.

COURSES OF STUDY

COURSE IN GENERAL AGRICULTURE

Substitutions and elections, other than those specified, can only be made after the student has consulted with the Chief of Division in the course in which he intends to specialize and has received his approval.

Six months' practical farm experience is required of each candidate for graduation in the Course in Agriculture. Students should consult at some time during the freshman year the Chiefs of Division in which they intend to specialize in regard to this requirement.

FRESHMAN YEAR

First Semester

*German 1 or French 1 (3)
or
Econ. 3a, Indust. Hist. of Europe (3)
Botany 1, General (3)
Rhetoric 1, General (3)
Agr. Eng. 1, Math. 1 (3)

Agr. 1, Agronomy (3)
Chem. 2, General (3)
Military Drill

Second Semester

*German 1 or French 1 (3)
or
Econ. 3b, Indust. Hist. of U. S. (3)
Botany 1, General (3)
Rhet. 1, General (3)
Dy. and An. Husb. 26, Farm Dairying (3)

Agr. Eng. 2, Math. 2 (3)
Chem. 3, Qualitative (3)
Military Drill

SOPHOMORE YEAR

First Semester

†Botany 2, Advanced (3)
*German 2 or French 2 (3)
or
‡Ped. 1, Principles of Teaching (3)
Rhet. 2, Argumentation (3)
Dy. and An. Husb. 1, Live Stock (3)
Zoology 1, General (3)
Agr. Eng. 4, Mechanical Drawing (3)
Military Drill

Second Semester

†Botany 2, Advanced (3)
*German 2 or French 2 (3)
or
‡Ped. 2, Industrial Education (3)
Hort. 10, General (3)
Rhet. 2, Argumentation (3)
Agr. Chem. 1, Plant and Animal Life (3)
Zoology 1, General (3)
Military Drill

JUNIOR YEAR

First Semester

**Agricultural Electives (3)
Econ. 1, Elements (3)
†Ent. 2, Economic Entomology (3)
‡Dy. and An. Husb. 14, Animal Nutrition (3)
†Veg. Path. 1, Plant Pathology (3)
Agr. Chem. 14, Soils (3)

Second Semester

Econ. 22, Rural Economics (3)
Agr. Eng. 11, Agr. Physics (3)
Vet. 1, Veterinary Work (3)

General Elective (3)
Agr. Chem. 15, Soil Fertility (3)

*Spanish or any other modern language may be substituted for German, provided a program can be arranged. A student electing a language must complete the second year's work in the language elected.

†Students intending to specialize in any section of Dairy and Animal Husbandry may substitute for Botany 2 and for either Entomology 2 or Vegetable Pathology 1 any course in Dairy and Animal Husbandry.

‡Students intending to take senior year special sciences should substitute Quantitative Chemistry for Animal Nutrition. Students intending to specialize in Horticulture may substitute Farm Forestry and Nursery for Animal Nutrition.

**Students intending to take senior year in Agronomy or Farm Management should elect Agriculture 3, Field Crops and Seeds.

‡Students intending to teach or supervise courses in Agriculture should elect Pedagogics 1 and 2 (6) in the sophomore year and take Education 1 (3) and Psychology 1b (3) in the junior year and Pedagogics 4 (6) in the senior year. (See page 37.)

SENIOR YEAR IN AGRONOMY OR FARM MANAGEMENT

First Semester

Agr. 11, Farm Management (3)
 Agr. 4, Thremmatology (3)
 Agr. Eng. 9, Farm Structures (3)
 Agricultural Elective (3)
 Agronomy Technology (3)
 Elective (3)

Second Semester

Agr. 7, Farm Management (3)
 Agr. 12, Grain and Corn Judging (3)
 Agr. 5, Plant Breeding (3)
 Agronomy or Farm Management, Elective (3)
 Veg. Path. 3, Agricultural Botany (3)
 Dy. and An. Husb. 7, Live Stock Feeding and Management (3)

Electives to be selected on approval of Chief of Division.

SENIOR YEAR IN ANIMAL HUSBANDRY

First Semester

Zool. 4, General Physiology (3)
 Dy. and An. Husb. 17, Dy. Stock Feeding (3)
 General Elective (3)
 Dy. and An. Husb. 2, Poultry (3)
 Dy. and An. Husb. 5, Stock Judging (3)
 General Elective (3)

Second Semester

Zool. 4, General Physiology (3)
 Dy. and An. Husb. 7, Live Stock Feeding and Management (3)
 Agr. 7, Farm Management (3)
 Dy. and An. Husb. 6, Animal Breeding (3)
 Animal Husbandry Elective (3)
 General Elective (3)

Electives to be selected on approval of Chief of Division.

SENIOR YEAR IN DAIRY HUSBANDRY

First Semester

Dy. and An. Husb. 18, Dairy Stock Judging (3)
 Agr. Eng. 9, Farm Structures (3)
 Zool. 4, General Physiology (3)
 Dy. and An. Husb. 21, Cheesemaking (3)
 Dy. and An. Husb. 17, Dairy Stock Feeding (3)
 Creamery Practice (3)

Second Semester

Dy. and An. Husb. 20, Factory Butter-making (3)
 Dy. and An. Husb. 22, Dairy Bacteriology (3)
 Vet. 2, Anatomy of Digestion (2)
 Vet. 3, Physiology of Nutrition (1½)
 Veterinary Elective (3)
 Dy. and An. Husb. 24, Dy. Bacteriology (1½)
 Dy. and An. Husb. 23, Dairy Farm Management (1½)
 Dy. and An. Husb. 7, Live Stock Feeding and Management (3)

Electives to be selected on approval of Chief of Division.

SENIOR YEAR IN HORTICULTURE

First Semester

General Elective
 Agr. 4, Thremmatology (3)
 Hort. 6, Landscape Gardening (3)
 Hort. 8, Systematic Pomology (3)
 General Elective (3)
 Hort. 1, Commercial Fruit Growing (3)

Second Semester

Hort. 7, Plant Breeding (3)
 Hort. 5, Floriculture (3)
 Academic Elective (3)
 Hort. 2, Market Gardening (3)
 Hort. 9, Spraying Materials and Comps. (1½)
 Hort. 11, Greenhouse Construction (1½)
 General Elective (3)

Electives to be selected on approval of Chief of Division.

SENIOR YEAR IN SPECIAL SCIENCES

As a basis for graduate work in one of the following: Entomology, Agricultural Chemistry and Soils, Plant Pathology, and Agricultural Botany.

First Semester

Chem. 9, Organic Chemistry (3)
 Ent. 2, Economic Entomology (3)

Second Semester

Chem. 9, Organic Chemistry (3)
 Ent. 2a, Economic Entomology (3)

Veg. Path. 4, Advanced Pathology (3)
Agr. 11, Farm Management (3)
Electives (6)

Veg. Path. 6, Adv. Agricultural Bot. (3)
Hort. 1, Commercial Fruit Growing (3)
Electives (6)

Electives to be selected on approval of Chief of Division.

Courses for Teachers and Supervisors of Agriculture

Students may, in addition to specializing in one of the senior years given above, prepare especially for supervising and teaching of Agriculture in secondary schools. This is done by electing educational subjects as indicated on page 35. A first grade professional teacher's certificate can be obtained by completing the following courses:

Ped. 1, Principles of Teaching (3)
Ped. 2, Industrial Education (3)
Educ. 1, History of Education (3)
Psychology 1b, Elements of Psychology (3)
Ped. 4, Organization of Agricultural and Industrial Courses (6)

COURSE IN HOME ECONOMICS

Students intending to teach or supervise courses in Home Economics may obtain a teacher's certificate in accordance with announcement in *Courses for Teacher's Certificates* given on page 38.

FRESHMAN YEAR

First Semester

*German 1 or French 1 (3)
or
Econ. 3a, Ind. Hist. of Europe (3)
Botany 1, General (3)
Rhet. 1, General (3)
Dom. Sci. 1, Elementary (3)
Dom. Art. 1, Elementary Sewing (3)
Chem. 2, General (3)
†Hygiene

Second Semester

*German 1 or French 1 (3)
or
Econ. 3b, Ind. Hist. of the U. S. (3)
Botany 1, General (3)
Rhet. 1, General (3)
Dom. Sci. 2, Dom. Sci. (3)
Dom. Art 2, Designing and Drafting (3)
Chem. 3, Qualitative (3)

SOPHOMORE YEAR

First Semester

Dom. Sci. 3, Domestic Science (3)
Ped. 1, Principles of Teaching (3)
*German 2 or French 2 (3)
or
Rhet. 5, English (3)
Dom. Econ. 1, The Family (3)
Zool 4, General (3)
Agr. Chem. 2, Domestic Chemistry (3)

Second Semester

Dom. Art. 3, History of Costume (3)
*German 2 or French 2 (3)
or
Rhet. 5, English (3)
Library Methods 1 (3)
Ped. 2, Industrial Education (3)
Zool. 1, General (3)
Veg. Path. 8, General Bacteriology (3)

*Spanish or any other modern language may be substituted for German, provided a program can be arranged. A student electing a language must complete the second year's work in the language elected.

†All freshmen in the Home Economics Course will be required to attend a course of lectures on Hygiene.

JUNIOR YEAR

First Semester

Econ. 1, Elements (3)
 Zool. 4, General Physiology (3)
 or
 Educ. 1, History of Education (3)
 Dom. Econ. 2, The Home (3)
 Dom. Econ. 5, Hygiene (1)
 Dy. and An. Husb. 3, Meats (1)
 Dom. Art 4, Textiles (3)
 Ent. 1, General (1)
 Draw. 1, Freehand (3)

Second Semester

Agr. Eng. 4, Mechanical Drawing (3)
 Agr. Chem. 6, Chemistry of Foods (3)
 Dom. Econ. 3, Domestic Service (3)
 Zool. 4, General Physiology (3)
 or
 Psychology 1b, Elements (3)
 Dy. & An. Husb. 26, Dairy Husbandry (3)
 Dom. Sci. 4, Methods in Domestic Science
 (2)
 Dy. and An. Husb. 2, Poultry (1)

SENIOR YEAR

First Semester

Dom. Sci. 6, Domestic Science (3)
 Dom. Art 6, Household Art (3)
 Agr. Eng. 10, Household Mechanics (2)
 and
 Dom. Sci. 5, Household Sanitation (1)
 Dom. Art 5, Practice Teaching (1)
 Electives (8)

Second Semester

Dom. Econ. 4, Position of Women (3)
 Agr. 9, Agronomy (3)
 or
 Hort. 10, General (3)
 Dom. Art 7, Handicraft (3)
 Electives (9)

Courses for Teacher's Certificates

The teacher's first grade professional certificate may be obtained upon graduation from the Home Economics Course upon completion of the following courses:

Ped. 1, Principles of Teaching (3)
 Ped. 2, Industrial Education (3)
 Educ. 1, History of Education (3)
 Psychology 1b, Elements of Psychology (3)
 Dom. Sci. 4, Methods of Domestic Science (2)
 Dom. Art 5, Practice Teaching (1)

DEPARTMENTAL STATEMENTS

AGRICULTURE

- ANDREW BOSS, Professor of Agriculture and Chief of Division
21 1st fl. Main Bldg.
- COATES P. BULL, B.Agr., Associate Professor of Agriculture
23 1st fl. Main Bldg.
- LOUIS B. BASSETT, Assistant Professor of Farm Management
18 1st fl. Main Bldg.
- ALBERT C. ARNY, B.S. in Agr., Instructor in Agriculture
21 1st fl. Main Bldg.

1. Agronomy Mr. ARNY

Three credits (six hours per week); first semester. Required of freshmen in Agricultural Course.

A study of the principles and effects of crop rotation, supplemented by the working out of rotations suited to different farms and types of farming; the value, care, and use of barnyard manures; bacteria as related to soil fertility; weeds in relation to crop production and farm profits; plant selection and breeding methods; seed selection; the use and care of meadows and pastures; the planting, cultivating, harvesting, storing, and marketing of field crops. A thesis on some suitable agronomic subject will be required.

2. Farm Machinery Mr. BASSETT

Three credits (six hours per week); first semester. Elective. Open to juniors and seniors.

Practical suggestions and practice work are given in connection with the best methods of adjustment, handling, and adaptation of the various kinds of machinery to the soils, weeds, and seasons. Durability and convenience in manipulation are chief among the points considered.

3. Field Crops and Seeds Mr. ARNY

Three crédits (three hours per week); first semester. Required of seniors in Agricultural Course. Prerequisites, Botany 1, Agr. 1.

(a) Seeds: Their Identity and Value

In this course the students are made acquainted with the physical botany, the uses, identification, vitality, testing, grading, and judging of all classes of field seeds. Special attention is given to the reproducing value of seeds of various grades of grains and to the importance of testing. A thesis upon some phase of the subject of seeds is required for full credit.

(b) Field Crops: Their Structure and Use

In this course are considered the botany, cultivation, and economic value of the various cereal, forage, root, fiber, sugar, and miscellaneous crops. Special attention is given to the subjects of meadows, pastures, soiling crops, and to the production and preservation of all kinds of dry cured forage and ensilaged crops.

4. Thremmatology Mr. BULL

Three credits (three hours per week); first semester. Required of seniors in Agricultural Course. Prerequisites, Bot. 1. Zool. 1. Given in alternate years. 1912-13.

Heredity, variation, laws of breeding, the art of breeding, improvement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, immense value of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, fancy points and distinguishing marks, statistical methods in breeding pedigree records of efficiency, fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of literature of breeding.

5. Plant Breeding

Mr. BULL

Three credits (three hours per week); second semester. Required of seniors in Agricultural Course. Prerequisites, Bot. 1, Agr. 4. Given in alternate years. 1911-12.

Botany of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self-fertilization, originating varieties and improving standard varieties by selection and by hybridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation, and practical breeding, and the breeding of each of the various field crops grown in Minnesota.

7. Farm Management

Mr. BOSS

Three credits (three hours per week); second semester. Required of seniors in Agricultural Course. Prerequisite, Agr. 11.

This course is offered with a view to emphasizing the business side of farming. It includes the choice of farms; the comparison of types of farming; the adjustment of crops to location, markets, and live stock; the systematic arrangement of crops in rotation; the effect of cropping systems on soil productivity and crop yields; the regular employment of capital, and the employment and distribution of labor. Special attention is given to the reorganization of farm plans. Each student is required to draft a plan of a farm in which he is interested where some specialized type of farming is followed; to submit a business statement of the fixed and operating capital employed, together with the cost of operation, the revenue, and the net profit.

9. Agronomy

Mr. ARMY

Three credits (three hours per week); second semester. Elective in Home Economics Course. Open to seniors.

A study of the principles governing the science of agriculture and their relation to farm life; a brief study of the origin, formation, and cultivation of soils; the movement and control of soil moisture; the conservation of soil fertility by systematic rotation and the use of fertilizers; bacteria in their relation to soil fertility; methods in plant improvement. The larger part of the time given to this subject will be devoted to a study of the cereal, sugar, and fiber crops from the standpoint of producer and consumer. Special consideration will be given to the crops and their by-products that are largely used for human food. The course is intended to give such an insight into farming as a business and into farm life that those taking it may be better able to lend their influence toward bringing about healthful ideas and surroundings for life in the country.

11. Farm Management

Mr. RECK

Three credits (six hours per week); first semester. Required of seniors in Agricultural Course.

A course of lectures combined with text-book and practical work in the science of accounting and in kindred subjects, designed especially for students expecting to become farm managers, farm superintendents, or farm management field men. Consideration is given to the various forms of commercial paper, the relation of credit institutions to the farm and to business methods in common practice. Emphasis laid upon methods of cost keeping and the drawing up of yearly statements which show the condition of the farm business.

12. Grain and Corn Judging Mr. ARMY
 Three credits (four hours per week); second semester. Required of seniors in Agricultural Course. Prerequisites, Bot. 1 and 2, and Agr. 1.

A history and study in detail of representative samples of the leading varieties of grain, corn, and grass seeds, together with the adaptation of each to different localities; the conditions affecting the yield and market value; the uses to which grains and corn are put. Score card practice and comparative judging of grain, corn, and grass seed is a prominent feature of this work.

13. Plant Breeding Mr. BULL
 Six credits (minimum). Open to graduate students who have had two years in Botany, Agr. 1, or equivalents. Thremmatology and Cytology are required, but may be taken as extra work during the course.

14. Special Agronomic Problems Mr. BULL
 Six credits (minimum). Open to graduate students who have had two years in Botany, Agr. 1 and 2, or equivalents. The choice of subjects will be left primarily with the candidate; but it must be approved by the Chief of the Division and by the Committee in charge of graduate work.

15. Advanced Farm Management Mr. Boss
 Six credits (minimum). Open to graduate students who have had Agriculture 1, Elementary Economics, Agriculture 6, or equivalent, Farm Management 7.

16. Farm Management Surveys Mr. Boss
 Credit, six hours (minimum). Prerequisites, Elementary Economics, Agricultural Economics, Courses 11 and 7 (Agron. and Farm Management) or equivalents. May be chosen as a major or minor subject. (For graduate students.)

Special work in making farm management surveys of the farms of a certain territory or of special types of farming. Studies of the cost of producing certain farm products may also be undertaken in connection with the statistical route work of the Division.

17. Agronomy Technology
 Three credits (six hours per week), Prerequisites, Agronomy, and one year each General Botany and Chemistry.

A study of field crops and their use in manufacturing commercial products.

AGRICULTURAL CHEMISTRY AND SOILS

RALPH HOAGLAND, B.Agr., Professor of Agricultural Chemistry and Soils
 and Chief of Division 15 2d fl. Chemistry Bldg.

RODNEY M. WEST, B.A., Instructor in Agricultural Chemistry
16 2nd fl. Chemistry Bldg.

WILLIAM H. FRAZIER, B.S., Instructor in Soils
12 2d fl. Chemistry Bldg.

CORNELIA KENNEDY, B.A., Instructor in Agricultural Chemistry
15 2d fl. Chemistry Bldg.

C. H. BAILEY, Instructor in Chemistry 5 1st fl. Chemistry Bldg.

DE FOREST HUNGERFORD, B.S., Assistant in Soils

1. Chemistry of Plant and Animal Life Mr. WEST
 Three credits (six hours per week); second semester. Required of sophomores in Agricultural Course. Prerequisite, Chem. 3.

Some of the topics studied are: The ash elements of plants and their function in plant nutrition, the nitrogenous and non-nitrogenous compounds of plants and animals, the chemistry of seeds and plant growth, the factors influencing the composition and value of crops, and the composition and digestibility of foods. The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese are also studied. Laboratory practice forms a prominent feature of the work.

2. Domestic Chemistry Miss KENNEDY
 Three credits (six hours per week); first semester. Required of sophomores in Home Economics Course. Prerequisite, Chem. 3, Qual. Chem.

This course is devoted to a study of the chemistry of air, water, and food as related to human welfare. The following general topics are considered: Composition of air and causes affecting same, with special reference to air in dwellings; water: composition, safe water supplies, sources of contamination, and methods of detection and purification; fuels: composition and relative heating value; household chemistry; textiles; human foods: composition, changes taking place in preparation and preservation. Laboratory practice supplements the various topics taken up in class.

5. Quantitative Analysis Mr. WEST
 Four credits (eight hours per week); first semester. Elective. Open to juniors. Prerequisite, Chem. 3.

An elementary course in quantitative analysis. The principles involved in gravimetric and volumetric analysis are studied. The work includes the gravimetric determination of iron, sulphur, phosphorus, magnesium, chlorine, acidimetry and alkalimetry, the volumetric determination of iron, calcium, and the principles of iodimetry. The purpose of this course is to prepare the student for advanced agricultural and soil analysis.

Students intending to pursue advanced work in Agricultural Chemistry or Soils should elect quantitative analysis in the junior year.

6. The Chemistry of Foods Mr. HOAGLAND
 Three credits (three hours per week); second semester. Required of juniors in Home Economics Course. Prerequisite, Chem. 3.

Lectures. An advanced course treating of the composition, digestibility, and nutritive value of human foods. The processes employed in the preparation of foods, as the milling of wheat and other cereals, the economic uses of human and animal foods, the comparative value of foods, and the chemical methods employed in human nutrition investigations, particularly in proteid and carbohydrate metabolism, and the losses of energy from the body are studied. Dietary studies, including the cost of nutrients, and influence of different methods of preparation upon their nutritive value, are also included in the work. It is the object of this course to familiarize the student with the fundamental principles of nutrition and the use of literature upon the subject.

7. Analysis of Foods Miss KENNEDY
 Three credits (six hours per week); second semester. Elective. Open to juniors. Prerequisite, Agr. Chem. 5.

This work includes the determinations of water, ash, starch, sugar, cellulose, fats, proteids and different forms of nitrogen in foodstuffs, the use of the calorimeter and polariscope in food analysis. Before completing the course each student makes a complete proximate analysis of some foodstuff. This course is planned to meet the wants of those who wish to become familiar with methods used in food analysis and nutrition investigation.

8. Human Nutrition and Dietetics Miss KENNEDY
 Three credits (six hours per week); second semester. Elective. Open to seniors. Prerequisites, Agr. Chem. 6 and 7.

An advanced course arranged to give the student a practical understanding of the problems of nutrition and laboratory methods employed in such work. The results of the more important human nutrition investigations will be studied and in addition each student will be required to carry on an original investigation with some problem of nutrition and to report the results in a thesis.

10. Chemistry of Wheat and Its Milled Products Mr. BAILEY
 Three credits (six hours per week); first semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

This course is designed to meet the needs of those who wish to become familiar with the chemistry of the milling industry. It includes the determination of water, protein, ash, starch, sugar, gliadin and glutenin, fiber in wheat flour and mill feeds. Special attention is paid to the composition of wheat as affecting the quality of flour for bread making. Provision has been made for conducting milling tests with wheat, and baking and other physical tests with flour.

11. Advanced Agricultural Analysis Mr. HOAGLAND
 Three credits (six hours per week); second semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

This course offers an opportunity for those who wish to pursue work along some special line in agricultural or food chemistry. Work such as digestion experiments, analysis of dairy products, composition of crops at different stages of growth, etc., may be taken if desired. Students desiring to take this course should arrange for it before the close of the junior year so that material may be obtained for the work.

12. Dairy Chemistry Mr. HOAGLAND
 Three credits (six hours per week); second semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

An advanced course dealing with the chemistry of milk and its products. Laboratory practice includes the quantitative analysis of milk, butter, and cheese, and the detection of adulterants in those products.

13. Chemistry of Agricultural Products and By-Products Mr. WEST
 Three credits (three hours per week); second semester. Elective. Open to seniors. Prerequisites, Agr. Chem. 5 and 7.

Lectures will cover the composition of the principal products and by-products of agriculture and their utilization as raw material in the various industries.

14. Soils Mr. HOAGLAND
 Three credits (six hours per week); first semester. Required of juniors in Agricultural Course. Prerequisite, Chem. 3.

This course comprises a study of the soil from the geological, physical, and bacteriological standpoints, including such topics as soil formation, physical composition, and soil types, and the relation of soil to water, air, heat, soil organic matter and its transformation into plant food. The various factors in the control of physical condition of the soil are considered.

Laboratory practice: This work will consist mainly of a physical study of the soil. Some of the experiments are: Determination of hygroscopic moisture; effect of drainage upon temperature of soil; flocculating action of lime; reaction of soils; apparent and real, specific gravity; porosity; conductivity; rate of percolation of air through soils; effects of soil mulches; influence of continuous cultivation and crop rotation upon the properties of soils; extraction of humus, and determination of soil type.

15. Soil Fertility

Mr. FRAZIER

Three credits (six hours per week); second semester. Required of juniors in Agricultural Course. Prerequisite, Agr. Chem. 14.

This course comprises a study of the inherent and cumulative fertility of soils. A further study of the interpretation of chemical analyses and composition of soils, the essential elements of plant food, their occurrence in the soil and availability, maintenance of fertility, green manuring, influence of soil bacteria, barnyard manures, commercial fertilizers, their manufacture and composition, draft of farm crops upon the soil, balanced soil conditions.

Laboratory practice: This consists of a short course in the principles of quantitative analysis followed by the analysis of soils, crops, and fertilizers for the essential plant food elements, and a study of the chemical changes taking place in the soil, especially as influenced by different methods of cropping. Pot culture work is used to illustrate the importance of the various plant food elements, and commercial fertilizers in plant growth.

16. Physical Analysis of Soils

Mr. FRAZIER

Three credits (six hours per week); first semester. Elective. Open to juniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the mechanical analysis of soils by the most important of the elutriation and sedimentation methods as modified by the centrifuge. The student will be required to review and report other methods not used in the laboratory, and a study will be made of data available on physical composition of soils.

Students intending to take this or other advanced laboratory courses in Soils should elect quantitative analysis in the junior year.

17. Chemical Analysis of Soils

Mr. FRAZIER

Three credits (six hours per week); second semester. Elective. Open to juniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the chemical analysis of soils and a study of the chemical methods employed in soil investigation. The student will be required to analyze soil from his home farm before completion of the course.

18. Analysis of Fertilizers

Mr. FRAZIER

Three credits (six hours per week); first semester. Elective. Open to seniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the analysis of fertilizers according to methods outlined by the Association of Official Agricultural Chemists. The object of this course is to prepare students as analysts for fertilizer control work.

19. Research Work in Soils

Mr. HOAGLAND

Three credits (six hours per week); second semester. Graduate course. Open to seniors. Prerequisite, Agr. Chem. 17.

Special opportunity will be given students in this course to choose some line of investigation, and do original work. A thesis will be required covering all previous data together with results of original work.

AGRICULTURAL ENGINEERING

JOHN T. STEWART, C.E., Professor of Agricultural Engineering and Chief of Division

7 Main Bldg.

ALVAH M. BULL, Instructor in Farm Structures

4 Drill Hall

HALL B. WHITE, B.S. in Agr., Instructor in Carpentry

6 Drill Hall

HARRY B. ROE, B.S., Instructor in Mathematics

6 Drill Hall

JASON L. MOWRY, Instructor in Mechanics	6 Drill Hall
ALLEN D. JOHNSTON, Instructor in Blacksmithing	Blacksmith Shop
JENNESS B. FREAR, M.E., Assistant in Mechanics	6 Drill Hall
LYOYD R. WHITSON, E.M., Instructor in Drawing	8 Drill Hall
HARRIET GOLDSTEIN, Instructor in Freehand Drawing	
WALTER C. ANDERSON, E.M., Assistant in Drawing	

1. Mathematics 1

Mr. ROE

Three credits (three hours per week); first semester. Open to and required of all freshmen in the Agricultural Course who have completed all entrance Mathematics. Prerequisites, all entrance Mathematics.

This course is mainly demonstration and development of certain fundamental principles of higher mathematics with continuous application to the solution of a great variety of geometrical, physical, and other practical problems. The subjects covered are: Variation and quadratic equations reviewed; special forms of higher equations; simultaneous quadratics; graphics; theory and development of functions, including maxima and minima, indeterminate forms, differentiation, Taylor's formula and the binomial formula; theory and practice of logarithms; indeterminate equations; and the general solution of cubics and biquadratics.

2. Mathematics 2

Mr. ROE

Three credits (three hours per week); second semester. Open to and required of all freshmen in the Agricultural Course. Prerequisite, Agr. Eng. 1.

This course covers the entire theory of plane trigonometry with numerous practical applications in problems solved with and without the use of logarithms and also the fundamental formulas of spherical trigonometry with such practical application as time permits.

4. Mechanical Drawing

Mr. WHITSON

Three credits (six hours per week); either semester. Required in Home Economics and Agricultural Courses.

This course includes lectures on drawing; preliminary exercises in the use of drawing instruments; lettering; water coloring; the making of working drawings from models; and the practical value of drawing in arranging buildings, machinery, household equipment, etc.

5. Carpentry

Mr. WHITE

Three credits (six hours per week); first semester. Elective.

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building materials, painting, etc. In the carpenter shop students are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc. Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

6. Blacksmithing

Mr. JOHNSTON

Three credits (six hours per week); second semester. Elective.

The students are instructed in the management of the forge and fire, and in bending, shaping, and welding iron and steel. Particular attention is given to rapid and accurate welding and to the sharpening and tempering of steel tools.

9. Farm Structures

Mr. BULL

Three credits (six hours per week); first semester. Required of seniors in Agricultural Courses. Prerequisites, Agr. Eng. 4 and 11.

Each student selects an imaginary or real farm and makes drawings showing location of buildings, drives, yards, fences, etc., paying particular attention to locating each building and properly planning them so as best to meet the requirements of each individual farm and the means at hand for erecting them. Specifications and estimates of cost of buildings are also made.

10. Household Mechanics Mr. MOWRY

Two credits (four hours per week); first semester. Required of seniors in Home Economics Course. Prerequisite, Agr. Eng. 4.

This course is given in connection with Household Sanitation. The two subjects are taken together and constitute three credits. The Household Mechanics includes lectures and practice work in drawing; location of farm buildings, drives, yards, etc.; architectural designing, the study of plans, fittings, and equipment; heating systems, ventilation, floors, and woodwork, painting, and decoration. Each student is required to lay out plans for an imaginary or real house, paying particular attention to location.

11. Agricultural Physics Mr. MOWRY

Three credits (six hours per week and laboratory period); second semester. Required of juniors in Agricultural Course. Prerequisites, Agr. Eng. 2 and 4.

This work includes lectures, reference reading, and laboratory periods on both the theory and practical application of the subjects ordinarily treated in Physics. The various subjects considered are: Ventilation as applied to dwellings and barns; the pressure and flow of water, including wells, pumps, water supply, and drainage systems for the individual house; light, its theory and methods of lighting buildings; heat, in the heating of buildings and the operation of steam and gasoline engines; electricity and its application to the farm; sound and rural telephone construction; the preservation of timber, manufacture of cement; laboratory work in pipe fitting, soldering, belt lacing, rope splicing; properties and strength of wood, steel, and cement.

12. Farm Engineering Mr. STEWART

Three credits (six hours per week); second semester. Required in Agricultural Course. Open to juniors and seniors only who have completed Agr. Eng. 2 and 4.

Methods of keeping original records; explosives and their use on the farm; the manufacture of drain tile and sewer pipe; temperature, rainfall, runoff. Methods of making U. S. land surveys, and the principles of resurveying, the improvement of farm lands by open ditches, under drainage, levees, outflow culverts, and pumps. A brief summary of irrigation methods in the arid, semi-arid, and humid regions; roads and road construction in agricultural districts. Methods and cost of farm fencing, practical work in mensuration, and elementary surveying.

15. Special Problems Mr. STEWART

Three credits, minimum; nine credits, maximum. Open to graduates of Engineering and Agricultural Colleges.

Investigation, collection of data, and compilation of facts relating to the various problems of Engineering as applied to Agriculture. Offered as special problems to individual students who have the necessary preparation for pursuing the line of work desired.

16. Freehand Drawing Miss GOLDSTEIN

Three credits (six hours per week); first semester. Required of juniors in Home Economics Course.

Study of proportion and form, including drawing from plants and other objects. A study of prospective in rectangular and cylindrical objects. Interior drawings. Adaptation of designs of articles of household use, etc.

Note: Students taking any of the above courses must provide themselves with the necessary drafting instruments, regulation note books, drawing paper, etc.

DAIRY AND ANIMAL HUSBANDRY

THEOPHILUS L. HAECKER, Professor of Dairy and Animal Husbandry and
Chief of Division 30 2d fl. Dairy Hall

Animal Husbandry Section

HOWARD R. SMITH, B.S., Professor in Charge 2 2d fl. Live Stock Pavilion
WILLIAM H. TOMHAVE, B.S. in Agr., Assistant Professor of Animal
Husbandry 15 1st fl. Main Bldg.
JOSEPH S. MONTGOMERY, B.S. in Agr., Assistant Professor of Animal
Husbandry 5 2d fl. Live Stock Pavilion
RICHARD H. WILLIAMS, M.S., Assistant Professor of Animal Husbandry
3 2d fl. Live Stock Pavilion
FRANK W. WHITE, B.S. in Agr., Instructor in Animal Husbandry
3 2d fl. Live Stock Pavilion
ALBERT L. HUTCHINGS, Instructor in Animal Husbandry
6 2d fl. Live Stock Pavilion

Dairy Section

ROBERT M. WASHBURN, M.S.A., Associate Professor in Dairy Husbandry
38 2d fl. Dairy Hall
EDWIN O. HANSON, Instructor in Dairy Husbandry 1st fl. Dairy Hall

Poultry Section

FREDERICK H. STONEBURN, Professor in Charge
DWIGHT J. LANE, Instructor in Poultry 32 2d fl. Dairy Hall
C. H. MATTHEWS, Assistant in Poultry 32 2d fl. Dairy Hall

1. Breeds and Types of Live Stock Mr. SMITH
Three credits (six hours per week); first semester. Required of
sophomores in Agricultural Course.

The 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. This is followed in each class of stock with the most common and valuable breeds for the State. These are studied carefully as regards their origin and characteristics, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at the University Farm for this purpose. Work in stock judging is combined with studies of the breeds and types. A short period of time is given to the consideration of live stock management, including instruction in the best practices in breeding.

2. Poultry Mr. STONEBURN

(a) Three credits (three hours per week); first semester. Required of seniors in Animal Husbandry Course.

(b) One credit (one hour per week); second semester. Required of juniors in Home Economics Course.

The instruction in this subject will include the following topics: History and characteristics of the leading breeds of poultry; breeding, rearing, and management of fowls for eggs and for the market; planning, building, and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, work-room, etc., has been provided where experimental work and practical instruction are carried on.

3. Meats

Mr. TOMHAVE

One credit (two hours per week); first semester. Required of juniors in Home Economics Course.

The instruction given to the students in Home Economics in the subject of meats as it pertains to the selection and value of different classes of meats and to the best methods of curing and preserving.

4. Stock Judging

Mr. WILLIAMS

Three credits (six hours per week); second semester. Required of sophomores in Animal Husbandry Course.

This course is calculated to meet the needs of students desiring to become expert stock judges and of those who wish to study animal form with a view of becoming breeders of superior animals.

Score card work in combination with the presence of living specimens is a feature of this course. Students are drilled in judging from the standpoint of breed, type, form, stamina, quality, breeding capacity, suitability for feeding, and for general and specific production.

5. Stock Judging

Mr. SMITH

Three credits (six hours per week); first semester. Required of seniors in Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 4.

6. Animal Breeding

Messrs. WILLIAMS and LIPP

Three credits (three hours per week); second semester. Required of juniors in Animal Husbandry Course. Prerequisite, Zool. 1.

A study of the physiology of the reproductive organs of animals and of the processes of production; the causes and forms of variation; and laws of transmission and heredity; the application of these principles to the practical methods of breeding; a review of the practices of breeders famous for the improvement of live stock; outlines of methods for individual breeding operations, and for co-operative operations, including plans for a community co-operative breeding project.

7. Feeding and Management of Market Stock

Mr. SMITH

Three credits (three hours per week); second semester. Required of juniors in Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 1.

The principles of feeding as applied to economical production; feeding rations, feed stuffs, methods of feeding, care and management of breeding and fattening stock, management of animals during pasture, yard and stall feeding for the block, and stable management suitable for the various classes of live stock. The work is based on the investigations of the experiment stations, and a careful review of Station bulletins and publications will be made.

8. Market Classes of Live Stock

Mr. SMITH

Three credits (six hours per week); first semester. Required of juniors in Animal Husbandry Course. Prerequisites, Dy. and An. Husb. 1 and 4.

This will include a discussion of the various market classes of cattle, sheep, and hogs. Specimens for this work will largely be secured by going to South St. Paul and from the Station herds and flocks.

9. Meats

Mr. TOMHAVE

Three credits (six hours per week); first semester. Required in Animal Husbandry Course. Open to sophomores.

A continuation of studies in meats as outlined in the School course, supplemented by dissection and studies of muscular structure of various kinds of meat. This course is designed especially for studying meat-making animals and their products. Under general guidance each student makes up rings of animals which he studies in detail, at every step from the live state until the different parts are cooked and tested at the table. Full records and conclusions, as well as illustrations, are required in thesis form.

10. Live Stock Records and Research Mr. WILLIAMS
 Three credits (six hours per week); second semester. Elective for seniors in Animal Husbandry Course.

This course will consist of reviewing literature upon different phases of stock production. The Experiment Station records and other sources of information will be used largely. This together with original work will form the basis of extended compilation of material on live stock husbandry, and a thorough study of systems of keeping and compiling stock records upon stock farms, and at experiment stations. Sufficient actual practice will be required to become familiar with live stock records and herd books.

11. Animal By-Products Mr. TOMHAVE
 Three credits (six hours per week); second semester. Required in Animal Husbandry Course. Open to seniors only.

Individual study of the by-products manufactured at the large packing houses will be required of each student. The value and place that each has in economic use is considered.

12. Advanced Meats and Judging Mr. TOMHAVE
 Three credits (six hours per week); second semester. Elective for juniors and seniors only.

Work along this line is a continuation of that begun in Course 9. More attention is given the more important details concerning meat, and a minute study of its physical and chemical composition is required.

13. Live Stock Practicum Mr. HUTCHINGS
 Two credits (four hours per week); second semester. Elective for freshmen.

Feeding and stable management of cattle, horses, sheep, and swine; recording and calculating amounts of pasturage obtained from different forage crops, keeping herd records, writing pedigrees, and recording animals, calculating feeding records and cost of production.

14. Animal Nutrition Mr. HAECKER
 Three credits; first semester. Required of juniors in Agricultural Course.

Lectures and classroom work. The principles of animal nutrition, their relation to the economic production of animal and animal products, and the relation of the constituents in feed consumed to amount and character of products produced, form the basis of this course. Accompanying this course there will be assignments carrying out some phase of animal production or the production of some animal product tracing the disposition made of the nutrients in the feed.

15. Statistics of Nutrition Mr. WILLIAMS
 First semester. Elective. Prerequisite, Dy. and An. Husb. 14.

This includes a thorough study of experiments made on ingo and expenditure of matter, and the income and expenditure of energy, the relation of food consumed to kinds and character of energy expended.

16. Nutrition Research Mr. HAECKER
 Three credits (three hours per week); second semester. Required of seniors in Animal Nutrition Course. Prerequisite, Dy. and An. Husb. 14.

This course is open to advanced students and is offered during the second semester. The student is required to become familiar with the literature of some phase of animal production, outline and conduct an investigation under the supervision of the instructors of the department, and prepare a suitable report of the investigation. For carrying out this work animals will be provided for slaughter tests. The object of this course is to familiarize the student with the methods employed in the study of problems relating to animal production.

17. Dairy Stock Feeding

Mr. WASHBURN

Three credits; first semester. Required of seniors in Animal Nutrition and Dairy Husbandry Courses.

Lectures on the characteristics, composition, and nutrition value of feed stuffs; the economical production of dairy stock and dairy products. A study of the production value of feeds or the relation of feeds to products. Practice work in formulating rations.

18. Dairy Stock Judging

Mr. WASHBURN

Three credits (six hours per week); first semester. Required of seniors in Dairy Husbandry Course.

The gross anatomy of the dairy cow is studied, showing the relation of form to function. Complete life record of many cows is at the student's disposal, giving not only the total yield of each cow, but their economic production as well, placing the work on a scientific basis. A brief history of the dairy breeds is given and practical drill in breed characteristics. Many pure-bred herds in the vicinity of the Twin Cities are visited after laying a foundation by working on cows whose economic habits are known. The last six weeks of the semester are devoted to a systematic study of pedigrees.

19. Factory Management

Mr. WASHBURN

Three credits (three hours per week); first semester. Elective in Dairy Husbandry Course. Open to seniors.

Includes a study of the organization of creamery associations essential for success in operating creameries, the construction and equipment of whole milk and hand separator factories, and lectures on calculating dividends, sinking funds, percentage of yield, over-run, etc.

20. Factory Buttermaking

Mr. WASHBURN

Three credits (six hours per week); second semester. Required of seniors in Dairy Husbandry Course.

Includes lectures on the composition of dairy products, separation of milk, cream ripening, preparation of pure culture starter, pasteurization, churning and working, controlling moisture content of butter, preparing the butter for market, a study of market requirements, the examination and scoring of butter and cheese and practical demonstrations in the college creamery, or four weeks in State Creamery.

21. Cheesemaking

Three credits; first semester. Required in Dairy Husbandry Course. Open to seniors only. November 11th to December 7th.

Includes lectures and practical work in making common and fancy cheese as brick, and Gouda; also advanced work in the study of the importance of the quality and composition of the milk in manufacturing Cheddar cheese; the principles involved in cutting, heating, milling, salting, and pressing the curd, curing and marketing cheese, and the construction and ventilation of factories and curing rooms. Factory practicums during vacation or four weeks training in accredited cheese factory.

22. Dairy Bacteriology

Three credits (six hours per week); second semester. Required in Dairy Husbandry Course. Open to juniors and seniors only.

Instruction is given in the preparation of culture media and the cultivation of bacteria. During the semester a general study is made of bacteria, their function and activities together with a study of the milk flora and of commercial cultures.

23. Dairy Farm Management Mr. WASHBURN

One and one-half credits (three hours per week); last half, second semester. Required in Dairy Husbandry Course. Open to juniors and seniors only.

Lectures covering the fundamental principles of breeding for developing the highest efficiency in the mature animal. Forage crops will be considered and the arrangements of pasture and field for the most economical feeding of stock. One dairy barn plan will be required.

24. Dairy Bacteriology

One and one-half credits (three hours per week); first half, second semester. Required in Dairy Husbandry Course. Prerequisite, Dy. and An. Husb. 22.

Lectures on the morphology, classification, physiology, and cultivation of bacteria; their relation to sanitary milk production and to scientific dairying.

25. General Bacteriology

Mr. WASHBURN

See Vegetable Pathology, Course 8.

26. Farm Dairying

Mr. HAECKER

Three credits (six hours per week); second semester. Required in Agricultural and Home Economics Courses.

Lectures giving instruction in the care of milk, the running of farm separators, and the manufacture of butter. Lectures on the characteristics of the different dairy breeds and points desirable in animals intended for the dairy, the relation of form to production being the basis of instruction in dairy stock selection. Lectures are also given covering the practical phases of feeding. Along with these lectures, practice work is given in cream ripening, churning, working and packing butter, in the use of cream separators, and in milk testing.

DOMESTIC ART

MARGARET J. BLAIR, In Charge of Section 323 3d fl. Main Building

GRETA E. SMITH, Assistant

ELIZABETH BROOKS, Assistant

MAUDE B. RICE, B.S. in H.E., Assistant

GEORGIA BELLE ELWELL, B.S., Assistant

1. Elementary Sewing

Mrs. BLAIR

Three credits (six hours per week); first semester. Required of freshmen in Home Economics Course.

Instruction is given in hand sewing, including the different stitches, hems, seams, gussets, plackets, fastenings, and the various kinds of darning and patching, taking up the practical application of each in designing, drafting, cutting, and making underwear. The drafting is taught by a simple method in which only a tape line and square are used. Talks are given on the use and care of the work basket, touching upon the history of its implements, and upon the textiles cotton, wool, silk, and linen, also the selection of suitable materials and the care of underwear.

2. Designing and Drafting Mrs. BLAIR
 Three credits (six hours per week); second semester. Required of freshmen in Home Economics Course. Prerequisite, Dom. Art. 1.
 Each student is given instruction in designing, drafting, fitting, and finishing a shirt waist suit. Lectures are given upon proper dress, its style, neatness, and suitability to the wearer; also a color study from nature in reference to harmony of color in dress.
3. History of Costume Mrs. BLAIR
 Three credits (six hours per week); second semester. Required of sophomores in Home Economics Course. Prerequisites, Dom. Art. 1 and 2.
 A course designed to teach the drafting of skirt patterns and the fitting and making of a thin dress. Lectures are given and research work required along the history of dress. Instruction is given in millinery suitable for home use.
4. Textiles Mrs. BLAIR
 Three credits (six hours per week); first semester. Required of juniors in Home Economics Course.
 This course includes the study of cotton, linen, flax, and wool and the manufacture of different materials. The student is required to make a note book containing samples of each material as it is studied.
5. Practice Teaching Mrs. BLAIR
 One credit. Required of seniors in Home Economics Course. Prerequisite, Dom. Art 3. Those eligible should consult the instructor as it is necessary to arrange the time for the individual students.
 Each student is required to do a given amount of work in teaching under the supervision of the teachers in the School of Agriculture or in one of the Mission Schools or private schools of the two cities. Lecture work in Theory and Methods of Teaching Domestic Art as well as laboratory work is required. Preparation of materials for classes is part of the course.
6. Household Art Mrs. BLAIR
 Three credits (three hours per week); first semester. Required of seniors in Home Economics Course. Prerequisite, Agr. Eng. 4. This course is taken along with or after the student has completed Household Mechanics, Agr. Eng. 10.
 Lectures upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; the influence of the outlook; an elementary study of architecture in connection with planning a house; instruction in the fundamental value of color, form, and design; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishing and furnishing of the house. At the end of the term a book containing an original house plan with furnishing schemes and color selections is prepared by each student.
7. Handicraft Mrs. BLAIR
 Three credits (six hours per week); second semester. Required of seniors in Home Economics Course.
 Pottery, basketry, leather work, weaving, crocheting, and knitting are taken up in this course and studied in their simpler forms.
8. Advanced Designing and Drafting Mrs. BLAIR
 Three credits. Elective. Prerequisites, Dom. Art. 1, 2, and 3.

This course is designed especially to make the student more efficient in designing, drafting, and cutting of patterns and making and fitting of garments. The course also includes the cutting, fitting, and making of drop skirt and tailored dress skirt. Lectures deal with the presentation of work, the appropriate dress for different figures, beauty and individuality in dress.

9. Advanced Textiles Mrs. BLAIR

Six credits (three hours per week); both semesters. Open to seniors in Home Economics Course. Prerequisite, Dom. Art. 4.

The study of textile fibers will be taken up. Their history, physical and chemical properties, cultivation, and manufacture will be considered. This course will include the chemical testing of fibers and fabrics as well as the microscopic examination of the same. Some attention will be given to the study of fur and leather and their proper care and storage. The selection of materials in regard to their best wearing qualities will be studied. Research work to determine the wearing qualities of mixed and dyed fabrics will be pursued. The various weaves and methods of dyeing and the means of promoting pure fiber clothing industries will also be studied.

DOMESTIC ECONOMICS

FANNIE C. BOUTELLE, In Charge of Section

33 Main fl. Girls' Old Dormitory

MARTHA B. MOORHEAD, M.D., Lecturer in Domestic Hygiene

1. The Family Mrs. BOUTELLE

Three credits (three hours per week); first semester. Required of sophomores in Home Economics Course.

History of the family as an institution. The economic functions of the family with regard to industry, prosperity, education, and population. The psychology of family life. Lectures, problems, and recitations.

2. The Home Mrs. BOUTELLE

Three credits (three hours per week); first semester. Required of juniors in Home Economics Course. Prerequisite, Dom. Econ. 1.

The evolution of the modern home from primitive conditions. Evolutions of the social, industrial, religious, and economic conditions in the home, and their relation to civic life. Influence of the standard of living. Administration, organization, and maintenance of the home. Lectures, problems, and recitations.

3. Domestic Service Mrs. BOUTELLE

Three credits (three hours per week); second semester. Required of juniors in Home Economics Course. Prerequisite, Dom. Econ. 2.

History of domestic service in Europe in so far as it has affected domestic service in America. History of domestic service in America. Economic phases of domestic service. General principles upon which remedies for existing evils should depend. Lectures, problems and recitations.

4. Legal and Economic Position of Women Mrs. BOUTELLE

Three credits (three hours per week); second semester. Required of seniors in Home Economics Course. Prerequisite, Dom. Econ. 2.

Conservatism of women and the difficulty of dealing with women as an economic factor. Effect of social and industrial changes and of economic independence on women. Co-operation with special reference to women's work. Child labor from an economic standpoint. Women's clubs, their history, use, and abuse, and relation to civic life. Investments with special reference to the principles which should govern the investments of women. Lectures, problems, and recitations.

5. Domestic Hygiene Dr. MOORHEAD
 One credit (two hours per week); both semesters. Required of juniors in Home Economics Course.

The care of the sick, accidents and emergencies, infectious diseases, especially the contagious diseases of childhood, typhoid fever, and tuberculosis; causes, means of transmission, methods of prevention. Personal hygiene, hygiene of infancy, maidenhood, and maternity.

6. Euthenics Mrs. BOUTELLE
 Three credits (three hours per week); first semester. Elective. Open to seniors only.

A study of controllable environment and those social agencies which may impair or improve the characteristics of the human race. A brief consideration of the conservation of human powers both by the individual and by the state.

DOMESTIC SCIENCE

JUNIATA L. SHEPPERD, M.A., In Charge of Section

1st fl. Domestic Science Bldg.

BESSIE BEMIS, B.S., Assistant (In Charge, 1912-1913)

LOLA McCLURE, Assistant

CLARA AUST, B.S., Assistant

1. Elementary Domestic Science Miss SHEPPERD
 Three credits (six hours per week); first semester. Required of freshmen in Home Economics Course.

Fuels: Composition, source, and available power for household use are considered, together with various appliances used in the culinary art.

Cooking: The composition, digestibility, food and money value of vegetables, cereals, breads, etc., are carefully studied, and possible losses in preparing and cooking are elaborated by the use of suitable laboratory exercises. Research work is directed largely toward acquiring reliable data regarding the composition, digestibility, comparative food and money values of such materials as are used in the laboratory practice.

Laundrying: During the semester the principles of laundrying are elaborated; removing stains, dyeing, bleaching, etc., as well as the right use of chemicals and machinery in the laundry receive due attention. The comparative value of starches and blueings is studied. The use of hand and commercial laundry machinery is taught by means of demonstration, observation, and reading. Text-books, lectures, assigned readings, and recitations.

2. Domestic Science Miss SHEPPERD
 Three credits (six hours per week); second semester. Required of freshmen in Home Economics Course. Prerequisite, Dom. Sci. 1.

This course is a continuation of the food studies of Course 1. After April 1st an afternoon session is substituted for one morning session. This afternoon session is devoted to the study of yeasts and fermented breads with laboratory work in breadmaking. Lectures, library research, laboratory practice, and classroom discussions.

3. Domestic Science Miss SHEPPERD
 Three credits (six hours per week); first semester. Required of sophomores in Home Economics Course. Prerequisite, Dom. Sci. 2.

Special attention is given to fruit dishes, the preservation of fruit and other food materials by means of canning, preserving, pickling, etc., followed by the preparation and serving of some of the food materials commonly used in a strictly vegetarian diet. Laboratory canning, preserving, jelly making, salads, etc. Lectures, library research, classroom discussions.

4. Methods in Domestic Science Miss SHEPPERD
Two credits; second semester. Required of juniors in Home Economics Course. Prerequisite, Dom. Sci. 3.

The general subjects here treated are dietaries, table service, and methods of teaching. Special attention is given to dishes for invalids and children; school lunches, simple table service, glossary of special terms used, etc. receive attention. An attempt is made to insure students obtaining a comprehensive knowledge of methods of teaching. To this end practice teaching is required in addition to the regular class work during as many sessions as is practicable.

5. Household Sanitation Miss SHEPPERD
One credit (two hours per week); first semester. Required of seniors in Home Economics Course. Prerequisite, Agr. Eng. 4. Given in connection with Household Mechanics, the two subjects constituting three credits.

Instruction consists of discussions in regard to the conditions necessary to healthfulness; the general application of sanitary principles in regard to food, air, and water; care of plumbing, heating, lighting, and ventilating apparatus; disposal of kitchen waste, cremation, earth burial; etc. This follows Household Mechanics in order that the students may be able to gain a more comprehensive view of the subject of ventilation, heating, etc., because of knowing something of materials of construction from the architect's standpoint.

6. Domestic Science Miss SHEPPERD
Three credits (six hours per week); first semester. Required of seniors in Home Economics Course. Prerequisite, Dom. Sci. 3.

Students desiring to take an elective course in Domestic Science should elect this course in the first semester of the senior year. Those who do not take an elective course in Domestic Science are required to take this course in the second semester, senior year.

The dining room in its different phases of equipment, care, etc., labor saving devices and the possible application of business methods in housekeeping receive due consideration. Preparing and serving with limited means is required. Independent teaching with as much practice as possible in selecting food materials at the market. An itemized account of kind and amount of material used, number of students present, cost of lessons, etc. Adjacent public schools give opportunity for such work. Classroom discussions, laboratory practice, fancy cookery, serving, etc. This is the culmination of the student's school work, and each is expected to show her ability to use knowledge by preparing floor plans showing equipment, with details of construction and tentative cost of a laboratory kitchen, as well as to make lesson outlines, practice their use, and revise and perfect them as far as possible.

7. Domestic Science Miss SHEPPERD
Two credits (four hours per week); second semester. Elective in Home Economics Course. Open to seniors. Prerequisite, Dom. Sci. 6.

In this course the students endeavor to solve by personal experiments some of the housekeeper's problems.

ENTOMOLOGY

- FREDERICK L. WASHBURN, M.A., Professor of Entomology and Chief of
Division 302 3d fl. Main Bldg.
ARTHUR G. RUGGLES, M.A., Assistant Professor of Entomology
301 3d fl. Main Bldg.
C. W. HOWARD, B.A., Instructor in Entomology 303 3d fl. Main Bldg.

1. General Entomology Mr. WASHBURN
 One credit (two hours per week); first semester. Required of juniors in Home Economics Course.
 The structure and classification of insects. Study of injurious insects in different orders affecting the household and garden.
2. Economic Entomology Mr. WASHBURN
 Three credits (three hours per week); first semester. Required of juniors in Agricultural Course. Elective in Animal Nutrition Course. Prerequisite, Zool. 1 or its equivalent.
 Lectures upon injurious insects of Minnesota and best methods of combating the same. The use of insecticides and spraying machinery. Beneficial insects.
- 2a. Economic Entomology Mr. WASHBURN
 Three credits (three hours per week); second semester. Elective. Open to juniors or seniors. Prerequisite, Ent. 2 or its equivalent.
 This course is a continuation of Course 2, and is advised for students specializing in Agriculture and Horticulture, or planning advanced work in the sciences. Before electing students must confer with Chief of Division.
4. Comparative Anatomy and Histology of Insects Mr. RUGGLES
 Three credits (six hours per week); first and second semesters. Elective. Open to juniors and seniors. Prerequisites, Zool. 1 and Ent. 2 or equivalents.
 A detailed study of structure of representatives of different orders of insects.
5. Elements of Bee Keeping Mr. WASHBURN
 One credit (two hours per week); second half, second semester. Elective. Open to juniors and seniors. Prerequisites, Ent. 1 or Ent. 2 or equivalent.
 One lecture a week and work in apiary.
6. Special Problems Mr. WASHBURN
 Three credits (three hours per week); first and second semesters. Elective. Graduate course. Prerequisites, Zool. 1, Ent. 2, and 2a, or equivalents.
 Before electing students must confer with Chief of Division.
7. Insects and Diseases Mr. HOWARD
 One credit; second half, second semester. Elective. Open to juniors or seniors. Prerequisites, Zool. 1 and Ent. 2.
 Lectures upon insects and insect-like animals which are in any way carriers of disease, or which affect the general health of man or other animals. Such pests as the common housefly (and its relation to typhoid or other diseases), the malarial and yellow fever mosquitoes, fever bearing ticks, bot flies, fleas, lice, poultry pests, mange and scab producing animals will be discussed and studied.
 Before electing students must confer with the Chief of Division.
9. Advanced Histology and Morphology of Insects Mr. RUGGLES
 Four credits (minimum). Open to graduate students who have had Course 4 or its equivalent.
 Lectures and laboratory work.

HORTICULTURE

LE ROY CADY, B.S. in Agr., Associate Professor of Horticulture, Acting
Chief of Division 22 2d fl. Horticulture Bldg.

ALFRED R. KOHLER, B.S.A., Instructor in Horticulture
22 2d fl. Horticulture Bldg.

1. Commercial Fruit Growing Mr. KOHLER
Three credits (three hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Geography of fruit growing, soils, tillage, soil fertilization, pollination, orchard protection, harvesting, storing, and marketing of fruits, yields, cost of production, profits, etc., and a brief study of the growing of tropical and subtropical fruits. Lectures and references.

2. Market Gardening Mr. KOHLER
Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Geography of vegetable growing, soils, tillage, soil fertilization, seed sowing, vegetables under glass, pollination, crop protection, storage, harvesting, and marketing of vegetables, commercial methods in the production of the various vegetable crops, yields, cost of production, profits, etc. Lectures, references, and a study of commercial practice in the vicinity of the Twin Cities.

4. Nursery Practice Mr. CADY
One and one-half credits (six hours per week); first half, first semester. Required of juniors in Horticulture Course. Prerequisite, Hort. 10.

Seedage, layerage, cuttings, graftage, planting, pruning, thinning, storage of nursery stock; tillage of nursery lands; relation of insect and fungus diseases to nursery stock. Lectures and practice work.

5. Floriculture Mr. CADY
Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Lectures and laboratory work. Greenhouse management; temperature; soil; watering; benches; propagation; prevention of diseases and extermination of insects; rest and growth periods of plants; plants for greenhouse cultivation.

6. Landscape Gardening Mr. CADY
Three credits (three hours per week); first semester. Required of seniors in Horticulture.

A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.

7. Plant Breeding
Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisites, Hort. 10, Agr. 4.

Lectures and laboratory work. The fact and philosophy of variation; crossing of plants; origin of horticultural varieties of plants.

8. Systematic Pomology

Mr. KOHLER

Three credits (six hours per week); first semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

The classification and distribution of temperate, sub-tropical and tropical fruits; technical description and general study of the more important varieties; identification of varieties; judging of fruits; fruit literature. Lectures, laboratory work, and references.

9. Orchard Spraying

Mr. KOHLER

One and one-half credits (six hours per week); last half, second semester. Required of seniors in Horticulture Course. Prerequisite, Hort. 10, Plant Path. 1, and Ent. 2.

A study of spraying materials and compounds, their preparation and application. A large number of spraying mixtures will be prepared in the laboratory, types of machinery and apparatus for their application will be studied, and practice given in the application of the more important applications.

10. General Horticulture

Mr. CADY

Three credits (six hours per week); second semester. Required of sophomores in Agricultural and Home Economics Courses.

The course will cover in an elementary way the principles of fruit growing, vegetable gardening, and plant propagation. Two classroom periods and one afternoon for laboratory work.

11. Greenhouse Construction

Mr. CADY

One and one-half credits (six hours per week); first half, second semester. Required of seniors in Horticulture Course.

Evolution of the greenhouse; types of houses; materials and methods of construction. Laboratory work in planning and estimating cost of glass houses. Excursions.

12. Advanced Horticulture

Mr. CADY

Six credits (minimum). Open to graduates who have completed undergraduate work preparatory to advanced special work in Horticulture, along one of the following lines: Plant breeding, vegetable gardening, pomology, or floriculture.

The course will consist of lectures, research, field and laboratory work along the line selected. One season's work at University Farm, Fruit Farm, or other approved horticultural establishment will be required.

LIBRARY METHODS

ANNA M. SMITH, Instructor, 212 2d fl. Main Bldg.

1. Library Methods

Miss SMITH

Three credits (six hours per week); second semester. Required of sophomores in Home Economics Course.

Lectures and practice work given in the use of libraries and in the management of school libraries, including selection and purchasing of books, indexing, cataloguing, and general library administration for such institutions.

PEDAGOGICS

DEXTER D. MAYNE, Professor of Agricultural Pedagogics

207 2d fl. Main Bldg.

1. Principles of Teaching

Mr. MAYNE

Three credits (three hours per week); first semester. Required of sophomores in Home Economics Course.

This course includes a consideration of the elementary principles of teaching, a study of general methods, and a special study of methods of teaching industrial subjects. Lectures, assigned readings, discussions, and reports.

2. Industrial Education

Mr. MAYNE

Three credits (three hours per week); second semester. Required of sophomores in Home Economics Course.

This course includes a short history of industrial education; the present status of industrial education in Europe and in the United States; the place of manual training and home arts in an educational system; the place of agricultural teaching in the public schools; trade and vocational schools.

4. Organization and Administration of Agricultural and other Industrial Courses

Mr. MAYNE

Six credits (three hours per week).

This course is given to acquaint students with the organization of courses in industrial subjects and their administration. It involves a study of the system of industrial education provided for Minnesota, and a comparison with systems in other states. Students will observe work in the School of Agriculture and in the Twin Cities and will prepare courses of study and syllabi on assigned industrial subjects. The administration of courses in the High Schools of Minnesota under the Putnam and the Lee Benson Acts will receive special consideration. Instruction in industrial work for Consolidated Rural Schools and methods of handling school gardens in the cities and in the country, and practice teaching in the Agricultural High Schools of the State.

PHYSICAL TRAINING

GRACE DENNY, Instructor

1. Physical Training

Miss DENNY

Two credits (three hours per week); both semesters. Elective in Home Economics Course.

This course includes careful analysis of standing position and walking, aiming to correct faulty posture and to produce grace and strength; exercises of hygienic value relieving abnormal conditions and strengthening the heart, lungs, and digestive organs; aesthetic and folk dancing; also exercises with special attention to deep breathing; cross country tramps, skating, tennis, and games.

2. Advanced Physical Training

Miss DENNY

Two credits (three hours per week); both semesters. Elective in Home Economics Course. Open to those who have completed Course 1.

Advanced work in continuation of Course 1.

RHETORIC

ROBERT C. LANSING, M.A., Assistant Professor of English

36 2d fl. Dairy Hall

ESTELLE COOK, Instructor in English

Home Building

1. General Rhetoric

Mr. LANSING

Six credits (three hours per week); both semesters. Required of freshmen in Agricultural and Home Economics Courses.

Theme course: Lectures and recitations on the principles of themes, the construction of sentences, and the use of words. The papers written in the classes and examinations of the various departments of the College will be turned over to the English Department for correction of the English. These will be the subject of personal interviews with the student, and will partly determine his final grade in English.

2. Argumentation

Mr. LANSING

Six credits (three hours per week); both semesters. Required of sophomores in the Agricultural Course. Prerequisite, Rhetoric 1.

The course consists of a study of the rules of reasoning, the tests of evidence, and effective presentation. There is frequent practice in writing, briefing, and speaking both from the floor and formal debate.

Students who are careless and incorrect in their use of language in papers written in any course will be required to rewrite them under the supervision of the English Department.

4. Public Speaking

Miss COOK

Three credits (three hours per week); both semesters. Prerequisite, Rhetoric 1.

This course consists of the study and practice of the fundamental principles of voice production, articulation, gesture, platform deportment, and expression.

5. English

Mr. LANSING

Six credits (three hours per week); both semesters. Prerequisite, Rhetoric 1.

Outline of course to be given in next catalogue.

VEGETABLE PATHOLOGY AND BOTANY

EDWARD M. FREEMAN, Ph.D., Professor of Vegetable Pathology and Botany and Chief of Division

30 3d fl. Horticulture Bldg.

WIELAND L. OSWALD, Instructor in Agricultural Botany

31 3d fl. Horticulture Bldg.

E. C. STAKMAN, M.A., Instructor in Vegetable Pathology

35 3d fl. Horticulture Bldg.

1. Plant Pathology

Mr. FREEMAN

Three credits (six hours per week); first semester. Required of juniors in the Agricultural Course. Prerequisite, Botany 1.

General outline of the diseases of plants due to fungus organisms; a special study of the life histories and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Thesis work and specialization according to the interests of the students; for instance, for forestry students, diseases of forest trees; for agronomy students, diseases of cereal crops, etc. Special attention is paid to methods of prevention and cure. Lectures, reference reading, laboratory, and thesis work.

3. Agricultural Botany Mr. FREEMAN
 Three credits (six hours per week); second semester. Required in the Agricultural Course. Open to juniors and seniors. Prerequisite, Botany 1.

This course includes a study of weeds and weed seeds and methods of detection and eradication. Special study of impurities of Minnesota seeds is made. Methods of seed testing both for purity and germination are given. The study of weeds includes the common weeds and other plants of agricultural importance, their distribution, history of introduction, and botanical features.

4. Advanced Pathology Mr. STAKMAN
 Six credits (six hours per week); both semesters. Elective. Open to seniors. Prerequisite, Veg. Path. 1, Mycology.

Special cultural and laboratory methods in Plant Pathology. Special practical problems in plant diseases. Laboratory, reference, and lecture work.

5. Advanced Pathology Mr. FREEMAN
 Graduate course. Prerequisites, Botany 3, Veg. Path. 1, Mycology.

Special problems in the investigation and prevention of plant diseases. This course is designed for minor or major subjects for candidates for advanced degrees.

6. Advanced Agricultural Botany Mr. OSWALD
 Six credits (six hours per week); both semesters. Elective. Open to seniors. Prerequisite, Veg. Path. 3.

Special work along agricultural botanical lines. Special problems in seed testing and weed work.

7. Advanced Agricultural Botany Mr. FREEMAN
 Graduate course. Prerequisites, Botany 3, Veg. Path. 1, 3, 4, and 6.

Special problems in agricultural botany. Designed for minor or major subject for candidates for advanced degrees.

8. General Bacteriology (Plant Pathology Division) Mr. STAKMAN
(Dairy Division) Mr. R. M. WASHBURN
(Veterinary Division) Mr. WILLEY

Three credits (six hours per week); second semester. Required of sophomores in House Economics Course. Open to sophomores, juniors, and seniors in Agricultural Course. Prerequisites, Bot. 1 and Chem. 3.

General introductory outlines of Bacteriology including classification, culture methods, and biology of bacteria with special reference to agricultural importance (Division of Vegetable Pathology), followed by special work in dairy bacteriology (Dairy and Animal Husbandry Division), and in human and animal pathology (Veterinary Division). (See Dairy and Animal Husbandry 25 and Veterinary Science 6.)

VETERINARY SCIENCE

MYRON H. REYNOLDS, B.S., D.V.M., M.D., Professor of Veterinary Medicine and Surgery and Chief of Division

16 2d fl. Veterinary Bldg.

CHARLES C. LIPP, D.V.M., Assistant Professor of Veterinary Medicine and Surgery

15 2d fl. Veterinary Bldg.

WILLARD L. BOYD, Instructor in Veterinary Medicine and Surgery
15 2d fl. Veterinary Bldg.
LOUIS E. WILLEY, D.V.M., Instructor in Veterinary Science

1. Veterinary Work

Mr. REYNOLDS

Three credits (three hours per week); second semester. Required of juniors in Agricultural Course.

This course is given by lecture, by practicum, and by text. Its purpose is to fit students for intelligent care of farm stock. The work will cover animal physiology, anatomy, elementary pathology, causes and prevention of disease, lameness, unsoundness, and common medicines; and will be illustrated by stereopticon, charts, skeletons, and manikins.

2. Anatomy of Digestion

Mr. SPENCER

Two credits (four hours per week); first half, second semester. Required. Open to juniors and seniors. Prerequisite, Vet. 1.

Comparative anatomy of the digestive organs, dissection, collateral reading, and recitations. Chauveau's Comparative Anatomy is used for reference and comparison.

3. Physiology of Nutrition

Mr. LIPP

One and one-half credits (three hours per week); last half, second semester. Required. Open to juniors and seniors. Prerequisite, Vet. 2.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

4. Anatomy of Locomotion and Conformation

Mr. WILLEY

Two credits (four hours per week); first half, second semester. Elective. Prerequisite, Vet. 1.

This course deals with the anatomy of locomotion. The bones, articulations and muscles involved in locomotion and conformation are studied by text-book, dissection and collateral reading. Strangeway's Veterinary Anatomy is used as a text-book and Chauveau for reference.

5. Common Diseases

Mr. REYNOLDS

One and one-half credits (three hours per week); last half, second semester. Elective. Open to sophomores and juniors.

This course deals with common and serious diseases of domestic animals, their causes and prevention and in some cases, treatment.

6. General Bacteriology

See Vegetable Pathology, Course 8.

COURSES OF STUDY IN OTHER COLLEGES

BOTANY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

FREDERIC E. CLEMENTS, Ph.D., Professor, Head of Department of Botany	207 Pillsbury Hall
JOSEPHINE E. TILDEN, M.S., Professor	214 Pillsbury Hall
CARL O. ROSENDAHL, Ph.D., Professor	18 Pillsbury Hall
NED L. HUFF, M.A., Assistant Professor	214 Pillsbury Hall
FREDERIC K. BUTTERS, B.S., B.A., Assistant Professor	206 Pillsbury Hall
EDITH CLEMENTS, Ph.D., Instructor	207 Pillsbury Hall
ALICE M. MISZ, M.A., Instructor,	16 Pillsbury Hall

1. General Botany Messrs. CLEMENTS, HUFF, and BUTTERS, and Miss MISZ

Six credits (six hours per week); both semesters. Open to freshmen.

Laboratory study of the structure of flowering plants, from organs through parts and tissues to cells, followed by a brief study of common types of flowerless plants, leading to the origin of the flower and seed habit, and the classification of flowering plants; greenhouse study of the behavior of plants, correlated with the study of organs and tissues, and field work and classification of trees and shrubs, fruits and seeds, buds and shoots, and spring flowers.

2. Advanced Botany Messrs. CLEMENTS and ROSENDAHL,
Mrs. CLEMENTS, and Miss MISZ

Six credits (six hours per week); both semesters. Open to sophomores. Prerequisite, Bot. 1.

Greenhouse and field study of the important flower families from the standpoint of evolution, classification and identification, with especial reference to woody plants, composites, weeds, and grasses; in the second semester the emphasis is upon pollination and seed production, following the life history from the origin of pollen grains and ovules through fertilization, development of the embryo, germination and growth; during the spring particular attention is given to the correlation of the year's results by means of the chart method of identification and classification.

3. Physiology and Ecology Mr. CLEMENTS
Six credits (six hours per week); both semesters. Open to juniors.
Prerequisites, Bot. 1 and 2.

Study of the factors which make the plant's home, viz., water, light, heat, soil, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization, and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation, and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc., of plants.

5. Fungi Mr. CLEMENTS
Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Discussions and quizzes, laboratory, greenhouse and field work.

7. Flowering Plants Mr. ROSENDAHL

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse, and herbarium work, together with field work in the fall and spring.

8. Ecology Mr. CLEMENTS

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1, 2, and 3.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. Plant Physiology Mr. CLEMENTS

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1, 2, and 3.

A study of 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.

11. Industrial Botany Miss TILDEN

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

A study of the origin, distribution, and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics, and laboratory work.

CHEMISTRY

SCHOOL OF CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor, Head of Department
of Chemistry 114 Chemistry Bldg.

IRA H. DERBY, Ph.D., Assistant Professor 220 Chemistry Bldg.

EDWARD E. NICHOLSON, M.A., Assistant Professor 104 Chemistry Bldg.

FRANK W. BLISS, M.S., Instructor 205 Chemistry Bldg.

LILLIAN COHEN, M.S., Instructor, 106 Chemistry Bldg.

LILLIAN L. NYE, M.A., Instructor, 106 Chemistry Bldg.

2. General Chemistry (Given at University) Mr. FRANKFORTER and
INSTRUCTORS

Three credits (two lectures, four laboratory hours per week); first semester. Open to freshmen.

This course includes a study of the chemical properties of the metallic and non-metallic elements, with a brief introduction to organic chemistry.

3. Qualitative Analysis (Given at University) Messrs. NICHOLSON and BLISS
 Three credits (one lecture, four hours laboratory per week); second semester. Open to freshmen.

This course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

9. Organic Chemistry (Given at University) Mr. FRANKFORTER and INSTRUCTORS
 Six credits (six hours per week); both semesters. Open to juniors. Prerequisite, Chem. 3. Elective.

Lectures and laboratory work. The course includes the aliphatic and aromatic series with the preparation of the more important compounds.

14. Physical Chemistry (Given at University) Mr. DERBY
 Four credits (one lecture, six hours laboratory per week); first semester. Open to seniors. Prerequisite, Chem. 5. Elective.

This course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

*JOHN H. GRAY, Professor, Head of Department of Economics and Political Science
 Mechanic Arts Bldg.

EDWARD VAN DYKE ROBINSON, Ph.D., Professor, Acting Head of Department of Economics and Political Science, Feb. 1912-Feb. 1913.

Mechanic Arts Bldg.

CARL W. THOMPSON, M.A., Associate Professor and Director of Bureau of Research in Agricultural Economics in the Department of Agriculture
 Mechanic Arts Bldg.

THOMAS WARNER MITCHELL, Ph.D., Assistant Professor

Mechanic Arts Bldg.

JEREMIAH S. YOUNG, Ph.D., Assistant Professor
 Mechanic Arts Bldg.

1. Element of Economics Mr. THOMPSON

Three credits (three hours per week); first semester. Required of juniors in Agricultural, Forestry, and Home Economics Courses; designed for those who desire a general knowledge of Economics and as an introduction to more advanced courses offered in the Department.

2a. Physical and Human Geography Messrs. LEHNERTS and ROBINSON

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have not taken Geology 29. Constitutes a unit course for which no credit is allowed until both semesters are completed. May be counted toward a major or minor in either the Department of Geology and Mineralogy or the Department of Economics and Political Science.

*On leave of absence Feb. 1912-Feb. 1913.

First semester, given by Mr. Lehnerts: Fundamental physiographic facts, processes, and relations, with special reference to their effect on the activities of mankind; planetary relations, climate, land forms, and oceans; rivers, lakes, and waterpowers; ground water, and soils; mountains, plateaus, and plains; deserts, steppes, and prairies. Lectures, laboratory, and field work.

Second semester, given by Mr. Robinson: A study of economic and political development in relation to nature, exclusive of ethnography; meaning of the geographic and the economic interpretations of history; economic progress as a phase of adaption to environment, illustrated by reference to the industrial conditions of the leading countries. Text-book, supplemented by lectures and reports on special topics.

2b. Economic Geography

Mr. ROBINSON

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors except those who have admission credit in Commercial Geography. Course 2a may profitably precede or accompany Course 2b.

The economic basis of modern civilization; the causes, both in nature and man, which control the localization of industries, the geographic factor in American history and economic development; natural resources and the economic problem of their use and conservation; the principal extractive, manufacturing, and distributive industries of the United States, its outlying possessions, and the leading foreign countries, especially those which have a large prospective value as markets for American manufactures and as fields for the investment of American capital. Text-book with lectures and special reports.

3a. Modern Industrial and Commercial History of Europe

Mr. GRAY

Three credits (three hours per week); first semester. Optional with modern languages in Agricultural and Home Economic Courses in freshman year.

The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain; the effects of mechanical invention and political change on industry and trade.

Course 3a requires no preliminary course and may be taken advantageously with Course 1 or Course 26. (See Course 3b.) Given in 1912-13.

3b. Industrial and Commercial History of the United States

Mr. GRAY

Three credits (three hours per week); second semester. Optional with modern languages in Agricultural and Home Economics courses in freshman year.

Courses 3a and 3b are conducted each with a text-book, supplemented by lectures and prescribed topical readings. In each of these courses, one written report of considerable length will be required each semester. Given in 1912-13.

4. Advanced Economics

Mr. ROBINSON

Three credits (three hours per week); second semester. Open to those who have completed Course 1; required for a major in Economics and should be taken as soon as possible after Course 1.

An advanced course in economic theory, devoted chiefly to a study of recent theories of distribution. Assigned readings, reports, and discussions.

15. Business Organization

Mr. MITCHELL

Three credits (three hours per week); second semester. Open to those who have completed Course 1.

Forms of organization to effect business control; executive committees; the main departments of a business and the principles governing sub-departmentization and office organization of each. Based on Parson's *Business Administration*, with lectures, theses, and class discussions.

16. Principles of Accounting Mr. MITCHELL
 Three credits (three hours per week); first semester. Open to those who have completed Course 1.

Aims and essentials of a desirable system of accounts; tabular books and ledger systems; proper treatment of discounts, contingent liabilities and anticipated losses; depreciation; expense classification; preparation and interpretation of revenue accounts, balance sheets, and other business statements. A laboratory course, supplemented by lectures.

22. Principles of Rural Economics Mr. THOMPSON
 Three credits (three hours per week); second semester. Required of juniors in the Agricultural Course. Prerequisite, Economics 1.

Introductory survey of agricultural systems; comparison of rural and urban economy; a study of internal and external economies of agricultural industries, giving special attention to localization, marketing, land tenure and credit; the social and political aspects of rural economy. Lectures, assigned readings and written reports.

29. Seminar in the Economic Development of the Middle West Mr. ROBINSON

Three credits (three hours per week); second semester. Open to graduates, and to seniors who have credit in Economics 1 and 4. Courses 2b and 28 should also precede Course 29.

In 1912-13, members of the seminar will undertake original investigations relating to the development of various industries in the Middle West. In alternate years, attention will be given to the development of tax systems and present problems in taxation, viewed as functions of economic development. Reference reading, discussions, and thesis work.

33. Seminar in Agricultural Economics Mr. THOMPSON
 Six credits (three hours per week); both semesters. Open to graduate students and to seniors who have completed Courses 1 and 22.

Research problems in the marketing and distribution of farm products, agricultural credit, farm ownership and tenancy, and agricultural organizations.

EDUCATION

COLLEGE OF EDUCATION

GEORGE F. JAMES, Ph.D., Professor, Head of Department of Education
 125 Folwell Hall

FLETCHER H. SWIFT, Ph.D., Professor 300 Folwell Hall

Course 1b in Psychology and twelve additional credits in Education are required for the University teacher's certificate. Additional work in Education may be elected from other courses announced by that College.

1. History of Education Mr. SWIFT
 Three credits (three hours per week); first semester. Open to juniors and seniors.

An introductory study in the history of education conducted by means of lectures assigned readings, discussions, and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigations, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given

especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in Medieval times, the rise of the university and of the humanistic schools of the Renaissance.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

FORESTRY

COLLEGE OF FORESTRY

EDWARD G. CHEYNEY, B.A., Professor of Forestry, Chief of Division
3 1st fl. Horticulture Bldg.

10. Farm Forestry Mr. CHEYNEY
Three credits (three hours per week); first semester. Required of juniors for those specializing in Horticulture.

This course is designed to give a general definition of Forestry in its different branches, and in its relation to Agriculture. It takes up in detail the formation, care, and utilization of the woodlot, the planting and influence of windbreaks, the preservation of timber, and the principles which should underlie the selection of species and arrangement in ornamental planting around the homestead. Lectures, recitations, and reference reading.

FRENCH

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

CHARLES W. BENTON, Litt.D., Professor, Head of Department of Romance Languages 200 Folwell Hall
RENE M. DELAMARE, B.L., Instructor

1. Beginning French Mr. DELAMARE
Six credits (three hours per week); both semesters. Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French.

Thieme and Effinger, French Grammar and Reader; modern texts.

2. Intermediate French Mr. DELAMARE
Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

Francois, Advanced French Prose Composition; modern texts will be read, including some of the works of Coppee, Merimee, Daudet, Scribe, etc.

3. Scientific French Mr. DELAMARE
Six credits (three hours per week); both semesters. Open to those who have completed Courses 1 and 2.

This course is designed to acquaint students with French scientific journals.

GEOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

WILLIAM H. EMMONS, Ph.D., Professor, Head of Department of Geology and Mineralogy	108 Pillsbury Hall
EDWARD M. LEHNERTS, M.A., Assistant Professor	107 Pillsbury Hall
FRANK F. GROUT, M.S., Assistant Professor	102 Pillsbury Hall
A. WALFRED JOHNSTON, M.A., Instructor	112 Pillsbury Hall

1a. General Geology Messrs. EMMONS and JOHNSTON

Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors. The class is divided in four sections. High school or college Chemistry is a desirable antecedent, but is a prerequisite for one section only.

A synoptical treatment of the materials of the earth and of geologic processes; physiographic, structural, and dynamic geology, with a brief introduction to historical geology. Lectures, laboratory, field excursions, map study, and conferences.

2. Physiography Mr. LEHNERTS

Three credits (three hours per week); first semester. Open to freshmen.

This course is designed for the students in Agricultural and Forestry Courses; and the work includes: (1) The fundamental facts and principles of mathematical and physical geography and their relation to human industries; (2) minerals, rocks, and building stones; (3) ground and surface waters; (4) physiographic regions of the United States; (5) natural resources, their utilization and conservation; (6) map studies; (7) local field work; and (8) practical problems. Text-books, lectures, and reference reading.

3. Industrial Geography Mr. LEHNERTS

Three credits (three hours per week); second semester. Open to students who have completed Course 1a.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominant climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. Elements of Meteorology Mr. LEHNERTS

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Courses 1a or 2.

The general principles of meteorology are treated, embracing properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-books, lectures, and reference reading.

5. Geography and Geology of Minnesota Mr. JOHNSTON

Three credits (three hours per week); second semester. Open to students who have completed Course 1a.

The physical geography of the State in its relations to geological history and industrial development; the principles and facts of pre-Cambrian geology as exemplified in the State and the extension of these into general application; the present problems of the State in agriculture, drainage, water power, mining, quarrying, etc.

6. Elements of Mineralogy Messrs. BOWLES and GROUT
 Three credits (six hours per week); second semester. Open to freshmen, sophomores, juniors, and seniors who have taken high school Chemistry or are taking college Chemistry.

The systems of crystallization; the morphological, physical, and chemical characters of minerals; classification and description of common minerals; the occurrence, genesis, and use of minerals. Laboratory work, involving the application of chemical and blowpipe tests to the identification of species; determination of minerals by physical properties and sight identifications.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

JOHN G. MOORE, B.A., Professor, Head of Department of German	210 Folwell Hall
HANS JUERGENSEN, M.A., Assistant Professor	215 Folwell Hall
OSCAR C. BURKHARD, M.A. Assistant Professor	214 Folwell Hall
RICHARD WISCHKAEMPER, M.A., Instructor	216 Folwell Hall
LEON METZINGER, Ph.B., Instructor	

1. Beginning Mr. METZINGER
 Six credits (three hours per week); both semesters. Open to all who do not present German for entrance.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

- 3b. Scientific Intermediate Mr. METZINGER
 Six credits (three hours per week); both semesters. Prerequisite, Course 1.

This course is arranged to meet the peculiar needs of students of this College. Text: Hodges, Scientific German.

4. Prose and Poetry Messrs. MOORE, JUERGENSEN, BURKHARD, and WISCHKAEMPER
 Six credits (three hours per week); both semesters. Open to all who enter the University with two years of German.

Selections of prose and poetry, geography, history, and legend; review of German grammar throughout the year.

7. Advanced Scientific Reading Messrs. JUERGENSEN and BURKHARD
 Six credits (three hours per week); both semesters. Open to all who have taken Course 3 or 4.

Reading of scientific monographs and periodicals.

8. Seminar in Scientific Reading Mr. JUERGENSEN
 Two credits (two hours per week); open to graduate students and, by permission of the Department, to undergraduates who have completed Course 7.

1912-13. The literature of evolution (Haeckel, Reinke, etc.)

PHILOSOPHY AND PSYCHOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

NORMAN WILDE, Ph.D., Professor, Head of Department of Philosophy and Psychology	323 Folwell Hall
JAMES BURT MINER, Ph.D., Assistant Professor	317 Folwell Hall
DAVID F. SWENSON, B.S., Assistant Professor	320 Folwell Hall

1a. General Psychology Messrs. MINER, SWENSON, and WOODROW
Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors. This course is strongly advised as an introduction for all who can give a year to the subject. Either 1a or 1b is required for the teacher's certificate. Both semesters must be completed before credit is given for the first semester.

The aims and methods of psychology, the facts and laws of mental life and the functions of the various mental processes in the adjustment of man and his environment; the study of mental development and the learning process in relation to training and instinct.

1b. Elements of Psychology Mr. SWENSON
Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

For those who do not expect to take further work in psychology, but wish a brief outline of the subject, either as preparatory for work in philosophy or as part of their general education. The significance of mental facts for the problems of philosophy will be noted.

2. Logic Messrs. WILDE and SWENSON
Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

The nature of knowledge, the laws of reasoning, and the principles and methods of scientific proof. The aim of the course is to produce accuracy of thought as well as to familiarize the student with the logical grounds of modern science. Text-book, lectures, and reports.

11. Ethics Mr. WILDE
Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors who have completed Course 1a or 1b or Course 2.

An introductory study of the principles of morals. Sketch of the historical development of morality followed by an analysis of its meaning, showing the elements in human nature upon which it is based and the ground of its authority; the nature of goodness, the authority of conscience, moral knowledge, duty and responsibility; the application of moral principles to certain unsettled problems of moral life.

ZOOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

HENRY F. NACHTRIEB, B.S., Professor, Head of Department of Animal Biology	205 Pillsbury Hall
CHARLES P. SIGERFOOS, Ph.D., Professor	201 Pillsbury Hall
OSCAR W. OESTLUND, Ph.D., Assistant Professor	220 Pillsbury Hall
HAL DOWNEY, Ph.D., Assistant Professor	203 Pillsbury Hall
CHARLES E. JOHNSON, M.A., Instructor	2 Pillsbury Hall

1. General Zoology Messrs. NACHTRIEB and SIGERFOOS
Six credits (six hours per week); both semesters. Required of sophomores in Agricultural, Forestry, and Home Economics courses.

A general survey of the animal kingdom aiming at an appreciation of the principles of organization, physiology, and development of animals. In the laboratory representatives of the chief branches of the animal kingdom are studied in detail and three or four weeks are devoted to a study of the development of the chick and some invertebrates. Lectures, quizzes, and laboratory work.

2. Essentials of Histology and Embryology Mr. DOWNEY
Six credits (six hours per week); both semesters. Required of seniors in Animal Nutrition. Prerequisite, Zool. 1.

In this course are taken up the development and minute structure of the animal as an organism built up of tissue combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

4. General Physiology Mr. NACHTRIEB
Six credits (three hours per week); both semesters. Required of seniors in Animal Nutrition and Dairy Husbandry Courses. Elective for juniors in Home Economics Course. Prerequisite, Zool. 1.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relation to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

5. Comparative Anatomy of Vertebrates Mr. JOHNSON
Six credits (six hours per week); both semesters. Elective. Open to juniors and seniors. Prerequisite, Zool. 1 or its equivalent.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes, and laboratory work. Required text-books: Davidson's Mammalian Anatomy and Burkholder's Anatomy of the Brain.

12. Parasitology Mr. NACHTRIEB
Three credits (six hours per week); second semester. Open to those who have completed Course 1.

Can be combined with Course 10 for a year course. Reference and laboratory work on animal parasites, their structure, habits, life histories and economic importance.

14. Ornithology Mr. JOHNSON
Three credits (six hours per week); second semester. Open to those who have completed Course 1.

Lectures, quizzes, laboratory and field work on the structure, classification, nest building, food, habits, and distinction of birds; migration, coloration, flight, etc.; practical demonstrations of the preparation of birds and eggs for scientific purposes. Required: Chapman's Handbook of Birds of Eastern North America.

STUDENTS

POSTGRADUATES—16

Evans, Nevada S., 3637 10th Ave. S., Minneapolis	Roe, Ellen F., 2105 Scudder, Ave., St. Paul
Frear, Dana W., Fort Collins, Colo.	Salt, Clifford G., Columbus, Ohio
Harlan, Harvey V., Washington, D. C.	Stakman, Elvin C., 1485 Cleveland Ave., St. Paul
Hofmann, Julius V., Janesville	Thompson, Mark J., Winsted
Hungerford De Forest, Manhattan, Kans.	Tolaas, Arne G., 844 Jessamine St., St. Paul
Kenety, William H., Fulda	Walker, George W., 907 20th Ave. N. E., Minneapolis
Mayland, Edwin, Cokato	Westover, Edgar L., Brownell, Kans.
Kugimoto, Masaji, Tokyo, Japan	White, Frank, Excelsior

AGRICULTURE

SENIORS—8

Hagerman, William F., Morris	Olson, Andrew J., Renville
Husby, John, McIntosh	Peck, Frank W., University Farm, St. Paul
Jessness, Oscar B., Fosston	Sturges, Paul E., Buffalo
Johnson, F. Roy, Casselton, N. D.	Werner, Henry, Fulda

JUNIORS—21

Anderson, Arthur K., Montevideo	Nordberg, John Jr., 2628 E. 22nd St., Minneapolis
Bryan, William J., Red Wing, R. 2	Parker, John H., 1272 County Road, St. Paul
Bullock, Benjamin F., Breck School, Enfield, N. C.	Peterson, Clarence C., 2708 E. 22nd St., Minneapolis
Carpenter, Fred B., Sleepy Eye, R. 5	Plaisance, Gerald P., Stewart
Dahlberg, Robert C., Fergus Falls	Ricks, Nelson D., University Farm, St. Paul
Dvoracek, Daniel C., Glencoe	Rose, Raymond C., Duluth
Fitzpatrick, Guy, 1455 Cleveland Ave., St. Paul	*Rustad, Emil O., Black River Falls, Wis.
Hagen, Percy E., Janesville	Valleau, William Dorney, 2231 Scudder Ave., St. Paul
Hooper, Lynn Goodrich, 3830 N. Lyndale Ave., Minneapolis	Von Berg, Leonard E., Albert Lea
Kelley, F. John, Belle Plaine	Wilcox, Roy H., 5408 Nicollet Ave., Minneapolis
Morck, Hans M., Storden	

SOPHOMORES—41

*Anderson, Philip A. W., Forest Lake, Box 53	Clapp, Franklin C., Mankato, R. 4
Beach, Walter S., Hutchinson	Cleland, Spencer B., Waseca
Borst, Harold L., 1419 5th St. S. E., Minneapolis	Cole, Benjamin, Canby
*Borst, Milton, H., Windom	*Curran, James M., Thief River Falls
Brown, Leslie R., 1018 4th St. S. E., Minneapolis	Daniels, Franc P., 2112 Kenwood Parkway, Minneapolis
	Emerson, Arthur E., Glencoe

- *Farnquist, William C., 2215 22nd Ave. S.,
Minneapolis
- *Hanson, Harlow J., Hutchinson
Harrison, Harold F., Hallock
Ihle, John, Newfolden
Lashbrook, Alfred J., Northfield
Leaman, John W., 325 6th Ave., S. E.,
Minneapolis
Lovgren, Bernard N., Red Wing
McDonald, Arthur B., 866 Main St., Osh-
kosh, Wis.
Moore, Fred F., Stewart
Norcross, Everett W., 3122 Clinton Ave.,
Minneapolis
Oppel, Carl A., Fulda
Orsinger, Ward S., White Bear
Parker, Frederick L., 579 Rondo St., St. Paul
Peake, George W., Eagle Bend
Perkins, Alfred G., 1780 Wakefield Ave., St.
Paul
- Peterson, Algert L., Buffalo, R. 2
Piemeisel, Frank J., Jordan
Pinska, F. Harold, 1217 Dayton Ave., St.
Paul
Robbins, Leon H., Clearwater
Robertson, Lynn S., 1139 Raymond Ave.,
St. Paul
Schneiderhan, Felix D., Jordan
Sisler, Raymond L., Grand Rapids
Speer, Ray P., 1476 Chelmsford Ave., St.
Paul
*Stanek, Joseph A., Montgomery
Swedberg, Jasper I., White Bear
*Voak, Jay P., Worthington
Warber, Gustav P., St. Charles
Wilcox, William W., White Bear
Wilson, Donald, Stillwater
Wirth, Clarence A., 1700 3rd St. N., Minne-
apolis

FRESHMEN—51

- Anderson, Sophus H., 1485 Cleveland Ave.,
St. Paul
Bauman, Edwin E., Prior Lake
Brandt, George C., 680 Osceola Ave., St.
Paul
Bumgardner, Hugh K., 379 Lookout Place,
St. Paul
Burns, James F., 2320 Fremont Ave., S.,
Minneapolis
Campbell, Louis A., Chippewa Falls, Wis.
Clague, Eliot, 1502 Raymond Ave., St. Paul
Clarke, Harry E., 913 Eustis St., St. Paul
Cowie, G. Grey, 2057 Grand Ave., St. Paul
Dash, Victor A., Smithville
Derby, Paul E., 820 9th Ave. S. E., Minne-
apolis
Duxbury, Pierre S., 524 Ashland Ave., St.
Paul
Ferrell, T. Howard, Owatonna, R. 8
Flygare, J. Benjamin, Winthrop
Hacking, Robert W., 516 3rd Ave. S. E.,
Minneapolis
Hajicek, Mat P., Hutchinson
Hansen, George N., Bird Island
Holman, Peter A., 626 E. 18th St. Minneap-
olis
Howell, Thomas R., 2628 Garfield Ave. S.,
Minneapolis
Husby, Ingvar, McIntosh
Jahnke, Emil, Pepin, Wis.
Jesness, Martin, Fosston
Johnsrud, Peder L., Spring Grove, R. 3
Kalash, William C., Lakefield
Keene, Purley L., Mankato, R. 6
Kingsley, Daniel P., 2322 Bryant Ave. S.,
Minneapolis
- Larson, Homer A., Fosston
Ludlow, H. Dwight, Worthington
Lundholm, Arthur, 677 University Ave.,
St. Paul
McLean, Robert, 2217 Colfax Ave. S., Min-
neapolis
MacGilvra, Everett E., 1208 Raymond Ave.,
St. Paul
Meck, Calton, L. B., 913 Sims St., St. Paul
Morlan, Ogden C., 1921 Irving Ave. S.,
Minneapolis
Murphy, Eugene E., Lakefield
Nelson, Arthur E., Hallock
Nelson, Nelof, Dawson
Neutson, Earl J., 3037 Fremont Ave. S.,
Minneapolis
O'Brien, Harold T., 2325 Buford Ave., St.
Paul
Orsinger, Remington, White Bear
Peterson, R. Maynard, University Farm, St.
Paul
Schryver, Lloyd L., 900 30th Ave. N., Min-
neapolis
Searles, Harold R., Rochester
Stephl, Otto E., 1107 S. 11th St., La Crosse,
Wis.
Stryker, Perin, 1280 River Blvd., St. Paul
Thompson, Samuel H., Hutchinson
Uiland, Selmar A., Blooming Prairie
Walker, Roy C., 2000 Hennepin Ave., Min-
neapolis
Weiss, Freeman, 1602 N. Fremont Ave.,
Minneapolis
Wells, F. Grant, 2248 Carter Ave., St. Paul
Wilson, Thomas, Dover
Zavoral, Henry G., Hutchinson

HOME ECONOMICS COURSE

SENIORS—14

Adams, Emma T., Owatonna	McIntosh, Marguerite F., 201 Cleveland Ave. N., St. Paul
Best, Emir, 1111 3rd Ave. S., Fargo, N. D.	Morton, Agnes, Elmwood, Ill.
Brooks, Elizabeth F., Grand Rapids	Mueller, Martha J., 979 Hudson Ave., St. Paul
Collier, Ava I., 806 4th St. S. E., Minneapolis	Ober, Catherine, 643 Washington St. N. E., Minneapolis
Cornish, Ruth, Vernon Center	Thompson, Katherine G., 1015 13th Ave. S. E., Minneapolis
Drew, Cosette, 5224 41st Ave. S., Minneapolis	Williams, Ruth J., St. Louis Park, R. 1
Hopkins, Rachel, R. 1, Sta. F., Minneapolis	
Larson, Elvira C., 301 6th St. S., Minneapolis	

JUNIORS—10

Campbell, Ruth E., 220 Nelson Ave., St. Paul	Hawkinson, Julia D., St. James
Carlson, Gudrun I., 413 Delaware St. S. E., Minneapolis	Rogers, Ethel, Windom
Duncan, Janet K., 806 4th St. S. E., Minneapolis	Smith, Ethel A., 1401 W. 36th St., Minneapolis
Gray, Grace A., River Falls, Wis.	Snell, Ella May, 403 Dewey Ave., St. Paul
Hall, Ruth M., 981 Bayless Ave., St. Paul	Sorlien, Ella H., 524 13th Ave. S. E., Minneapolis

SOPHOMORES—32

Allison, Minnie S., Milaca	*Knopp, Marguerite F., 215 E. Robie St., St. Paul
Baird, Edna P., Stanford, Ill.	Krache, Genevieve E., Pine Island
Bean, Agnes L., 1815 Como Ave. S. E., Minneapolis	Lewis, Rhoda, 698 Ashland Ave., St. Paul
Bede, Retta, Pine City	Lovett, Ruth E., 3236 Lyndale Ave., Minneapolis
Brown, Beryl B., 1531 7th St. S. E., Minneapolis	Maxwell, Mirdyaleen, Fulda
Burgan, Genevieve L., 2315 Sheridan Ave. N., Minneapolis	Muir, Jean I., 1811 Como Ave. S. E., Minneapolis
Cunningham, Leola, Buffalo	Nelson, Julia A., Evansville
Fraiken, Imadee M., 2745 17th Ave. S., Minneapolis	Olson, J. Adelia, Triumph
Fraser, Mary J., 17 E. 27th St., Minneapolis	Potter, Olive M., Springfield
Green, Mrs. Etta, Mallory	Sheire, Caroline M., 1167 Chatsworth St., St. Paul
Hall, Saidee L., Cambridge, Wis.	Sherwin, Rena M., Monticello
Hillman, Alice M., 396 Dewey Ave., St. Paul	Simmons, Marjorie M., 3000 S. Knox Ave., Minneapolis
*Hubbard, Elizabeth D., Excelsior	Sly, Florence A., 2933 3rd Ave. S., Minneapolis
*Johnson, Elizabeth W., 59 Seymour Ave. S. E., Minneapolis	Streed, Anna M., Little Falls
Keller, Martha K., Dundas, R. 1.	Ulland, Amelia O., Blooming Prairie
Wilson, Leila E., Gridley, Ill.	Upson, Ada L., Lake Crystal

FRESHMEN—83

Ackley, Louise C., 925 17th Ave. S. E., Minneapolis	Babcock, Doris A., 95 Langside, Winnipeg, Man., Canada
Amidon, Muriel M., Houston	Barton, Elizabeth C., 141 E. 25th St., Minneapolis
Anderson, May S., Milaca	

- Birmingham, Myra F., 1567 W. 7th St., St. Paul
 Boeckh, Bernice C., Lansing, Iowa
 Boeckh, Martha L., Lansing, Iowa
 Bumgardner, Helen E., 379 Lookout Place, St. Paul
 Burnham, Alice M., Detroit
 Carter, M. Luella, Deer River
 Chladek, Elizabeth A., Tyndall, S. D.
 Collopy, Rose L., Hazel Park, St. Paul
 Conley, Ora K., Cannon Falls
 Corneliusen, Clara, Benson
 Crosman, Flossie M., 3628 4th Ave S., Minneapolis
 Cummings, Marguerite M., 11 Summit Court, St. Paul
 Day, Ruetta T., St. James
 Dostal, Vera G., 1026 24th Ave. N. E., Minneapolis
 Dunphy, Mary, 832 Holly Ave., St. Paul
 Eddy, Josephine L., Morris
 Ellison, Viola M., Monticello
 Engstrom, Mildred L., Cannon Falls
 Forester, Helen, 3656 Portland Ave., Minneapolis
 Fortier, Ruth A., 2819 Pleasant Ave. S., Minneapolis
 Foster, Inez M., Big Lake
 Fulford, Ida F., Sioux Falls, S. D.
 Gillard, Marion S., 1671 Marshall Ave., St. Paul
 Glotfelter, Helen, Waterville
 Goff, Mary E., Mapleton
 Grannis, Margaret V., 4729 McCullough St. E., Duluth
 Hale, Helen F., 1723 Dayton Ave., St. Paul
 Helbing, Cleora C., Glenwood
 Holiday, Lora C., Carrington, N. D.
 Hough, Susan A., 1854 Rondo St., St. Paul
 Howard, June E., 1281 Raymond Ave., St. Paul
 Howard, Nina, 1281 Raymond Ave., St. Paul
 Hunter, Bessie B., Red Wing
 Idtse, Anna S., Ada
 Jacobson, Gladys G., 1057 18th Ave. S. E., Minneapolis
 Joyce, Margaret A., 77 Summit Ave., St. Paul
 Kadlec, Ethel S., Glencoe
 Kane, Grace F., 1637 Penn Ave. N., Minneapolis
 Keenan, Angeline V., 2627 W. 44th St., Minneapolis
 Keogan, Eva E., 615 9th Ave. S. E., Minneapolis
 Kilgore, Rachel E., 710 7th St. S. E., Minneapolis
 Kingsbury, Hazel A., Monticello
 Larson, Carrie P., Atwater
 Lee, Marjorie W., Stillwater
 Lenning, Gladys C., 1604 E. Superior St., Duluth
 Lokke, Josie M., Grand Meadow
 Loomis, Florence M., Wells
 Lubiens, Irma V., St. Ansgare, Iowa
 Lynner, Ingine, Clarkfield
 Maclean, Marjorie, 2641 Fremont Ave. N., Minneapolis
 Morgan, Georgetta, Zumbrota
 Morgan, S. Edith, Zumbrota
 Nelson, Hannah C., 504 Union Ave. N., Fergus Falls
 Neudeck, Mabel C., 1900 Rondo St., Merriam Park
 Nobles, Carrie V., Sumter
 Noggle, Beth M., Sioux Falls, S. D.
 Olsen, O. Antoinette, 822 7th St. S. E., Minneapolis
 Olson, Florence E., 1287 De Soto St., St. Paul
 Papez, Mary A., Hector
 Peters, Claribel C., 94 W. George St., St. Paul
 Phelps, Ethelwynn, 1306 57th Ave. W., Duluth
 Phillips, Birdine M., Lansing
 Reed, Jessie F., 4218 London Road, Duluth
 Russ, Ethel O., Robbinsdale
 Rutherford, Margaret E., 3309 1st Ave. S., Minneapolis
 Sampson, Myrtle L., 911 17th St., Minneapolis
 Seager, Marion, Cannon Falls
 Severson, Cora H., 2074 Marshall Ave., St. Paul
 Simerman, M. Ruth, 1823 St. Anthony Ave., St. Paul
 Smollett, H. Vera, 3115 Harriet Ave., Minneapolis
 South, Margaret A., 316 17th Ave. S. E., Minneapolis
 Spencer, Ruth A., 408 18th Ave. S. E., Minneapolis
 Strong, Gertrude, 2 E. George St., St. Paul
 Swendsen, Helga M., 311 Walnut St. S. E., Minneapolis
 Symons, Stella, 2195 Carter Ave., St. Paul
 Tosdal, Hannah L., Northwood, Iowa
 Wallace, Luella, 228 5th Ave. S., Faribault
 Wood, Viola, 636 Harvard St., St. Paul

TEACHERS' NORMAL COURSE—64

- Anderson, Mabel, 2906 2nd Ave. S., Minneapolis
 Atkinson, Beatrice, 311 Lincoln St., Hibbing
 Barnes, Ruth, Vernon Center
 Brodeen, Vivian, Stillwater
 Bryson, Sadie Belle, Helena, Mont.

- Carlson, Gudrun, 413 Delaware St. S. E.,
Minneapolis
- Coffin, Mildred L., 3212 Clinton Ave., Min-
neapolis
- Dahleen, Esther V., Maynard
- Dahlen, Anne C., Detroit
- Dalton, Elsie, Waseca
- Dorsey, Lucy G., 808 4th St. S. E., Minne-
apolis
- Duncanson, Geneva, Stewartville
- Erickson, Ellen J., Alexandria
- Erickson, Helen I., Canby
- Ford, Frances A., 245 Irving Ave. N., Min-
neapolis
- Ford, Olive M., 245 Irving Ave. N., Min-
neapolis
- Gaus, Glendora A., 1906 E. 31st St., Min-
neapolis
- Gibbons, Hazel M., 1308 7th St. S. E., Min-
neapolis
- Green, Clair E., 1417 E. 3rd St., Duluth
- Griswold, Florence I., Dodge Center
- Griswold, Mary E., 107 West Island Ave.,
Minneapolis
- Hagerman, Charlotte W., Morris
- Hartney, Agnes J., Maynard
- Hasselberg, Edna P., 2101 27th Ave. S.,
Minneapolis
- Hensel, Elsie V., Farmington
- Hillman, Alice M., 396 Dewey Ave., St.
Paul
- Houghtaling, Frances J., Fairmont
- Johnson, Esther A., Red Wing
- Johnson, Gertrude V., 1005 Lincoln Ave.,
St. Paul
- Johnson, Sadie, Redwood Falls
- Johnston, Marie T., Mitchell, S. D.
- Kenety, Ella C., Fulda
- King, Genevieve R., 2138 Knapp St., St.
Paul
- Lillesve, Louise, McIntosh
- Loyhed, Kathryn, Faribault
- Lundquist, Edith A., St. James
- McFadden, Nellie M., 109 54th Ave. E.,
Duluth
- McKinstry, Donna, 618 15th St. E., Minne-
apolis
- Maricle, Ethel, Wells
- Marks, Eva E., Moorhead
- Marsden, Alice L., Fairmont
- Mattson, Edith A., Warren
- Murphy, Frances, Faribault
- Nelson, Dora N., Cloquet
- Newhall, Margery A., Clinton Falls
- Nordberg, Mabel, 2628 E. 22nd St., Minne-
apolis
- Pickett, M. Elizabeth, 1611 West 32nd St.,
Minneapolis
- Root, Mary C., Omro, Wis.
- Rosche, Frances A., 315 N. Owens St., Still-
water
- Scott, M. Alice, 3032 Dupont Ave. S., Min-
neapolis
- Shephard, Lucile C., 2531 Grand Ave.,
Minneapolis
- Stake, Edna M., Anoka
- Swanson, Millie H., Warren
- Swenson, Emma M., Willmar
- Timberlake, Lucile, 1015 8th St. S. E., Min-
neapolis
- Tonkin, Bessie G., Ely
- Train, Lilah M., Browns Valley
- Turner, Amelia H., St. Peter
- Walters, Marion L., 3005 Emerson Ave. S.,
Minneapolis
- Webster, Agnes I., 515 5th Ave. S. E., Min-
neapolis
- West, Elizabeth A., 1898 Selby Ave., St.
Paul
- Wheeler, Harriet F., Sauk Center
- Willis, Ethel J., 467 Brown Ave., St. Paul
- Wright, Gladys B., 2616 5th Ave. S., Min-
neapolis
- Wyre, Nina A., St. James

SPECIALS—12

- Bailey, Clyde H., 251 15th Ave. N., Minne-
apolis
- Case, Florence D., West Allis, Wis.
- Erstad, Andrew, Zumbrota
- French, Mrs. R. W., 1035 13th Ave. S. E.,
Minneapolis
- Johnson, Fred O., 1459 Gibbs Ave., St. Paul
- Lane, Dwight J., Minnetonka, R. 2
- McBroom, John K., Excelsior
- McClure, Lola, University Farm, St. Paul
- MacComber, Mrs. Olive B., 1393 Cleveland
Ave., St. Paul
- Polk, Grace E., 2435 Harriet Ave., Minne-
apolis
- Roy, Bijoy K., Calcutta, India
- Smith, Greta E., 2620 5th Ave. S., Minne-
apolis

COLLEGE SUMMER SCHOOL—70

- Alexander, William A., Grand Meadow
- Anderson, Joseph E., Amboy
- Ash, Adair, Wendell
- Bailey, S. P., 365 W. 5th St., Winona
- Bergh, Maybelle, Spring Grove
- Best, Emir, Fargo, N. D.

- Bowman, Edith, Dodd Road, St. Paul
 Brown, Leslie R., 1018 4th St. S. E., Minneapolis
 Christianson, Mary, Langby
 Church, Clara G., Madelia
 Cooper, Mrs. Edith, Dodge Center
 Corneliusen, Clara, Benson
 Critchett, Francis E., 611 13th Ave. S. E., Minneapolis
 Denissoff, Mrs. Mary, 1480 Raymond Ave., St. Paul
 Doyle, Sister Madeline, Graceville
 Engson, Edward, Clarkfield
 Espeseth, Anna, Erskine
 Farrell, Margaret A., Franklin
 Fletcher, Margaret, Sta. F. R. 2. Minneapolis
 Halverson, C. Alfred, Revere
 Hanson, Amanda J., Anoka
 Hart, Margaret A., New Richland
 Hill, Robert A., Ortonville
 Huff, Susie, 3905 6th St. N., Minneapolis
 Hummel, Mollie H., Dundas
 Ihle, John, Newfolden
 Jacobson, Albert S., 1516 7th St S. E., Minneapolis
 Johnson, Mathilde M., New Ulm
 Johnson, Nina P., Fairmont
 Johnston, Isabel, Chatfield
 Kakuschke, Emma, Waseca
 Kelley, John F., Belle Plaine
 Kingsley, Aura, Bricelyn
 Knowles, Leigh, Mantorville
 Koessler, Rudolph F., Le Sueur
 Kusske, Bertha, Gaylord
 Loomis, Veda H., 1063 13th Ave. S. E., Minneapolis
 MacComber, Mrs. Olive, 1393 Cleveland Ave., St. Paul
 Moore, Hans G., Elmore
 Nelson, Gunella, Hanska, R. 2, Box 35
 Nelson, Nelof, Dawson
 Parent, Gust Jr., Parent
 Parker, Mandana, Granada
 Pease, Elva, Lampson, Wis.
 Petterson, Huldah O., Cottonwood
 Rea, Garnet, 24 S. St. Albans St., St. Paul
 Robison, Grace E., Windom
 Roe, Ellen F., 2105 Scudder Ave., St. Paul
 Rogers, Caroline, 1429 6th St. S. E., Minneapolis
 Rovang, Ida, Erskine
 Salt, Clifford G., 1915 Hennepin Ave., Minneapolis
 Scheer, Lydia, Howard Lake
 Schlutz, Dorothy, New Richland
 Scott, Robert E., Byron
 Sly, Florence A., 2933 3rd Ave S., Minneapolis
 Snortum, K. O., Canby
 Snortum, S. I., Canby
 Stallard, Harvey, 2357 Carter Ave., St. Paul
 Sweet, Earl, Blue Earth
 Tang, Severt O., Hawley
 Thompson, Alice E., 1015 13th Ave. S. E., Minneapolis
 Thrall, Addie F., Curtis Court, Minneapolis
 Tisdale, Julia, 1540 Raymond Ave., St. Paul
 Todd, Florence, 225 Langford Ave., St. Paul
 Trautman, Olivia, 323 6th Ave. S., E. Minneapolis
 Warber, G. P., St. Charles
 Wier, Amelia, 624 15th Ave. S., E. Minneapolis
 Williams, Mary L., 317 Hennepin Ave., Minneapolis
 Wilson, John A., 410 17th Ave. S. E., Minneapolis
 Zengerle, Teresa E., Stillwater

INDEX

Absences	21
Accredited Schools	16
Administration: Rules Governing	19-25
Admission: Rules Governing	13-18
Admission Groups	14
Agricultural Club	28
Agricultural Course, General	35
Agricultural Chemistry and Soils, Departmental Statement	41-44
Equipment	30
Agricultural Engineering: Departmental Statement	44-46
Equipment	30
Agriculture: Departmental Statement	39-41
Equipment	29
Agronomy: Senior year in	36
Animal Husbandry: Senior Year in	36
See Dairy and Animal Husbandry	
Animal Nutrition: Senior Year in	36
See Dairy and Animal Husbandry	
Athletics: Eligibility Rule	23
Calendar	4-6
Certificates: Professional	24
Classification of Students	20
Class Parties	25
Committees: Faculty	11
Conditions	23
Control of Classes	21-22
Courses of Study	35-38
Daily Routine	21
Dairy and Animal Husbandry, Departmental Statement	47-51
Equipment	30
Dairy Club	28
Dairy Husbandry: Senior Year in	36
See Dairy and Animal Husbandry	
Debate: Eligibility Rule	23
Degrees: Requirements for Bachelor's	24
For Graduate	26
Delinquents: Rules Governing	22-24
Departmental Statements	39-72
Disturbances	24
Domestic Art	51-53
Domestic Economics	53-54

Domestic Science.....	54-55
Dramatic Club: Eligibility Rule.....	23
Drill; See Military Drill	
Electives.....	19
Eligibility Regulations.....	23
Enrollment; See Admission	
Entomology: Departmental Statement.....	55-56
Equipment.....	31
Equipment (See Separate Divisions)	
Examinations.....	21
Extra Work.....	19
Faculty: College of Agriculture.....	9-11
Committees.....	11
Meetings.....	24
Failures.....	23
Fees.....	20
Fines.....	21
Graduate Work and Degrees.....	26
Graduation: Requirements for.....	24
Home Economics: Association.....	28
Home Economics Course.....	37-38
Horticulture: Departmental Statement.....	57-58
Equipment.....	32
Senior Year in.....	37-38
Incompletes.....	23
Instructions to Prospective Students.....	13
Judging Contests: Eligibility Rule.....	23
Leave of Absence.....	21
Library: Departmental Statement.....	58-59
Equipment.....	28
Literary Societies.....	27
Military Drill.....	33
Excused from.....	24
Officers: Executive.....	8
Oratory: Eligibility Rule.....	23
Pedagogs.....	59
Petitions.....	24
Physical Training.....	59
Poultry; See Dairy and Animal Husbandry.....	31, 47
Prizes.....	26
Probation.....	22
Professional Certificates.....	24
Regents.....	8
Registration.....	19-21
Rhetoric.....	60
Scholarships.....	26
Seniors (Special Rules).....	23
Soils; See Agricultural Chemistry and Soils	

INDEX

81

Special Sciences (Senior Year).....	36
Student List.....	73
Student Organization.....	25
Unclassed Students.....	20
Schools and Colleges.....	7
Vegetable Pathology and Botany, Departmental Statement....	60-61
Equipment.....	33
Veterinary Medicine and Surgery, Departmental Statement ...	61-62
Equipment.....	34

The University of Minnesota

THE COLLEGE OF EDUCATION

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 10. JULY 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

1912							1913													
JULY							JANUARY							JULY						
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST						
..	..	..	..	1	2	3	..	..	..	..	..	..	1	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..	..	..
SEPTEMBER							MARCH							SEPTEMBER						
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	..	..	..	..	..	..
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	..	..	..	..	..	..	30	31	..	..	..	..	..	..	..	..	..	..	..	..
OCTOBER							APRIL							OCTOBER						
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER						
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..
DECEMBER							JUNE							DECEMBER						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
Sept. 30 - Oct. 5		Week	Second semester condition examinations
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
March 31-Apr. 5		Week	First semester condition examinations
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday, Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
	2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday, Sept. 11	9 a. m.	English
	2 p. m.	German, French, Latin, Scandinavian
Thursday, Sept. 12	9 a. m.	Elementary Algebra
	2 p. m.	Higher Algebra
Friday, Sept. 13	9 a. m.	Plane Geometry
	2 p. m.	Solid Geometry

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.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery
ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
GEORGE F. JAMES, Ph.D., Dean of the College of Education
HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
ADA L. COMSTOCK, M.A., Dean of Women

COLLEGE OF EDUCATION

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.
GEORGE F. JAMES, Ph.D., Dean and Professor of Education
316 10th Ave. S. E.
DAVID L. KIEHLE, LL.D., Professor of Education, Emeritus
266 25th St. N., Portland, Ore.
ALBERT W. RANKIN, B.A., Professor of Education 916 5th St. S. E.
FLETCHER HARPER SWIFT, Ph.D., Professor of Education
*EDWARD G. QUIGLEY, B.A., Assistant Professor of Education
†SAMUEL QUIGLEY, M.A., Assistant Professor of Education
916 5th St. S. E.
JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
1115 5th St. S. E.
JOHN G. MOORE, B.A., Professor of German
2810 University Ave. S. E.
WILLIAM H. EMMONS, Ph.D., Professor of Geology 1120 6th St. S. E.
CHARLES W. BENTON, M.A., Litt.D., Professor of French
516 9th Ave. S. E.
JOSEPH M. THOMAS, Ph.D., Professor of Rhetoric 623 14th Ave. S. E.
JOHN CORRIN HUTCHINSON, B.A., Professor of Greek
3806 Blaisdell Ave.
HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
905 6th St. S. E.
CHARLES PETER SIGERFOOS, Ph.D., Professor of Animal Biology
1023 University Ave. S. E.
RICHARD BURTON, Ph.D., Professor of English 2109 Blaisdell Ave.
JOHN ZELENY, Ph.D., Professor of Physics 712 10th Ave. S. E.
GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
525 E. River Road
‡WILLIS M. WEST, M.A., Professor of History Grand Rapids, Minn.
JOHN J. FLATHER, Ph.B., M.M.E., Professor of Mechanical Engineering
315 11th Ave. S. E.
FRANCIS P. LEAVENWORTH, M.A., Professor of Astronomy
317 17th Ave. S. E.
JOSEPH BROWN PIKE, M.A., Professor of Latin 525 10th Ave. S. E.

*Absent on leave for 1912-13.

†Substitute for 1911-13.

‡Resigned June 1, 1912.

SAMUEL G. SMITH, Ph.D., LL.D., Professor of Sociology	The Aberdeen, St. Paul
NORMAN WILDE, Ph.D., Professor of Philosophy and Psychology	901 6th St. S. E.
WILLIAM A. SCHAPER, Ph.D., Professor of Political Science	625 Fulton St. S. E.
FREDERIC E. CLEMENTS, Ph.D., Professor of Botany	800 4th St. S. E.
*JOHN HENRY GRAY, Ph.D., Professor of Economics	412 Walnut St. S. E.
EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics	827 7th St. S. E.
ANDREW A. STOMBERG, M.S., Professor of Scandinavian	531 Walnut St. S. E.
CARLYLE M. SCOTT, Professor of Music	36 S. 13th St.
LOUIS J. COOKE, M.D., Director of Gymnasium	909 6th St. S. E.
JOHN B. JOHNSTON, Ph.D., Professor of Neurology	715 Fulton St. S. E.
EDWARD M. LEHNERTS, M.A., Assistant Professor of Geography	800 4th St. S. E.
DEXTER D. MAYNE, Principal of the School of Agriculture	University Farm, St. Paul
JAMES BURT MINER, Ph.D., Assistant Professor of Philosophy	428 Walnut St. S. E.
S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construction	1517 E. River Road
JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science	1120 6th St. S. E.

INSTRUCTORS

MARGARET BLAIR, Domestic Art	1403 Cleveland Ave., St. Paul
FRANCES BLAKE, B.A., Practice School	2413 Bayless Ave., St. Paul
JESSIE W. BOYCE, B.A., Practice School	1112 4th St. S. E.
†ANNA M. BUTNER, Physical Culture	65 11th St. S.
HENRIETTE CLOPATH, Drawing	813 Fulton St. S. E.
CHARLES M. HOLT, B.A., Education	32 Spruce Place
LAURA FRANCES KENDALL, Music	3529 Blaisdell Ave.
ALICE J. MOTT, Ph.D., Principal of the Practice School	423 Beacon St. S. E.
WILLIAM H. RICHARDS, Sloyd and Woodwork	1423 W. 27th St.
JUNIATA SHEPPERD, Domestic Science	1385 Raymond Ave., St. Paul

*Absent on leave, February 1, 1912 to February 1, 1913.

†Until June, 1912.

GENERAL INFORMATION

The College of Education was authorized by a special enactment of the Legislature of Minnesota in 1905, and was established by the Regents of the University in the following year.

It offers both 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.

ADMISSION

Entrance examinations are held only at the beginning of the college year. Students prevented from entering at that time may be admitted later if the circumstances justify this action. Such students are, however, at a great disadvantage, and all students expecting to enter the College are urged to be present at the beginning of the year.

All applicants should present themselves to the Registrar, who will furnish them with application blanks and directions for their examinations and registration.

CONDITIONS OF ADMISSION

Students who plan to enter the College of Education are advised to consult with the Dean of that College in regard to their course of study during their first year of college study. When they have completed with credit at least two full years of college work, they will be admitted to this College. During these two years they should have pursued one or more of the subjects which they expect to teach and, in addition, one year in general psychology.

ADMISSION TO ADVANCED STANDING

I. From Other Colleges

This College accepts records from all colleges of equal rank for credit to advanced standing. All candidates for graduation must, however, meet the conditions established by this College as indicated in a succeeding paragraph.

II. From Minnesota Normal Schools

Graduates of the Advanced Graduate Course (two years beyond the high school) of a Minnesota state normal school who present the individual recommendation of the normal school president will be admitted directly to the College of Education and will receive sixty credits toward

the bachelor's degree. These credits will be reckoned as about evenly distributed between liberal and professional study. Graduates of either of the five-year courses of a Minnesota state normal school will be admitted directly to the College of Education, on the recommendation of the normal school president, with an allowance of forty-two credits toward graduation. They will be reckoned as unclassified students until they have secured eighteen additional credits.

The program of every student for each semester is subject to the approval of the Dean, and normal school graduates who plan to enter upon university study are expected to consult with him as far as possible in advance of matriculation.

UNCLASSIFIED STUDENTS

Applicants who present satisfactory reasons for not taking the regular course may be admitted as unclassified students upon proof of fitness to profit by the work. The same general attainments are expected of these students as are required of those who enter the regular course. Unclassified students must take the same number of hours as regular students, except that men and women actually engaged in teaching may be allowed to enter for a less amount of work upon the approval of the committee in charge.

EXAMINATIONS

At the close of each semester examinations are held and students are reported as *excellent*, *good*, *passed*, *incomplete*, *conditioned*, or *failed*. An *incomplete* must be removed within one month from the opening of the following semester, or it becomes a *condition*.

A *condition* not made up before the subject is offered again becomes a *failure*, subject to rules governing failures. *Failures* must be pursued again in class. A student who at any time is deficient in more than half a year's work loses his class rank and is regarded as a member of the next lower class. Students whose absences in any term exceed four weeks in the aggregate are not permitted to take the term examinations without special permission of the Faculty.

FAILURE TO KEEP UP WITH THE CLASS

Any student receiving conditions or failures in 60 per cent of the work of the first semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the following year.

Any student failing to pass in one-half of the work of any year shall not be allowed to register until reinstated by action of the Faculty upon recommendation of the committee in charge.

FEES

All students in the College who are residents of the State are charged an incidental fee of fifteen dollars a semester. This incidental fee includes all laboratory expenses. Non-residents are charged double the fee required of residents of the State, or thirty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. A penalty fee of one dollar must be paid by all students who register or pay fees after the prescribed time. (See calendar page 3.) After the day previous to that on which classes begin, the penalty for delay increases at the rate of twenty-five cents per day.

In accordance with a regulation of the Board of Regents students of all colleges of the University are required to have a box in the University post-office, for which a rental charge of fifty cents a year is made. Assignment of boxes is made at the time of registration.

A deposit fee of five dollars is required of each student at the beginning of the first semester; against this deposit are charged rental of post-office box and lockers, all penalties for late registration or late payment of fees and condition examination fees. The unused balance is returned at the end of the year. If, at any time during the year, the charges against a student exceed the amount of the deposit, a second deposit of five dollars will be required.

COURSES OF STUDY

The College of Education offers a two-year course of study leading to the degree of Bachelor of Arts (in Education). The preparation for teaching which is afforded in these two years, in addition to two years of previous collegiate study, is planned to include first of all a thorough grounding in the correct use of English, both spoken and written. No student should propose to go into his work without adequate training of this kind, no matter what subjects he himself expects to teach, and no one will be graduated from the College of Education who has not attained a satisfactory standard in this particular.

A second element in the preparation of the future teacher is found in the courses in general and educational psychology, in the history and the organization of schools, in educational theory, and in the practice of teaching. Courses in psychology and in the history of education should be pursued by all students, and additional courses are elective in the theory and the practice of elementary and secondary teaching, in the history of secondary education, in school organization and law, and in school hygiene.

Another part of the teacher's training is found in the specific subjects which he proposes to teach. In this particular the standard in Minnesota schools is constantly rising, and year by year school trustees are asking of all high school teachers more definite and adequate preparation in the subjects assigned them. This preparation is not possible unless the prospective teacher selects his subjects early in the college course and

effects also a desirable and natural combination. When this is done, the work required for a bachelor's degree may be arranged to give both a liberal and a special training.

A third year of study leads to the degree of Master of Arts. The work of this year includes advanced studies in education and in philosophy, and in one or more of the subjects of the secondary curriculum at the option of the candidate. The course is planned especially for those holding the degree of Bachelor of Arts who desire to prepare themselves more carefully either for high school teaching or for work as principals and superintendents. Young men and young women who propose to take up this work permanently will find it advisable to do graduate study either immediately upon receiving the bachelor's degree or after a period of practical experience in teaching.

THE DEGREE OF BACHELOR OF ARTS (IN EDUCATION)

The degree of Bachelor of Arts (in Education) is granted to candidates on the following conditions:

A. The completion of college courses amounting to one hundred and twenty (120) credits, in addition to the required exercises in drill, gymnasium, and physical culture. The courses selected must be approved by the committee in charge. No student shall elect less than fifteen or more than eighteen hours per week without special permission. A credit is one hour per week through one semester.

B. They must have completed Philosophy 1a or 1b and Courses 1 and 2 or Course 3 in Education with additional work in Education so as to make a total of eighteen (18) credits including those specified in Philosophy.

C. Enough courses shall be taken in at least three departments concerned with the work of the secondary school to secure one major and two minor recommendations. Each minor recommendation will require not less than twelve (12) credits and each major not less than eighteen (18) credits in one department. Only in exceptional cases will the minimum mentioned be accepted. Usually the minor will demand from fifteen to eighteen credits, with a corresponding increase for the major, depending upon the combination which the student has selected with a view to future teaching.

D. Each candidate for graduation must show an average of scholarship through four years of college work indicated by at least as many marks of *good* as of *pass*, and must be counted as *good* by the department which recommends him.

E. A maximum of eighteen credits is elective from the laboratory and shop courses in the Manual Arts and Agriculture, but, in addition, credit is allowed for allied courses toward the bachelor's degree in the case of students who desire to specialize in Manual Training, Domestic Art, Domestic Science, or Agriculture.

GRADUATION WITH DISTINCTION

The bachelor's degree with distinction is granted to students of this College on the following conditions:

A. The degree with distinction is based on special excellence in the major subject.

B. Students who wish to be candidates for this degree must register before the beginning of the senior year, and are advised to register upon entering the College.

C. At the time of application the student must have an average of *good* in all of his previous work. (For the purpose of this count one *excellent* shall balance one *pass*.)

D. To receive the degree with distinction the student must meet all the conditions applying to the ordinary degree, must show a record higher than *pass* in four-fifths of all his work, must present a satisfactory thesis upon his major subject by May first of the senior year, must comply with the special requirements of the department chosen, must be recommended to the Faculty for special excellence, and be approved by the vote of the Faculty.

OBSERVATION AND PRACTICE TEACHING

The critical observation of good teaching and the practice of teaching under skilled supervision form a most important part of the preparation of the teacher. In connection with two courses on the practice of elementary and secondary teaching, opportunity was given students during two or three years to observe and to discuss the best methods of teaching employed in the public schools of Minneapolis, St. Paul, and adjacent towns. This plan was adopted as the only feasible substitute at that time for adequate opportunities in the way of observation and of practice. These opportunities, it was recognized from the first, can be furnished only in a school organized under the direct control of this College.

In November, 1907, a small school was installed in temporary quarters provided by the Regents, and during that academic year classes were conducted in seventh grade and in eighth grade work. In September, 1912, the school will be ready to enroll pupils from the seventh grade to the twelfth grade inclusive. The primary purpose in this school is to afford prospective high school teachers an opportunity for seeing the work of the secondary schools conducted under normal conditions in as efficient a way as possible, in order that they may gain by observation and, to some extent, by practice, familiarity with the instruction and management proper to a school of this grade. In addition, a fully graded elementary school, with kindergarten, ungraded room, and a three grade group, is planned as a place of observation and practice for prospective school principals and superintendents.

The elementary and high school for observation and practice in connection with the training of teachers is the prime condition of success.

To organize this adequately means buildings of considerable size, suitable and sufficient furniture and equipment, school libraries, laboratories, shops, gardens, and playgrounds. To secure this is the first aim and desire of the College. Meanwhile, the fullest use will be made of the temporary facilities, which are all that, during this year, the governing board is able to provide.

COMMERCIAL TRAINING

No definite course is now prescribed for those who are planning to teach business subjects (including Commercial Geography) in the high schools, but all are advised to take at least a three years' course in Economics and to elect courses also in Political Science and in History. Each student is advised further to select work in Rhetoric, in English Literature, and in one modern foreign language.

Students who expect to teach Commercial Geography will do well to select courses in some of the following subjects: Essentials of Physical Geography, Advanced General Chemistry, Industrial Botany, Economic Zoology, Applied Geology, and Anthropology. In Economics, courses are suggested in Elements of Economics, in Economic Geography, in Industrial and Commercial History, the Principles of Accounting, and the Elements of Business Law. These are general suggestions for those who wish to prepare themselves for the teaching of commercial subjects, but each candidate should very early consult with the committee in regard to the outlining of his entire course.

MANUAL TRAINING

The increasing demand for teachers who are able not only to handle two or three of the ordinary high school subjects, but also to direct the manual training work of the elementary and of the high school grades, is straining the facilities of our training schools for teachers in Minnesota. This College is not yet in a position to provide adequate facilities, but is able to offer at least introductory courses of this kind. Young men who desire to prepare themselves for manual training work may register in the college for courses of this description. By utilizing the shops on the campus and other opportunities here offered, future manual training teachers may prepare themselves both in woodwork and in ironwork. With these, students may also unite courses in Descriptive Geometry, in Mechanical Drawing, and in allied subjects, and in this way they may secure a fairly satisfactory preparation for the teaching of these branches in connection with some of the regular high school studies.

DOMESTIC ART AND DOMESTIC SCIENCE

These subjects are being added each year to the school course in an increasing number of Minnesota towns. So far superintendents and

boards of education have experienced considerable difficulty in securing teachers in these lines. The larger towns and cities can engage trained teachers and supervisors, but, in the smaller communities, on the first introduction of these subjects, it is necessary to entrust them to teachers able to give instruction in some high school studies.

A good opportunity, therefore, lies before prospective teachers who, in addition to a preparation in the ordinary studies of the high school course, will prepare for the direction of these subjects. Students who are interested in this line of work will be directed early in their college course in the selection of foundation work in Economics, Geography, Chemistry, Physics, and other related subjects, and will thus be prepared to elect during the last year or two the more technical instruction in Domestic Art and Domestic Science.

SATURDAY CLASSES AND COLLEGE EXTENSION COURSES

The College has offered during the past years a number of professional courses for those actually engaged in teaching, and most of this work has been organized for Saturdays and for the latter part of the afternoon on other days of the week. Teachers of Minneapolis and of St. Paul have registered in considerable numbers for this work, and teachers have come also from smaller adjacent towns. The courses arranged on the campus of the University for teachers will be continued and increased in number during the coming year.

Extension courses by members of the College Faculty have been given during recent years in Minneapolis and St. Paul. This work has included lectures on Literature, Anthropology, on General and on Educational Psychology, on School Administration, on the History of Education, and on various other subjects. The College plans to make available, as far as possible, its resources in teachers and equipment to all the school systems of Minnesota, particularly those of towns in the neighborhood of the Twin Cities. It will be possible, from time to time, to secure from the College a series of weekly or fortnightly lectures upon almost any of the ordinary branches of higher study.

Correspondence courses have been organized by members of the Faculty in all of the subjects required for the State Professional Certificate and in many branches of the secondary curriculum. A special bulletin contains information in regard to these.

THE SUMMER SESSION

In close connection with the work of this College, a Summer Session is conducted by the University for the benefit not only of college students, but of teachers and of other men and women whose occupations prevent their attendance during the academic year. Students who prove their capacity may be allowed to register during the regular semesters for additional work, and by attending the summer courses may complete the cred-

its necessary for the bachelor's degree in three years. Teachers will be especially interested in the opportunity thus afforded by the University for special preparation along the various lines required by the State Professional Certificate, as well as in the usual subjects of undergraduate and graduate study.

LIBRARY FACILITIES

The professional library of the College contains a large selection of works on the various phases of education, and is at the service not only of the students of the College, but of visiting teachers. During the past year a text-book collection was added covering the field of secondary schools. As soon as possible this illustrative library will be supplemented by model equipment of other kinds, thus offering concrete suggestions on questions of school furnishing and supplies.

Under certain restrictions the use of part of the professional library will, presently be made possible for non-resident students.

THE DEGREE OF MASTER OF ARTS

Graduates of the University of Minnesota and of other institutions of equal rank, will be admitted to work leading after one year of study to the degree of Master of Arts, upon the usual conditions attaching to that degree. They will be expected, however, to have given considerable attention in their collegiate work to Psychology and to the History, the Theory, and the Practice of Teaching.

Men and women actually engaged in teaching in Minnesota and possessing the bachelor's degree from a college of good rank will be allowed to pursue graduate studies in absentia. For non-resident students a special course is arranged with Education as the major subject. Two years are required and three are allowed for the completion of this work.

THE UNIVERSITY TEACHER'S CERTIFICATE

The University Teacher's Certificate is granted to all graduates of the College of Education and to those graduates of the College of Science, Literature, and the Arts who complete Philosophy 1a or 1b, and Courses 1 and 2 or Course 3 in Education, with additional work in Education so as to make a total of fifteen credits including those specified in Philosophy and who secure on the basis of excellent scholarship one major recommendation as qualified for teaching from a department of that College concerned with some branch of the secondary curriculum.

SPECIAL LECTURES

In addition to the courses announced for the College of Education, special lectures will be given from time to time, open to all students, by

men closely identified with public education in Minnesota. Educational organization, ideals, and methods will be treated from the point of view of those concerned with the State Department of Public Instruction, the inspection of state graded and high schools, the state normal schools, city school systems, and with the conduct of schools in smaller communities.

Public lectures will be given also by men familiar with the educational conditions, experiments, and tendencies in other states.

THE EDUCATIONAL CLUB

This organization is made up of those giving instruction in the College of Education and of students registered for advanced work. Meetings are held from time to time during the college year for the discussion of current questions in education and for reports and discussion upon recent educational literature, books, magazines, and journals.

COURSES OF INSTRUCTION

Fuller descriptions of some of the courses offered may be found in bulletins of the College of Science, Literature, and the Arts, the College of Engineering, the School of Chemistry, and the College of Agriculture.

RELATED DEPARTMENTS

The table below gives groups of related departments, but for convenience of reference in the departmental statements which follow, the departments are arranged in alphabetical order, after the statements in education.

- I. English Language and Literature
 - (a) English, (b) Comparative Philology, (c) Rhetoric
- II. Ancient Languages and Literatures
 - (a) Greek, (b) Latin
- III. Modern Languages and Literatures
 - (a) German, (b) Romance Languages, (1) French, (2) Spanish, (3) Italian, (c) Scandinavian Languages
- IV. Biological Sciences
 - (a) Animal Biology, (b) Botany, (c) Paleontology
- V. Physical Sciences
 - (a) Chemistry, (b) Geology and Mineralogy, (c) Physics
- VI. Pure and Applied Mathematics
 - (a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics

- VII. Philosophy, Education, and Anthropology
 - (a) Philosophy and Psychology, (b) Education, (c) Anthropology
- VIII. Social Sciences
 - (a) Economics and Political Science, (b) History, (c) Sociology
- IX. Fine Arts
 - (a) Drawing, (b) Music
- X. Agriculture, Domestic Art and Science, and Manual Training

DEPARTMENTAL STATEMENTS

EDUCATION

GEORGE F. JAMES, Ph.D., Professor, Head of the Department of Education	125 Folwell Hall
ALBERT W. RANKIN, B.A., Professor	125 Folwell Hall
FLETCHER HARPER SWIFT, Ph.D., Professor	300 Folwell Hall
*EDWARD G. QUIGLEY, B.A., Assistant Professor	
†SAMUEL QUIGLEY, M.A., Assistant Professor	319 Folwell Hall
ALICE J. MOTT, Ph.D., Instructor	Practice School
CHARLES M. HOLT, B.A., Instructor	Practice School
GUSTAV S. PETTERSON, B.A., Assistant	

1. History of Education to the Reformation Mr. SWIFT
Three credits (three hours per week); first semester. Open to juniors and seniors.

An introductory study in the history of education conducted by lectures, assigned readings, discussions, and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and Rome, the education of the early Christian centuries, the development of the different types of schools in medieval times, the rise of the university and of the humanistic schools of the Renaissance.

2. History of Modern Education Mr. SWIFT
Three credits (three hours per week); second semester. Open to juniors and seniors.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

3. Brief History of Education Mr. SWIFT
Three credits (three hours per week); each semester. Open to juniors and seniors.

A study of the origin and development of schools, more particularly in the modern period, as a preparation for the understanding of the educational systems, theories, and practices of the present.

4. Secondary Education Mr. JAMES
Three credits (three hours per week); first semester. Open to seniors.

*Absent on leave for 1912-13.

†Substitute for 1911-13.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports, and discussions.

5. Principles and Organization of Elementary Teaching Mr. QUIGLEY
Three credits (three hours per week); first semester. Open to juniors and seniors.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions, and reports. It is planned for all students who expect to teach in the high school schools or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

6. Principles and Organization of Secondary Teaching Mr. RANKIN
Three credits (three hours per week); second semester. Open to seniors.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

7. The Theory of Education Mr. QUIGLEY
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Philosophy 1a or 1b.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

8. School Administration Mr. RANKIN
Three credits (three hours per week); first semester. Open to seniors who have completed Courses 1 and 2, or Course 3.

An introductory study of school administration, conducted by lectures, reports, and discussions; the organization of school systems, the work of school boards, superintendents, principals, and teachers, school buildings, and hygiene. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. School Supervision Mr. RANKIN
Three credits (three hours per week); second semester. Open to seniors who have completed Courses 1 and 2, or Course 3; intended for students with experience in teaching.

An advanced course treating of the duties of school principals and superintendents. Credit will not be given both for Course 8 and for Course 9.

10. Comparative Study of School Systems Mr. JAMES
Three credits (three hours per week); second semester. Open to seniors.

This course deals with the school systems of Germany, France, England, and the United States, with special reference to principles and methods of administration. Elementary, secondary, and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports, and discussions.

11. Philosophy of Education Mr. QUIGLEY

Three credits (three hours per week); second semester. Open to seniors who have completed Courses 1 and 2, or Course 3, and Philosophy 1a or 1b.

An endeavor to correlate the various educational ideals drawn from biological and psychological studies, with special consideration of recent social phases of education.

12. Current Problems in Elementary Teaching Mr. RANKIN

Two credits (two hours per week); first semester. Open to seniors who have completed Course 5 and one other course, and to graduate students.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor, through readings, the visiting of schools, and through class discussions.

13. Educational Classics Mr. JAMES

Two credits (two hours per week); first semester. Open to seniors who have completed Courses 1 and 2, or Course 3, and to graduate students.

A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.

14. Current Problems in Secondary Teaching Mr. RANKIN

Two credits (two hours per week); second semester. Open to seniors and to graduate students who have completed Course 4 and one other course.

This is a seminar course for advanced students, preferably with teaching experience, who wish to pursue a theoretical and a practical study of some current problem in connection with secondary teaching. The course will be conducted by lectures, class discussions, readings, and by the visiting of schools.

15. Problems in School Administration Mr. JAMES

Two credits (two hours per week); second semester. Open to seniors and to graduate students who have completed Courses 1 and 2, or Course 3.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and when possible, by a study of actual school conditions falling within the proposed field.

16. School Sanitation Mr. RANKIN

Three credits (three hours per week); first semester. Open to seniors.

This course will be conducted by text, by lectures, and by investigation into the problems of school lighting, heating, and ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.

17. Organization of Higher Education Mr. JAMES

One credit (one hour per week); second semester. Open to seniors and to graduate students who have six credits in the department.

This course is intended for students who are interested in the general problems of educational administration, and who look forward later to college teaching. It includes a historical sketch of the development of the American university, with discussions of modes of organization and administration, problems of departmental management, and questions of class instruction.

18. Practice Teaching Mr. RANKIN and Miss MOTT
 Three credits (three hours per week); each semester. Open only to seniors and graduate students. The Registrar will accept enrollment only on written permission to the student from the instructor in charge, specifying one of the morning periods to be kept free for this work on each day of the week; five periods of teaching and Saturday conference; not counted as one of the five courses in Education required for graduation.

This is a course in observation and practice teaching, related for the present to the work of advanced grammar and first high school grades. As facilities permit, the work of other grades will be added.

19. Technique of Reading Mr. HOLT
 Three credits (three hours per week); each semester. Open only to a limited number of seniors after individual tests by the instructor.

This course is given in two sections for those who are specializing in this work and for those noticeably deficient in voice control.

20. History of Religious Education Mr. SWIFT
 One credit (one hour per week); first semester. Open to juniors and seniors.

An introductory study of the development of the religious consciousness and of the aim, means, and methods of religious instruction among certain types selected from ancient and modern civilizations.

21. Principles of Religious Education Mr. SWIFT
 One credit (one hour per week); second semester. Open to juniors and seniors.

A study of the most important principles of education, viewed from the standpoint of their relation and application to religious activities and institutions, and also to the means, methods, and materials of religious instruction.

22. Classroom Management Mr. QUIGLEY
 Three credits (three hours per week); second semester. Open to seniors who have completed Courses 1 and 2, or Course 3.

A detailed consideration of the daily practical problems of the schoolroom both in discipline and in instruction, intended for teachers in high schools and high school training departments, and for principals or superintendents. Observation of school work, with reports and discussions.

23. Principles and Practice of Industrial Training Mr. RANKIN
 Three credits (three hours per week); second semester. Open to seniors and graduate students who have six credits in the department.

A study of the principles fundamental to vocational training in the public school system, as affecting the arrangement of school years, the course of study, and the methods of teaching. The course will be conducted by lectures, assigned readings on topics, and reports on observations of school work.

AGRICULTURE

DEXTER D. MAYNE, Principal of the School of Agriculture

207 2d fl. Main Building, University Farm

The courses will be given at the College of Agriculture; hours to be arranged with the instructor.

1. Plant and Animal Life (Elements of Agriculture) Mr. MAYNE
Three credits (three hours per week); first semester. Open to juniors and seniors.

This course is planned to meet the increasing demand for a knowledge of the elements, at least, of agriculture on the part of graded school principals, rural school teachers, county superintendents of schools, and others concerned with education in the agricultural sections of the State.

2. Elements of Agriculture (Continued) Mr. MAYNE and ASSISTANTS
Three credits (three hours per week); second semester. Open to juniors and seniors.

This is a continuation of Course 1 and is planned to give the student some familiarity with the underlying principles and the simple processes connected with various forms of agricultural work. Mr. Mayne will have the co-operation of others connected with this branch of the University. Teachers will be assigned as far as possible to regular school classes pursuing required work.

Students who are interested are advised to read the Bulletin of the College of Agriculture and to note the various opportunities which are there afforded, as all of these will be made available to some extent in connection with these courses.

ANIMAL BIOLOGY

HENRY F. NACHTRIEB, B.S., Professor, Head of the Department of Animal Biology	205 Pillsbury Hall
CHARLES P. SIGERFOOS, Ph.D., Professor	201 Pillsbury Hall
OSCAR W. OESTLUND, Ph.D., Assistant Professor	220 Pillsbury Hall
HAL DOWNEY, Ph.D., Assistant Professor	203 Pillsbury Hall
CHARLES E. JOHNSON, Ph.D., Instructor	2 Pillsbury Hall

1. General Zoology Messrs. SIGERFOOS, OESTLUND, JOHNSON,
NACHTRIEB, and ASSISTANTS

Six credits (six hours per week); both semesters. Open to all.

Lectures, quizzes, and laboratory work. This course should be taken in the first or the second college year by all who expect to teach the subject.

2. Essentials of Histology and Embryology Mr. DOWNEY
Six credits (six hours per week); both semesters. Open to those who have completed Course 1.

3. Essentials of Histological and Embryological Technique Mr. DOWNEY
Three credits (six hours per week); second semester. Open to sophomores, juniors, and seniors who have completed Course 1 and the first semester of Course 2.

Practical work in the preparation of material.

4. General Physiology Mr. NACHTRIEB
Six credits (six hours per week); both semesters. Open to those who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

First semester: The physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Second semester: The life of the cell in its relations to that of other cells.

Demonstrations and simple experiments constitute a part of the course in both semesters.

5. Comparative Anatomy of Vertebrates Mr. JOHNSON and ASSISTANT
Six credits (six hours per week); both semesters. Open to those who have completed Course 1 or its equivalent. Both semesters must be completed before credit is given for the first semester.

17. Elements of Entomology and Ornithology Messrs. OESTLUND and JOHNSON
Six credits (six hours per week); both semesters. Open to those who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

18. Nature Study Mr. SIGERFOOS
Two credits (four hours per week); first semester. Open to those who have completed a minor in Zoology.

For a Major, at least eighteen credits, including Courses 1, 17, and 18, are required, together with six credits in Botany.

Students may select additional work, on the approval of the committee, from other courses announced in Animal Biology.

ART

HENRIETTE CLOPATH, Instructor, in Charge of the Department of Art,
Art Building 300 Washington Ave. S. E.

HARRIET GOLDSTEIN, Assistant Art Building

GRACE NEAL, Assistant Art Building

1. Drawing and Painting in Representation Miss CLOPATH and Miss GOLDSTEIN

Six credits (six hours per week); both semesters. Open to sophomores, with the permission of the instructor, and to juniors and seniors. Both semesters must be completed before credit will be given for the first semester.

Drawing of plant-form and landscape in pencil, water color, and charcoal; the study of perspective and the drawing of still life; drawing from the cast and sketching from life.

2. Drawing in Charcoal from Casts Miss CLOPATH
Six credits (six hours per week); both semesters. Open to sophomores, juniors, and seniors.

3. Drawing and Painting from Life Miss CLOPATH
Six credits (six hours per week); both semesters. Open to juniors and seniors who have completed Course 2.

4. Still-Life Painting in Oil and Water-Color Miss CLOPATH
Six credits (six hours per week); both semesters. Open to juniors and seniors who have completed Course 1.
5. Design Miss GOLDSTEIN
Six credits (six hours per week); both semesters. Open to juniors and seniors who have completed Course 1 or its equivalent.
The study of pure design, including arrangement of lines, tones, and colors in accordance with the principles of harmony, balance, and rhythm; and of design in representation, including the fundamental relation of design to pictorial art, composition as applied to plant form, landscape, still life, and life drawing, compositions of the masters, and the making of original compositions.
6. Design, second year Miss GOLDSTEIN
Six credits (six hours per week); both semesters. Open to seniors who have completed Course 3.
Advanced composition; book decoration with especial attention to lettering; designs for stained glass; and design applied to leather, pottery, metal, and embroidery.
7. Drawing as Related to Education Miss CLOPATH
Three credits (six hours per week); first semester. Open to seniors who have completed Courses 1 and 3.
Exercises in all the different kinds of art work used in the schools; advanced work in black and white and in color.
8. The Teaching of Drawing Miss CLOPATH
One credit (two hours per week); first semester. Open to seniors who have completed Course 5.
This course is conducted by lectures and collateral reading on the methods and value of drawing, as revealed through a study of the instincts and mental processes of the child.
9. Modeling Mrs. NEAL
Six credits (six hours per week); both semesters. Open to juniors and seniors who have completed Course 1.
Clay modeling from the antique and from life, in relief and in the round; casting in plaster.
10. Modeling, second year Mrs. NEAL
Six credits (six hours per week); both semesters. Open to seniors who have completed Course 9.
11. Modern Painting Miss CLOPATH
One credit (one hour per week); second semester. Open to juniors and seniors.
Lectures on the history and development of painting from the 18th century to the present; principles of art and critical analysis of pictures. Essays required on art subjects.

ASTRONOMY

**FRANCIS P. LEAVENWORTH, Professor, Head of the Department of Astronomy
Observatory or 123 Folwell Hall**

1. General Astronomy Mr. LEAVENWORTH
Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Mathematics 4 or 2 (Trigonometry).
The study of the general principles of astronomy, illustrated by lantern slides and telescopic observations. This course may be combined with Course 2.
2. Observatory Practice Mr. LEAVENWORTH
Three credits (hours arranged); both semesters. Open to those who have completed or are taking Course 1 or 3.
Work at the Observatory in connection with Course 1 or 3.
3. Descriptive Astronomy Mr. LEAVENWORTH
Three credits (three hours per week); first semester. Open to juniors and seniors.
Lectures on the elements of astronomy, illustrated by lantern slides. This course may be combined with Course 2.
4. Practical Astronomy Mr. LEAVENWORTH
Six or twelve credits (three or six hours per week); both semesters. Open to juniors and seniors who have completed Course 1 and Mathematics 7, 8, and 9.
The theory and use of astronomical instruments in determining time, latitude, longitude, and positions of heavenly bodies; astronomical photography, with measurements of plates; study of the method of least squares.

BOTANY

FREDERIC E. CLEMENTS, Ph.D., Professor, Head of the Department of Botany	207 Pillsbury Hall
JOSEPHINE E. TILDEN, M.S., Professor	214 Pillsbury Hall
CARL OTTO ROSENDAHL, Ph.D., Professor	18 Pillsbury Hall
FREDERIC K. BUTTERS, B.S., B.A., Assistant Professor	206 Pillsbury Hall
NED L. HUFF, M.A., Assistant Professor	214 Pillsbury Hall
EDITH CLEMENTS, Ph.D., Instructor	207 Pillsbury Hall
ALICE MISZ, M.A., Instructor	16 Pillsbury Hall

1. General Botany Messrs. CLEMENTS, HUFF, and BUTTERS, and Miss Misz
Six credits (six hours per week); both semesters. Open to all. Both semesters must be completed before credit will be given for the first semester.
2. Advanced Botany Messrs. CLEMENTS and ROSENDAHL, Mrs. CLEMENTS, and Miss Misz
Six credits (six hours per week); both semesters. Open to those who have completed Course 1.
3. Plant Physiology and Ecology Mr. CLEMENTS
Six credits (six hours per week); both semesters. Open to those who

have completed Courses 1 and 2; by permission of the department the course may be taken in conjunction with Course 2.

4. Algae

Miss TILDEN

Six credits (six hours per week); both semesters. Open to those who have completed Courses 1 and 2.

5. Fungi

Mr. CLEMENTS

Six credits (six hours per week); both semesters. Open to those who have completed Courses 1 and 2.

6. Mosses and Ferns

Messrs. ROSENDAHL and HUFF

Six credits (six hours per week); both semesters. Open to those who have completed Courses 1 and 2.

11. Industrial Botany

Miss TILDEN

Six credits (six hours per week); both semesters. Open to technical students who have completed Course 1, and to academic students who have completed Courses 1 and 2.

A study of the origin, distribution, and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics, and laboratory work.

12. Plant Foodstuffs and Textiles

Miss TILDEN

Six credits (six hours per week); one or both semesters. Open to technical students who have completed Course 1, and to academic students who have completed Courses 1 and 2.

A study of the botany of foods, textiles, and fabrics, with reference to their sources, structure, preparation, adulteration, etc., together with an inquiry into the relation of plants to household processes and problems. Lectures, demonstrations, topics, and laboratory work.

16. Teachers' Course; Plant Studies and Methods

Mr. CLEMENTS

Six credits (six hours per week); both semesters. Open to those who have completed Courses 1 and 2.

A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are taught, and not from the university point of view. The material is taken up in detail, in its proper sequence, and training in method is afforded, as far as possible, by practice in the Practice School of the College of Education.

For a Major, eighteen credits, with an average of at least *good*, are required, including Courses 1 and 2 and one advanced course covering two semesters, together with six credits in Zoology. Courses 11 and 16 in Botany are recommended.

Students may select additional work, on the approval of the committee, from other courses announced in Botany.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor, Head of the Department of Chemistry

114 Chemistry Building

CHARLES F. SIDENER, B.S., Professor	203 Chemistry Building
EDWARD E. NICHOLSON, M.A., Assistant Professor	104 Chemistry Building
IRA H. DERBY, Ph.D., Assistant Professor	220 Chemistry Building
LILLIAN COHEN, M.S., Instructor	106 Chemistry Building
FRANK W. BLISS, M.S., Instructor	205 Chemistry Building
HAROLD H. BROWN, M.A., Instructor	
WILLIAM H. HUNTER, Ph.D., Instructor	207 Chemistry Building

1. General Chemistry Miss COHEN and ASSISTANTS

Six credits (six hours per week); both semesters. Open to all who do not present any entrance credits in Chemistry, but juniors and seniors receive only half credit. Both semesters must be completed before credit is given for the first semester.

Recitations and laboratory work; the course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.

2. Advanced General Chemistry Mr. FRANKFORTER, Miss COHEN, Miss NYE, and ASSISTANTS

Six credits (six hours per week); both semesters. Open to all who have completed a satisfactory entrance course in General Chemistry. Both semesters must be completed before credit is given for the first semester.

Lectures and laboratory work; the ground covered includes an introduction to physical and technological chemistry, with an exhaustive study of the chemical elements.

3. Qualitative Analysis Messrs. NICHOLSON, BLISS, and ASSISTANTS

Six credits (six hours per week); both semesters. Open to those who have completed Course 1 or 2. Both semesters must be completed before credit is given for the first semester.

Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and the acids, with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. Quantitative Analysis Mr. SIDENER

Six credits (six hours per week); both semesters. Open to those who have completed Course 3. Both semesters must be completed before credit is given for the first semester.

The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester; followed the second semester by a discussion of standard solutions and the necessary stoichiometric calculations, with laboratory work in volumetric analysis.

5. Organic Chemistry Messrs. FRANKFORTER, DERBY, HUNTER, BROWN, and ASSISTANTS

Six credits (two lectures and six hours of laboratory work per week); both semesters. Open to those who have completed Course 3. Both semesters must be completed before credit is given for the first semester.

This course includes the aliphatic and aromatic series, with the preparation of the more important compounds.

6. Theoretical Chemistry

Mr. DERBY

Two credits (one lecture and one recitation per week); second semester. Open to those who have completed Course 5.

The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.

25. Teachers' Course

Miss COHEN

One credit (two hours per week); second semester. Open to those who have completed Course 3.

The course is offered to those who are interested in the teaching of Chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

For a Major, Courses 2 and 3, Course 4 or Course 5, and Course 25, with an average of at least *good*, are required, together with six additional credits in physical science.

DOMESTIC ART AND DOMESTIC SCIENCE

MARGARET BLAIR, Instructor 323 3d fl. Main Building, University Farm
JUNIATA L. SHEPPERD, Instructor

1st fl. Domestic Science Building, University Farm

These courses cover specifically the science and the art of the home. In the reactionary movement away from the theoretical and toward the practical in education, the need of teachers of scientific and artistic home-making has become marked. To meet this demand the following courses have been organized, to be given at the College of Agriculture; hours to be arranged with the instructor.

DOMESTIC ART

Domestic Art has to do with the very beginning of home-making, the selection of a site, the adaptation of architecture to the needs of the family, the choice of materials, colors, etc., and their relation to the surroundings, the interior of the home, its furniture and keeping. All these topics are viewed in both their economic and their social aspect. In addition a full course is offered in needlework in all its branches.

1. Elementary Sewing

Mrs. BLAIR

Three credits (six hours per week); first semester. Open primarily to those who expect to teach this subject.

A general course in hand sewing, including practice in the various stitches and in designing, drafting, cutting, and making simple garments, with instruction on the use and care of the various implements and of the work basket, and some lectures on textiles and the selection and care of materials.

2. Designing and Drafting

Mrs. BLAIR

Three credits (six hours per week); second semester. Open to those who have completed Course 1.

Designing, drafting, fitting, and finishing garments for adults, with lectures upon proper dress with special reference to style, neatness, suitability, and harmony of color.

3. Textiles

Mrs. BLAIR

Three credits (three hours per week); second semester.

A study of the various animal and vegetable fibers, the manufacture of textiles, and the proper uses of different fabrics; the student is required to make a notebook containing samples of the materials studied.

DOMESTIC SCIENCE

1. Elementary Domestic Science Miss SHEPPERD and ASSISTANTS

Three credits (six hours per week); first semester. Open primarily to those who expect to teach the subject.

The course includes a general study of (1) fuels, their composition, heat value, and uses in the household; (2) food materials, their composition, nutritive value, digestibility, and prices, illustrated by laboratory exercises in cooking; (3) laundering, dyeing, bleaching, etc., with laboratory practice in the use of laundry machinery and materials.

2. Domestic Science Miss SHEPPERD and ASSISTANTS

Three credits (six hours per week); second semester. Open to those who have completed Course 1.

A continuation of the food studies of Course 1. After April 1st an afternoon session is substituted for one morning session, and this time is devoted to the study of yeasts and fermented breads, with laboratory work in bread making.

The above courses are made, as far as possible, both practical and scientific. Students who are interested in this line are advised to read a fuller description, which will be found in the Bulletin of the College of Agriculture.

ECONOMICS AND POLITICAL SCIENCE

*JOHN H. GRAY, Ph.D., Professor, Head of Department of Economics and Political Science

Mechanic Arts Building

†EDWARD VAN DYKE ROBINSON, Ph.D., Professor.

Mechanic Arts Building

WILLIAM A. SCHAPER, Ph.D., Professor

Mechanic Arts Building

CARL W. THOMPSON, M.A., Associate Professor and Director of the Bureau of Research in Agricultural Economics

Mechanic Arts Building

THOMAS WARNER MITCHELL, Ph.D., Assistant Professor

Mechanic Arts Building

JEREMIAH S. YOUNG, Ph.D., Assistant Professor

Mechanic Arts Building

J. FRANKLIN EBERSOLE, M.A., Assistant Professor,

Mechanic Arts Building

*Absent on leave from February 1, 1912 to February 1, 1913.

†Acting Head, Department of Economics and Political Science from February 1, 1912f to February 1, 1913.

CEPHAS D. ALLIN, M.A., LL.B., Assistant Professor	Mechanic Arts Building
LOUIS D. H. WELD, Ph.D., Assistant Professor, Extension Work	Mechanic Arts Building
RAYMOND V. PHELAN, Ph.D., Instructor, Extension Work	Mechanic Arts Building
CHARLES H. PRESTON, B.A., Instructor, Extension Work	Mechanic Arts Building

ECONOMICS

INTRODUCTORY COURSES

*Starred courses are given in alternate years.

1. Elements of Economics Messrs. ROBINSON, THOMPSON, MITCHELL,
and EBERSOLE

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

Designed for those who desire a general knowledge of Economics, and as an introduction to the more advanced courses offered in the department. A thorough course in the elements of economic theory, with special reference to present-day economic and social problems; Marshall, Wright, and Field's *Outlines* and a text-book, supplemented by lectures with a weekly quiz.

- 2a. Physical and Human Geography Messrs. LEHNERTS and ROBINSON

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have not taken Geography 29a. Constitutes a unit course for which no credit is allowed until both semesters are completed. May be counted toward a major or minor in either the Department of Geology and Mineralogy or the Department of Economics and Political Science.

First semester, given by Mr. Lehnerts:—Fundamental physiographic facts, processes, and relations, with special reference to their effect on the activities of mankind; planetary relations, climate, land forms, and oceans; rivers, lakes, and waterpowers; ground water and soils; mountains, plateaus, and plains; deserts, steppes, and prairies. Lectures, laboratory and field work.

Second semester, given by Mr. Robinson:—A study of economic and political development in relation to nature, exclusive of ethnography; meaning of the geographic and economic interpretations of history; economic progress as a phase of adaption to environment, illustrated by reference to the industrial conditions of the leading countries. Text-book, supplemented by lectures and reports on special topics.

- 2b. Economic Geography Mr. ROBINSON

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors, except those who have admission credit in Commercial Geography. Course 2a may profitably precede or accompany 2b.

The economic basis of modern civilization; the causes, both in nature and man, which control the localization of industries; the geographic factor in American history and economic development; natural resources and the economic problem of their use and conservation;

the principal extractive, manufacturing, and distributive industries of the United States, its outlying possessions, and the leading foreign countries, especially those which have a large prospective value as markets for American manufactures and as fields for the investment of American capital. Text-book, with lectures and special reports.

***3a. Modern Industrial and Commercial History of Europe** Mr. GRAY
Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors.

The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain. Not given in 1912-13.

***3b. The Industrial and Commercial History of the United States** Mr. GRAY

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors.

Courses 3a and 3b are conducted each with a text-book, supplemented by lectures, prescribed topical readings, and written reports. Not given in 1912-13.

GENERAL COURSES

4. Advanced Economics Mr. ROBINSON
Three credits (three hours per week); second semester. Open to those who have completed Course 1; required for a major in Economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution. Assigned readings, reports, and discussions.

5. Money and Banking Mr. EBERSOLE
Three credits (three hours per week); second semester. Open to those who have completed Course 1.

The history, theory, and functions of money, nature and uses of credit, functions of banks, foreign exchange. Lectures, text-books, assigned reading, and discussions.

6. Public Finance and Taxation Mr. ROBINSON
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 1.

The development of the state as an economic organism. Text-books, supplemented by lectures and assigned readings.

21. Elements of Business Law Mr. YOUNG
Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Course 1 in Economics or Political Science.

The principles of law governing ordinary commercial transactions. 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 will deal with the general law of contracts, bankruptcy, agency, sales, negotiable instruments, partnership, and corporations. Assigned readings, lectures, and quizzes.

26. Property Insurance Mr. WELD
Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 1.

The basic theory of fire insurance. The historic development, peculiarities and practice of various forms of property insurance, including steam, boiler, marine, fire and mis-

cellaneous. A technical study of an insurance company of each type. Critical examination of policy contracts, exemptions, forfeitures, abandonments, co-insurance, re-insurance, adjustments, and other questions of procedure under insurance contracts. Lectures and assigned readings.

28. Pro-Seminar in the History, Scope, and Methods of Economics

Mr. ROBINSON

Three credits (three hours per week); first semester. Open to graduate students, also to juniors and seniors who have completed Economics 1 and 4.

In 1912-13 the general topic will be the history of economic thought in ancient, medieval, and modern times. In alternate years, emphasis will be placed on the scope and logical methods of Economics, the relation of Economics to the other social sciences and to Ethics, and on methods of investigation and instruction in Economics. Assigned readings, reports on special topics, and class discussions. Method of work informal, approaching the seminar plan.

Courses 2 and 11 in Philosophy (Logic and Ethics) may profitably precede or accompany Course 28.

POLITICAL SCIENCE

1. American Government Messrs. SCHAPER, YOUNG, and ALLIN

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

Intended as a preparation for the advanced courses in Political Science, for teaching secondary schools, and for good citizenship. Text, lectures, and special topics.

2. Comparative Government Mr. ALLIN

Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 1 and three additional credits in the department.

A comparative study of the organization and working of the government of the great European powers of today. Text, with lectures and assigned readings.

3. The Elements of Jurisprudence Mr. SCHAPER

Three credits (three hours per week); first semester. Open to those who have completed Course 1 and three additional credits in the department.

A study of those human relations requiring legal regulation considered from the American point of view. Text, cases, lectures, and assigned readings.

7. Municipal Administration Mr. SCHAPER

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors who have completed Course 1.

A comparative study of modern city charters and methods of administration. Text, lectures, and special topics.

8. Theory of the State Mr. SCHAPER

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Courses 1, and 2 or 7 or 15.

A study of the theory of the state, the origin, the nature, purpose, and justification of the state. Text-book, with lectures and topical readings.

- *9. Political Parties Mr. SCHAPER
 Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Courses 1, and 2 or 15.

An advanced course in political parties, their origin, development, and function, including a study of nominations, minority representation, the recall, and the initiative and referendum. Text, lectures, and special topics. Offered in 1912-13.

13. Teachers' Course in Government Mr. SCHAPER
 One credit (one hour per week); second semester. Open to students of suitable preparation who intend to teach American Government in the secondary schools.

Lectures and the examination of text-books, maps, and other materials useful to teachers.

15. State and Local Government Mr. YOUNG
 Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors who have completed Course 1.

A comparative study of our state constitutions; relation of the states to the United States and to the local units of government; recent experiments such as the initiative and referendum, the recall, primary systems of nominating, the preferential plan of voting, modification of the judicial system, and the extension of the police power. Texts, lectures, and special reports.

21. Elements of Business Law Mr. YOUNG
 Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Course 1 in Economics or Political Science.

For description, see Course 21 in Economics.

For a Major, in Commercial Subjects, eighteen credits in Economics, with an average of at least *good*, are required, together with twelve credits in Political Science and six credits selected from History and Sociology; in Government, eighteen credits in Political Science, including Course 13, with an average of at least *good*, are required, together with twelve credits in Economics and six credits selected from History and Sociology.

The attention of students who expect to teach History and American Government or Commercial Subjects is called to Courses 2a, 2b, 3a, 3b, 5, and 28 in Economics and to Courses 2, 3, 7, 9, 13, 15, 17, 18, and 20 in Political Science. All of these courses are open for election, on the approval of the committee, as well as the other courses announced in Economics and Political Science.

ENGLISH

RICHARD BURTON, Ph.D., Professor, Head of the Department of English	220 Folwell Hall
FREDERICK KLAEBER, Ph.D., Professor	222 Folwell Hall
HARDIN CRAIG, Ph.D., Professor	123 Folwell Hall
JOSEPH W. BEACH, Ph.D., Assistant Professor	219 Folwell Hall
OSCAR W. FIRKINS, M.A., Assistant Professor	116 Folwell Hall
GEORGE N. NORTHPROF, M.A., Instructor	116 Folwell Hall

1. General Survey of English Literature Messrs. BURTON and CRAIG,
assisted by other members of the department

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors. Both semesters must be completed before credit is given for the first semester. Required for a major, a minor, or a teacher's certificate.

This course is designed to cover the whole period of English and American literature in historical outline and to prepare for a more minute study of special periods.

2. Old English First Semester, Messrs. KLAEBER, FIRKINS, and BEACH
Second Semester, Mr. KLAEBER

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors. The first semester is required of those who take a major or obtain a teacher's certificate in English.

A study of the language and reading of representative selections of old English prose and poetry. The relations to modern English will be particularly emphasized.

3. Introduction to Middle English and Literature Mr. KLAEBER

Two credits (two hours per week); first semester. Open to sophomores, juniors, and seniors who have taken the first semester of Course 2; alternates with Course 4.

An outline of Middle English grammar including the interpretation of selected texts.

4. Piers the Plowman Mr. KLAEBER

Two credits (two hours per week); first semester. Open to sophomores, juniors, and seniors who have taken the first semester of Course 2; alternates with Course 3. Not given in 1912-13.

5. Chaucer First Semester, Messrs. FIRKINS and BEACH
Second Semester, Mr. BEACH

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors who have completed or are pursuing Course 1 and have completed the first semester of Course 2.

A study of the grammar and literary forms of fourteenth century English with selected readings from Chaucer's works. Special attention is given to the Canterbury Tales.

6. Spenser Mr. FIRKINS

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors who have completed or are pursuing Course 1.

- 7a. Shakespeare Messrs. CRAIG and NORTHROP

Three credits (three hours per week); first semester. Open to juniors and seniors who have completed a year of work in English. Required of all who take their major or obtain a teacher's recommendation in English.

An introductory study of Shakespeare's development as a poet and dramatist, with reading of representative plays.

- 7b. The Later Plays of Shakespeare Mr. NORTHROP
 Three credits (three hours per week); second semester. Open to those who have completed Course 7a.
8. Milton Mr. NORTHROP
 Three credits (three hours per week); second semester. Open to juniors and seniors who have completed one year of work in English.
- 9a. Eighteenth Century Literature: The Rise of Naturalism and Romanticism Mr. CRAIG
 Three credits (three hours per week); first semester. Open to juniors, seniors, and graduate students who have completed Course 1.
- 9b. The Romantic Movement Mr. CRAIG
 Three credits (three hours per week); second semester. Open to juniors, seniors, and graduate students who have completed Course 1.
10. The English Humorists Mr. BEACH
 Six credits (three hours per week); both semesters. Open to juniors, seniors, and graduate students who have completed Course 1.
11. Seventeenth Century Prose Mr. NORTHROP
 Six credits (three hours per week); both semesters. Open to juniors, seniors, and graduate students who have completed one year in English. Course 2 in History is a desirable prerequisite.
12. Outline of Nineteenth Century Literature Mr. NORTHROP
 Three credits (three hours per week); first semester. Open to juniors and seniors who have completed one year of work in English.
13. The Drama: Structure and Evolution Mr. FIRKINS
 Six credits (three hours per week); both semesters. Open to seniors and graduate students who have completed two years of work in English, which must include Course 7a (Shakespeare). Both semesters must be completed before credit is given for the first semester.
14. English Idiom Mr. BURTON
 Three credits (three hours per week); first semester. Open to juniors and seniors who have completed one year of work in English.
15. Browning and Tennyson Mr. BURTON
 Three credits (three hours per week); second semester. Open to juniors and seniors who have completed one year of work in English.
16. The English Novel Mr. BURTON
 Three credits (three hours per week); first semester. Open to juniors and seniors who have completed one year of work in English.

17. The Bible as Literature Mr. BURTON
 Three credits (three hours per week); second semester. Open to graduate students who have taken an undergraduate major in English and to juniors and seniors who have completed Course 1.

18. History of the English Language Mr. KLAEBER
 One credit (one hour per week); second semester. Open to sophomores, juniors, and seniors who have completed the first semester of Course 2. Required of all who take their major or obtain a teacher's recommendation in English.

19. Principles of Literary Criticism Mr. FIRKINS
 Six credits (three hours per week); both semesters. Open to graduate students, and to juniors and seniors upon approval of the instructor, who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

20. American Literature Mr. CRAIG
 Three credits (three hours per week); second semester. Open in alternate years to juniors, seniors, and graduate students who have completed one year of English. Not offered in 1912-13.

21. Moral Forces in English Literature Mr. BEACH
 Three credits (three hours per week); second semester. Open to juniors and seniors who have completed one year of work in English.

22. Elizabethan Literature Mr. CRAIG
 Three credits (three hours per week); second semester. Open in alternate years to juniors and seniors who have completed Course 1. A study of Elizabethan authors exclusive of Shakespeare. Offered in 1912-13.

For a Major, eighteen credits, including Course 1, the first semester of Course 2, Courses 5, 7a, and 18, together with twelve credits in Rhetoric, are required.

For a Minor, eighteen credits in English and Rhetoric, as arranged.

Students may select additional work, on the approval of the committee from other courses announced in English.

GEOLOGY AND MINERALOGY

WILLIAM H. EMMONS, Ph.D., Professor, Head of Department of Geology
 and Mineralogy 108 Pillsbury Hall

EDWARD M. LEHNERTS, M.A., Assistant Professor 107 Pillsbury Hall

A. WOLFRED JOHNSTON, M.A., Instructor 112 Pillsbury Hall

GEOLOGY

1a. General Geology Messrs. EMMONS and JOHNSTON
 Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors. The class is divided in four sections. High

school or college Chemistry is a desirable antecedent, but is a prerequisite for one section only.

A synoptical treatment of the materials of the earth and of geologic processes; physiographic, structural, and dynamic geology, with a brief introduction to historical geology. Lectures, laboratory work, field excursions, map study, and conferences.

1c. Laboratory Work Mr. JOHNSTON and ASSISTANTS

One credit (two hours per week); first semester. Open to students taking Course 1a.

To supplement 1a. The study of rocks and ores, of topographic and geologic maps, with a small amount of reference reading.

2. Geography and Geology of Minnesota Mr. JOHNSTON

Three credits (three hours per week); second semester. Open to students who have completed Course 1a.

The physical geography of the State in its relations to geological history and industrial development; a study of the principles and facts of pre-Cambrian geology as exemplified in the State, and the extension of these into general application; the present problems of the State in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

GEOGRAPHY

29a. General Physiography Mr. LEHNERTS

Three credits (three hours per week); first semester. Open to juniors and seniors.

The principles of earth sculpture; structural features of the continents; hydrography and oceanography; planetary relations; climatology; the evolution, uses, and effects of the materials and physical features of the earth.

29b. Physical and Human Geography Messrs. LEHNERTS and ROBINSON

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have not taken Course 29a.

Constitutes a unit course for which no credit is allowed until both semesters are completed. May be counted toward a major or a minor in either the Department of Geology and Mineralogy or the Department of Economics and Political Science.

First semester given by Mr. Lehnerts: Fundamental physiographic facts, processes, and relations with special reference to their effect on the activities of mankind; planetary relations, climate, land forms, and oceans; rivers, lakes, and waterpowers, ground water and soils; mountains, plateaus, and plains; deserts, steppes, and prairies. Lectures and laboratory work.

Second semester, given by Mr. Robinson: Economic and political development in relation to nature; meaning of the geographic and the economic interpretations of history; economic progress as a phase of adaption to environment, illustrated by reference to the industrial conditions of the leading countries. Text-books, supplemented by lectures and reports on special topics.

33. The Western Hemisphere Mr. LEHNERTS

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 29a or 29b.

Regional geography of the continents and countries of the Western Hemisphere; lectures, maps, and library work.

36. The Method and Material of Geography Mr. LEHNERTS
Two credits (one hour per week); both semesters.. Open to juniors and seniors who have completed Course 29a; especially designed for teachers.

The earth as an object of study in the grades and in the high school; guiding principles; the course of study; text-books and their use; practical laboratory work; excursions; collection and preparation of illustrative material; map drawing, chalk modeling, and relief work; organization of geographical subject matter for classroom instruction, and the method of recitation.

37. Field and Laboratory Practice Mr. LEHNERTS
Two credits (one hour per week); both semesters. Open to juniors and seniors who have completed Course 29a; designed especially for teachers.

A study of the geography and geology of Minneapolis, St. Paul, and adjacent territory, embracing the salient physiographic, stratigraphic, and economic features of this interesting region. Relief, topography, and map work will receive attention in the laboratory as well as in the field. For teachers and others who wish to learn the methods of field geography and geology.

38. Field Work in Geography Mr. LEHNERTS
Six credits; Summer Session. Open to juniors, seniors, and graduate students who have completed Course 1a or 29a.

A six weeks' course given during the summer months. It involves the systematic study, in the field, of the physical and industrial geography of selected areas in one or more western states. Arrangements may be ascertained upon application to the department.

GERMAN

JOHN G. MOORE, B.A., Professor, Head of the Department of German	210 Folwell Hall
*CARL SCHLENKER, B.A., Professor	211 Folwell Hall
OSCAR C. BURKHARD, M.A., Assistant Professor	214 Folwell Hall
J. THEODORE GEISSENDOERFER, Ph.D., Instructor	211 Folwell Hall

Courses 1, 2, or 3, and 5 are introductory courses. Students who present German for entrance may select Courses 4 and 6 or 7 during the first two college years.

8. Advanced Conversation, Grammar, and Composition
Messrs. SCHLENKER, JUERGENSEN, O. C. BURKHARD, KOENIG, and GEISSENDOERFER
Four credits (two hours per week); both semesters. Open to those who have taken or are taking Course 6, 7, or 9; recommended that it be preceded by Course 5; required of those who obtain a teacher's recommendation in German; intended as a preparation for Course 11. Both semesters must be completed before credit is given for the first semester.

*Absent on leave, 1912-13.

9. German Literature of the Classic Period Mr. MOORE
Six credits (three hours per week); both semesters. Open to those who have completed Course 2 (by special permission) or 6 or 7; required of those who obtain a teacher's recommendation in German. Both semesters must be completed before credit is given for the first semester.

10. Modern Authors Messrs. MOORE and SCHLENKER
Six credits (three hours per week); both semesters. Open to those who are taking or have completed Course 9; required of those who obtain a teacher's recommendation in German. Both semesters must be completed before credit is given for the first semester.

11. Teachers' Course Mr. MOORE
One credit (one hour per week); second semester. Open to those who have completed Course 10 or, by special permission, Course 9; this course is especially designed for those who expect to become teachers of German in high schools.

For a Major, Course 2 or Course 4, Course 6 or Course 7, and Courses 8, 9, 10, 11 are required, with an average of at least *good*.

For a Minor, eighteen credits, not including Course 1, to be selected after consultation.

Students may select additional work, on the approval of the committee, from other courses announced in German.

GREEK

JOHN CORRIN HUTCHINSON, B.A., Professor, Head of the Department of
Greek, 112 Folwell Hall
CHARLES ALBERT SAVAGE, Ph.D., Professor 112 Folwell Hall

In addition to at least two of the preliminary courses, students who expect to teach Greek in the High Schools should take the following:

4. Philosophy: Plato's *Apology* and selections Mr. HUTCHINSON
Three credits (three hours per week); first semester. Open to those who have completed Course 2 or 3.

The course consists chiefly in the reading of Plato's *Apology* together with selections from the *Crito* and the *Phaedo*. Lectures on Greek philosophy.

5. Oratory: Lysias and Demosthenes Mr. SAVAGE
Three credits (three hours per week); second semester. Open to those who have completed Course 2 or 3.

The course consists chiefly of readings from the orations of Lysias and Demosthenes; selections from Isocrates may also be read. Lectures on Greek oratory. At this stage of the student's development less attention is given to syntax, and more attention is paid to matters of literary interest.

6. Lyrics Mr. HUTCHINSON
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 4 or 5.

7. Tragedy: Aeschylus or Sophocles Mr. SAVAGE
Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 4 or 6.

8. Philosophy (Advanced): Plato's *Republic* Mr. HUTCHINSON
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 4.

The *Republic* of Plato is read, not primarily for its philosophic interest but as one of the best masterpieces of Greek literature. The study is, therefore, in the main, a study of literary style. Alternates with Course 9.

9. Oratory (Advanced): Demosthenes' *De Corona* Mr. SAVAGE
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 5.

This course is intended to secure a careful study of the development of oratorical style among the Greeks, and its culmination in this acknowledged masterpiece. Alternates with Course 8. Not offered in 1912-13.

10. Epic Poetry (Advanced): *The Iliad* Mr. HUTCHINSON
Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 7 or 11.

The object of this course is to secure as intimate an acquaintance as possible, at first hand, with Homer. The Homeric question given but scanty attention, its place being in the graduate work (Course 19). Literary values receive chief attention and that these may be realized by the student as much of the text is read as is consistent with careful work.

12. Greek Composition Mr. HUTCHINSON
Two credits (one hour per week); both semester.

Open to juniors and seniors who have completed Courses 4 and 5. Both semesters must be completed before credit is given for the first semester. Recommended to those who expect to teach Greek.

For a Major, Courses 4, 5, 7, 10, and 13 are required.

For a Minor, at least eighteen credits, not including Courses 20, 21, and 22. Students who desire further courses in Greek will consult with the committee.

HISTORY

*WILLIS M. WEST, M.A., Professor, Head of the Department of History	Library Building
FRANK M. ANDERSON, M.A., Professor	Library Building
ALBERT B. WHITE, Ph.D., Professor	Library Building
WILLIAM STEARNS DAVIS, Ph.D., Professor	Library Building
WALLACE NOTESTEIN, Ph.D., Assistant Professor	Library Building

INTRODUCTORY COURSES

1. Medieval and Modern History Mr. DAVIS
Six credits (three hours per week); both semesters. Open to all.

*Resigned June, 1912.

Designed especially for freshmen who offer less than two years of preparatory History for admission.

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.

8. American Political History, 1492-1912 Mr. ANDERSON

Six credits (three hours per week); both semesters. Open to freshmen who have not presented Senior American History for admission. Designed (like Course 1) for freshmen who offer less than two years of preparatory History; and not recommended to students who expect to take more than two years of college History.

Brief survey of the colonial and the most recent periods with fuller treatment for the year 1789-1865. Special attention given to political parties, territorial expansion, slavery and the civil war.

2. English Constitutional History to 1689 Messrs. WHITE and NOTESTEIN

Six credits (three hours per week); both semesters. Open to all who present two years of preparatory History for admission (American Government included in that amount if desired), or to those who have completed Course 1 or 8.

The general political history of England from the earliest times to the Bill of Rights, with special reference to the development of governmental institutions.

GENERAL COURSES

3. The Renaissance and Reformation Mr. WHITE

Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors who have completed Course 1 or 2 or 8.

The Renaissance and the Reformation will be studied as general European movements, with emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. Europe since 1789 Mr. ANDERSON

Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Course 1 or 2 or 8.

The history of France with that of other countries grouped about it.

5. American Constitutional History to 1840 Mr. ANDERSON

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Course 2.

Required for Courses 7, 9, 11, and 14, and therefore recommended for the sophomore year to students who expect to specialize in History.

15. Historical Method and Bibliography Mr. WHITE

Two credits (two hours per week); second semester. Open to those who have completed Course 1 or 2; designed only for those who intend to specialize in History.

16. Teachers' Course Mr. ANDERSON

One credit (one hour per week); second semester. Open to seniors and graduate students who have, including courses in progress, twenty-

four credits in History; required of those who obtain a teacher's recommendation in History.

This course is designed to assist those who expect to teach History in the High Schools. Mr. Anderson will be aided by other members of the department.

21. History of Greece Mr. DAVIS

Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Course 1 or 2, but not to any who have completed a course in Greek History.

The course is general in its nature, and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire. Special attention will be given to the permanent influence of Greek civilization. Alternates with Course 24. Not given in 1912-13.

22. Selected Topics in Greek History Mr. DAVIS

Three credits (three hours per week); second semester. Open to juniors and seniors eligible for Course 21, but desiring a shorter course. Given in alternate years. Offered in 1912-13.

23. Selected Topics in Roman History Mr. DAVIS

Three credits (three hours per week); second semester. Open to students eligible for Course 24, but desiring a shorter course. To alternate with Course 22. Not offered in 1912-13.

24. History of Rome Mr. DAVIS

Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Course 2, and, on approval, to those who have taken Course 1.

This course will treat both social and political development, with considerable attention to cultural subjects. In alternate years. Given in 1912-13.

INTENSIVE COURSES

7. The Making of the Constitution Mr. WEST

Six credits (three hours per week); both semesters. Open to juniors, seniors, and graduate students who have completed Course 5, but only on the approval of the instructor.

9. Studies in American Statesmen Mr. ANDERSON

Three credits (three hours per week); second semester. Open to juniors, seniors, and graduate students who have completed Course 2, and at least the first semester of Course 5. Not given in 1912-13.

10. A Critical Study of an Historical Masterpiece Mr. ANDERSON

Three credits (three hours per week); first semester. Open to juniors, seniors, and graduate students who have completed Course 3, 4, or 5.

11. The History of American Diplomacy Mr. ANDERSON

Three credits (three hours per week); second semester. Open to seniors and graduate students who have completed Course 5.

12. The History of European Diplomacy since 1789 Mr. ANDERSON
Three credits (three hours per week); second semester. Open to seniors and graduate students who have completed or are taking Course 4; ability to read easy French is required. Not given in 1912-13.
13. Colonial Expansion and Administration Mr. WEST
Three credits (three hours per week); second semester. Open to seniors and graduate students who have completed Course 4 or 5. Given in alternate years. Not given in 1912-13.
14. A Critical Study of Authorities for Early New England History
Mr. WEST
Four credits (two hours per week); both semesters. Open to seniors and graduate students who have completed eighteen credits, including Course 5. Given in alternate years. Not given in 1912-13.
17. Beginnings of Parliament Mr. WHITE
Three credits (three hours per week); second semester. Open, on permission of the instructor, to juniors, seniors, and graduate students who have completed twelve credits, including Course 2. Students should have a knowledge of at least high school Latin. This course alternates with Course 18. Given in 1912-13.
18. Origin of the English Judicial System Mr. WHITE
Three credits (three hours per week); second semester. Open, on permission of the instructor, to juniors, seniors, and graduate students who have completed six credits in history, in addition to Course 2. Students should have a knowledge of at least high school Latin. This course alternates with Course 17. Not given in 1912-13.
19. Cromwellian England Mr. NOTESTEIN
Six credits (three hours per week); both semesters. Open to juniors, seniors, and graduate students who have completed twelve credits in History, including Course 2.
20. Church and State in the Middle Ages. Mr. DAVIS
Three credits (three hours per week); first semester. Open to juniors, seniors, and graduate students who have twelve credits in History exclusive of courses in American History.
Devoted to the study of the institutions of the Holy Roman Empire and the Papacy between the years 918 and 1254 A. D.
- For a Major*, twenty-four credits, including Course 4 or Course 5, Course 16, and at least six credits in intensive courses, are required. At least the elements of the other social sciences are recommended.
- For a Minor*, eighteen credits.
- Students who expect to teach History are advised to consult in respect to their courses with the head of the department during the freshman year.

LATIN

JOSEPH B. PIKE, M.A., Professor, Head of the Department of Latin
118 Folwell Hall
JOHN S. CLARK, B.A., Professor
111 Folwell Hall

Students who desire a recommendation to teach Latin are expected to take Courses 1, 2, 3, and 4, during the first two college years.

6. Advanced Course in Caesar Mr. PIKE
Three credits (three hours per week); first semester. Open to those who have completed Courses 1 to 4, inclusive; required for teacher's recommendation in Latin.

Selections from books five to seven of the Gallic War and from the Civil War; thorough study of the principles of indirect discourse; intermediate composition; approximately one hour for one-half semester will be spent upon technical portions of the work, e. g., class drill work and discussion of the various problems connected with secondary school work in Latin.

7. Advanced Course in Virgil Mr. PIKE
Three credits (three hours per week); second semester. Open to those who have completed Courses 1 to 4, inclusive; required for a teacher's recommendation in Latin.

An interpretation of selections from books seven to twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages; approximately one hour for one-half semester will be spent upon the strictly technical portions of the subject.

10. Latin Composition Mr. PIKE
Two credits (two hours per week); second semester. Open to those who have completed Courses 1 to 4, inclusive. Required for degree with distinction.

12. Correspondence of Cicero Mr. CLARK
Three credits (three hours per week); first semester. Open to those who have completed Courses 1 to 4, inclusive.

Selections from the letters of Cicero, with a study of the life and history of his times.

For a Major, Courses 1, 2, 3, 4, 6, and 7, with an average of at least *good* are required.

For a Minor, Courses 1, 2, 3, and 4.

Students may select additional work, on the approval of the committee, from other courses announced in Latin.

MANUAL TRAINING

JOHN J. FLATHER, Ph.B., M.M.E., Professor, Head of Department of
Mechanical Engineering 12 Mechanical Engineering Building
S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construc-
tion 18 Mechanical Engineering Building

WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Making
28 Mechanical Engineering Building

EDWARD P. QUIGLEY, Instructor in Forge Work
Mechanical Engineering Building

PETER PETERSON, Instructor in Foundry Practice
Mechanical Engineering Building

Each credit hour calls in all Manual Training courses for at least two hours of shop work.

1. Introductory Course in Wood Work Mr. RICHARDS
Three credits (six hours per week); first semester. Open to juniors or seniors.
Designed to give the elementary principles of sloyd and to develop familiarity with tools and materials.
2. Advanced Course in Wood Work Mr. RICHARDS
Three credits (six hours per week); each semester. Open to juniors and seniors.
3. Blacksmithing Mr. QUIGLEY
Three credits (six hours per week); each semester. Open to juniors and seniors.
4. Foundry Practice Mr. PETERSON
Three credits (six hours per week); each semester. Open to juniors and seniors.
5. Introductory Course in Machine Work Mr. SHIPLEY
Three credits (six hours per week); each semester. Open to juniors and seniors.
6. Advanced Course in Machine Work Mr. SHIPLEY
Three credits (six hours per week); each semester. Open to juniors and seniors.

Students may register for credit in Manual Training Courses only with the approval of the committee.

MATHEMATICS

JOHN F. DOWNEY, M.A., C.E., Professor, Head of the Department of Mathematics	119 Folwell Hall
GEORGE N. BAUER, Ph.D., Professor	100 Folwell Hall
WILLIAM H. BUSSEY, Ph.D., Assistant Professor	122 Folwell Hall
ANTHONY L. UNDERHILL, Ph.D., Assistant Professor	121 Folwell Hall
ROYAL R. SHUMWAY, B.A., Assistant Professor	122 Folwell Hall
*GEORGE P. PAINE, M.A., LL.M., Assistant Professor	120 Folwell Hall
HERMON L. SLOBIN, Ph.D., Instructor	121 Folwell Hall
JAMES S. MIKESH, B.A., Instructor	120 Folwell Hall

*Resigned June, 1912.

1. Higher Algebra, Part I Messrs. UNDERHILL, SHUMWAY, PAINE, SLOBIN, and MIKESH
Five credits (five hours per week); first semester.
2. Algebra Continued and Plane Trigonometry Messrs. UNDERHILL, SHUMWAY, PAINE, SLOBIN, and MIKESH
Five credits (five hours per week); second semester. Course 2 must be completed before credit is given for Course 1.
3. Higher Algebra, Part II Messrs. BAUER, BUSSEY, UNDERHILL, SHUMWAY, PAINE, SLOBIN, and MIKESH
Three credits (three hours per week); first semester.
4. Logarithms and Trigonometry Messrs. BAUER, BUSSEY, UNDERHILL, SHUMWAY, PAINE, SLOBIN, and MIKESH
Three credits (three hours per week); second semester. Course 4 must be completed before credit is given for Course 3.
7. Analytical Geometry Messrs. BAUER, BUSSEY, SHUMWAY, PAINE, and SLOBIN
Three credits (three hours per week); first semester. Open to those who have completed Course 2 or 4.
8. Differential Calculus Messrs. DOWNEY, BAUER, BUSSEY, SHUMWAY, PAINE, and SLOBIN
Three credits (three hours per week); each semester. Open to those who have completed Course 7.
9. Integral Calculus Mr. DOWNEY
Three credits (three hours per week); each semester. Open to those who have completed Course 8.
13. Teachers' Course Mr. SHUMWAY
One credit (one hour per week); second semester. Open to those who have completed Course 8.
Special attention is paid to the fundamental principles of Algebra and Geometry. Text and assigned readings.

For a Major, eighteen credits, with an average of at least *good*, are required, including Courses 7, 8, 9, and 13, but not including Courses 1 and 2.

For a Minor, twelve credits, not including Courses 1 and 2.

MUSIC

CARLYLE M. SCOTT, Professor, Head of the Department of Music
315 14th Ave. S. E.
LAURA FRANCES KENDALL, Instructor Practice School

1. **Harmony** Mr. SCOTT
 Four credits (two hours per week); both semesters. Open to juniors and seniors.
2. **Counterpoint** Mr. SCOTT
 Four credits (two hours per week); both semesters. Open to juniors and seniors who have a thorough knowledge of harmony.
3. **Musical Form and Free Composition** Mr. SCOTT
 Two credits (two hours per week); second semester. Open to seniors who have completed Course 1 and the first semester of Course 2.
 Intended for those specializing in music, and can be taken only with the consent of the instructor.
4. **Pianoforte** Mr. SCOTT
 Three or six credits (one and one-half or three hours per week); both semesters. Open to juniors and seniors. The fee is thirty-two or sixty-four dollars per semester.
 Intended for those who propose to pursue the higher branches of pianoforte playing, or to fit themselves for piano teaching.
5. **Pianoforte, second course** Mr. SCOTT
 Three or six credits (one and one-half or three hours per week); both semesters. Open to seniors who have completed Course 4. The fee is thirty-two or sixty-four dollars per semester.
6. **Choral Culture** Mr. SCOTT
 Two credits (one hour per week); both semesters. Open to juniors and seniors. A single credit may be secured for chorus work, provided that students pursuing work for credit take Course 1 or 2 at the same time; students may pursue chorus work without credit by securing the consent of the director.
7. **Public School Music** Mrs. KENDALL
 Four credits (two hours per week); both semesters. Open to juniors and seniors.
 This course includes methods, harmony, analysis, voice training, composition, and practice teaching. Students are expected to become members of the Chapel choir and to take part in its duties.
8. **History of Music** Mr. SCOTT
 Two credits (one hour per week); both semesters. Open to juniors and seniors.

PHILOSOPHY AND PSYCHOLOGY

NORMAN WILDE, Ph.D., Professor, Head of the Department of Philosophy and Psychology 323 Folwell Hall
 JOHN B. JOHNSTON, Ph.D., Professor

DAVID F. SWENSON, B.S., Assistant Professor	320 Folwell Hall
JAMES BURT MINER, Ph.D., Assistant Professor	317 Folwell Hall
HERBERT H. WOODROW, Ph.D., Assistant Professor	318 Folwell Hall
CARL L. RAHN, Ph.B., Instructor	320 Folwell Hall
AUSTIN S. EDWARDS, Ph.D., Instructor	316 Folwell Hall

1a. General Psychology Messrs. MINER, WOODROW, RAHN, and EDWARDS

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors. Both semesters must be completed before credit is given for the first.

This course is designed to acquaint the student with the aims and methods of psychology, the facts and laws of mental life, and the functions of the various mental processes in the adjustment of man and his environment, with special emphasis in the latter part of the course on the study of mental development and the learning process in relation to training and instinct.

2. Logic Messrs. SWENSON and RAHN

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

4. Experimental Psychology Mr. WOODROW

Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 1a.

To develop ability in the use of psychological results. Experiments by the members of the class upon each other, in attention, comparison and discrimination, sensation, affection, imagination, association, perception of space, measurement of various aspects of each of these mental processes; the relationship of these processes to educational procedure, such as the transference of training, work and fatigue, the formation of habits, the learning process, the conditions of attention, individual differences, the measurement of intelligence and the diagnosis of mental abnormalities and defects. One hour of class discussion and two double hour laboratory periods.

5. Experimental Psychology Mr. WOODROW

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 1a.

The continuation of Course 4.

11. Ethics Mr. WILDE

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors who have completed Course 1a or 1b, or Course 2.

The principles of morals; sketch of the historical development of morality followed by an analysis of its meaning, showing the elements in human nature upon which it is based and the ground of its authority. The discussion includes consideration of such questions as the nature of goodness, the authority of conscience, moral knowledge, duty, and responsibility. Consideration is also given to the application of moral principles to certain unsettled problems of moral life.

15. Mental Retardation Mr. WOODROW

Three credits (three hours per week); first semester. Open to juniors, seniors, and graduate students who have completed Course 1a.

The nature and conditions of retarded and perverted development in children, the detection of mental defects and the devising of special methods for the training of backward children. Specially designed for those contemplating teaching or social work. The observation of backward children a part of the work.

16. Advanced Educational Psychology Mr. MINER

Three credits (three hours per week); second semester. Open to seniors and graduate students who have completed Course 1a.

This course takes up the experimental and statistical methods used in the study of problems in development and education, together with the results of researches in these lines, aiming to train the student for independent psychological investigation.

All of the above courses have direct bearing upon the problems of education. The attention of future teachers is directed also to courses in Ethics, the History of Philosophy, the Philosophy of Religion, and other courses which are announced in the Bulletin of the College of Science, Literature, and the Arts.

The following course in Neurology, offered by the College of Medicine and Surgery, is of value to students who are taking advanced courses in Psychology, and who are preparing to specialize in the teaching of Education and Psychology.

26. The Nervous System and Mental Life Mr. JOHNSTON

Three credits (three hours per week); second semester. Open to juniors, seniors, and graduate students by consent of the instructor.

PHYSICS

JOHN ZELENY, Ph.D., Professor, Head of the Department of Physics	15 Physics Building
ANTHONY ZELENY, Ph.D., Professor	20 Physics Building
HENRY A. ERIKSON, Ph.D., Assistant Professor	18 Physics Building
ALOIS F. KOVARIK, Ph.D., Assistant Professor	18 Physics Building
LOUIS W. MCKEEHAN, Ph.D., Instructor	19 Physics Building
RUFUS C. SHELLENBARGER, M.A., Instructor	19 Physics Building
JAMES C. SANDERSON, Ph.D., Instructor	32 Physics Building
PAUL E. KLOPSTEG, B.S., Assistant	

1. General Physics Messrs. A. ZELENY and SANDERSON

Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors who have completed Mathematics 4 or 2 (Trigonometry); may be taken separately or in conjunction with Course 2.

Mechanics of solids and fluids, heat and sound. This is the first part of an elementary course in Physics, designed for those who do not intend to pursue the subject longer than one year. The course is experimental rather than mathematical, and gives the student a general knowledge of the fundamental principles of the subject. There will be one experimental lecture and two recitations each week.

2. General Laboratory Practice Messrs. ERIKSON and SANDERSON
One credit (two hours per week); first semester. Open to sophomores, juniors, and seniors who have completed or are taking Course 1.
Physical measurements in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods.
3. General Physics Messrs. A. ZELNY and SANDERSON
Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors who have completed Course 1; may be taken separately or in conjunction with Course 4.
Light, electricity, and magnetism. This is the second part of the elementary course begun under Course 1.
4. General Laboratory Practice Messrs. ERIKSON and SANDERSON
One credit (two hours per week); second semester. Open to sophomores, juniors, and seniors who have completed or are taking Course 3.
Physical measurements in light, electricity, and magnetism.
5. Mechanics of Solids and Fluids Messrs. KOVARIK and SHELLNBARGER
Four credits (four hours per week); first semester. Open to sophomores, juniors, and seniors who have completed Mathematics 4 or 2 (Trigonometry).
The course consists of a thorough drill in the elementary principles of mechanics. Laboratory work will be given in the last half of the semester only. This is the first part of a general course continued in Courses 6, 7, and 8.
6. Heat, Magnetism, and Electrostatics Messrs. KOVARIK and SHELLNBARGER
Four credits (one lecture, two recitations, and two hours laboratory); second semester. Open to those who have completed Course 5.
7. Electrokinetics Messrs. J. ZELNY, SHELLNBARGER, and ASSISTANT
Four credits (one lecture, two recitations, and two hours laboratory); first semester. Open to those who have completed Course 6.
8. Sound and Light Messrs. J. ZELNY, ERIKSON, SHELLNBARGER, and ASSISTANT
Four credits (one lecture, two recitations, and two hours laboratory); second semester. Open to those who have completed Course 5.
10. Physical Manipulation and Laboratory Technique Mr. J. ZELNY
Three credits (six hours per week); first semester. Open to juniors and seniors who have completed Courses 5 and 6. This course is especially useful to those who intend to teach the science or to specialize in it.
The object of the course is to give the student a knowledge of the essential physical manipulations.
22. Teachers' Course Mr. A. ZELNY
One credit (one hour per week); second semester. Open to seniors who have completed Courses 1 to 4 or 5 to 8, inclusive.

Methods of presentation and the selection of lecture material and laboratory experiments are considered.

For a Major, Courses 5, 6, 7, 8, and 22 are required, together with six credits in Chemistry.

RHETORIC AND PUBLIC SPEAKING

JOSEPH M. THOMAS, Ph.D., Professor, Head of the Department of Rhetoric and Public Speaking	310 Folwell Hall
*ADA L. COMSTOCK, M.A., Professor	313 Folwell Hall
MARGARET SWEENEY, Ph.D., Professor	
FRANK M. RARIG, M.A., Assistant Professor	309 Folwell Hall
EDWARD A. COOK, B.A., Assistant Professor	314 Folwell Hall
HENRY A. BELLOWS, Ph.D., Assistant Professor	314 Folwell Hall
DANIEL FORD, M.A., Assistant Professor	304½ Folwell Hall
CHARLES W. NICHOLS, M.A., Assistant Professor	410 Folwell Hall
WILFORD O. CLURE, B.A., LL.B., Instructor	312 Folwell Hall
HALDOR GISLASON, B.A., LL.B., Instructor	309 Folwell Hall
MILTON PERCIVAL, M.A., Instructor	304½ Folwell Hall
WARREN T. POWELL, M.A., Instructor	410 Folwell Hall
ANNA H. PHELAN, Ph.D., Instructor	313 Folwell Hall
HELEN A. WHITNEY M.A., Instructor	312 Folwell Hall

RHETORIC

1. Composition and Rhetoric Messrs. THOMAS, COOK, BELLOWS, FORD, CLURE, PERCIVAL, and POWELL, Miss SWEENEY, Mrs. PHELAN, and Miss WHITNEY

Six credits (three hours per week); both semesters. Required of freshmen.

- 2a. Exposition, Description, and Narration Messrs. THOMAS, COOK, CLURE, and PERCIVAL, Mrs. PHELAN, and Miss WHITNEY

Six credits (three hours per week); both semesters. Open to those who have completed Course 1. Students who take both 2a and 2b will receive credit for only one.

In the first semester the analysis of specimens of exposition; short themes and fortnightly essays with emphasis on careful planning and amplification. In the second semester, the same general plan applied to description and narration.

- 2b. Exposition and Argument Messrs. BELLOWS and FORD
Six credits (three hours per week); both semesters. Open to those who have completed Course 1.

In the first semester, exposition; the second semester, argument. The study of a text and the analysis of specimens, accompanied by weekly essays and shorter themes.

*Resigned June, 1912.

3. Advanced Rhetoric Mr. FORD
Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Courses 1 and 2. This course should be taken by all who expect to teach English in the secondary schools.
5. Analysis of Prose Mr. THOMAS
Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Courses 1 and 2.
6. Short-Story Writing Mr. THOMAS
Three credits (three hours per week); second semester. Open to juniors and seniors who have shown exceptional proficiency in Course 2a.
7. Essay Writing Mr. COOK
Six credits (three hours per week); both semesters. Open to juniors and seniors who have completed Courses 1 and 2.
9. Seminar in Rhetoric Mr. THOMAS
Four credits (two hours per week); both semesters. Open to seniors and graduate students who have completed Courses 1 and 2 and at least one other course.
This is intended for those who are specializing in Rhetoric and Composition. Lectures, reports, and theses on special problems of rhetorical theory.
10. Seminar in Composition Mr. THOMAS
Four credits (two hours per week); both semesters.
This course is intended for a limited number of advanced students who write with facility, and who desire personal criticism and direction. The criticism of manuscripts submitted for inspection will be accompanied by lectures upon the fundamental principles of English composition.

PUBLIC SPEAKING

20. A General Course in Public Speaking Messrs. RARIG and GISLASON
Six credits (three hours per week); both semesters. Open to those who have completed Course 1.
21. Interpretative Reading Mr. RARIG
Six credits (three hours per week); both semesters. Open to those who have completed Courses 1 and 20.
This course aims to develop intelligent, suggestive, sympathetic, reading. The text used is Shakespeare's plays.
22. Argumentation and Debate Mr. GISLASON
Six credits (three hours per week); both semesters. Open to those who have completed Courses 1 and 20.
23. Oratorical Composition Mr. RARIG
Six credits (three hours per week); both semesters. Open to those who have completed Courses 1 and 20.

ROMANCE LANGUAGES

CHARLES W. BENTON, Litt.D., Professor, Head of the Department of Romance Languages	200 Folwell Hall
CHARLES M. ANDRIST, M.L., Professor	228 Folwell Hall
JULES T. FRELIN, B.A., Assistant Professor	228 Folwell Hall
*EMMA BERTIN, Assistant Professor	223 Folwell Hall
RUTH SHEPARD PHELPS, M.A., Instructor	223 Folwell Hall
LUTHER WOOD PARKER, M.A., Instructor	
HYME LOSSE, B.A., Assistant	

1. Beginning French Messrs. ANDRIST, FRELIN, and PARKER, Miss PHELPS, and Mr. LOSSE

Ten credits (five hours per week); both semesters. Open to all, but juniors and seniors receive only half credit; not counted toward a minor in French. Both semesters must be completed before credit is given for the first semester.
2. Intermediate French Messrs. ANDRIST, FRELIN, and PARKER, and Mr. LOSSE

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Course 1. Both semesters must be completed before credit is given for the first semester.
3. Advanced French Grammar and Composition Mr. FRELIN, Miss PHELPS, and Mr. DELAMARE

Six credits (three hours per week); both semesters. Open to all who enter the University with two years of French. Both semesters must be completed before credit is given for the first semester.
4. Elementary French Conversation Messrs. ANDRIST and FRELIN

Four credits (two hours per week); both semesters. Open only to those who have completed or are taking Course 2 or 3. Both semesters must be completed before credit is given for the first semester.
5. The Classical Period of French Literature Messrs. BENTON, ANDRIST, and FRELIN

Six credits (three hours per week); both semesters. Open to those who have completed Course 2 or 3. Both semesters must be completed before credit is given for the first semester.
6. Advanced French Conversation Mr. BENTON

Four credits (two hours per week); both semesters. Open to those who have completed Course 2 or 3. Both semesters must be completed before credit is given for the first semester.

*Until June, 1912.

7. French Literature of the Nineteenth Century Mr. BENTON
Six credits (three hours per week); both semesters. Open to those who have completed Course 2 or 3, and 5. Both semesters must be completed before credit is given for the first semester.
8. Teachers' Course in French Mr. BENTON
Two credits (one hour per week); both semesters. Open to those who have completed Course 5. Both semesters must be completed before credit is given for the first semester.
9. Romance Philology Mr. BENTON
Two credits (one hour per week); both semesters. Open to those who have completed Course 5. Both semesters must be completed before credit is given for the first semester.
Lectures on the phonetical development of the French and other Romance languages from popular Latin. Reading of old French texts.
- For a Major*, an average of at least *good* in Course 2 or 3 and Courses 4, 5, 6, 7, and 8 is required.
For a Minor, eighteen credits, including Course 2 or 3 and Course 5.

SOCIOLOGY AND ANTHROPOLOGY

SAMUEL G. SMITH, Ph.D., LL.D., Professor, Head of the Department of
Sociology and Anthropology 14 Folwell Hall
ALBERT E. JENKS, Ph.D., Professor 13 Folwell Hall
SAMUEL N. REEP, Ph.D., Assistant Professor, 13 Folwell Hall

General Lectures in Sociology

President Vincent will lecture to the students in the Department of Sociology and Anthropology from time to time during the year on Social Theories and Methods of Investigation.

1. Descriptive Sociology Mr. JENKS
Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.
Concrete data concerning human association, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment; the activities and institutions natural and peculiar to the several groups studied. Text-book, lectures, and assigned readings.
2. Elements of Sociology Mr. REEP
Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.
To give a general knowledge of the field of modern sociology, for such special sociological investigations as students may wish to make. Text-books, lectures, and assigned readings.
3. Culture Anthropology Mr. JENKS
Three credits (three hours per week); first semester. Open to juniors and seniors.

An elementary course. The essential characteristics of mankind and the general features of the several races of men; the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text-books, lectures, assigned readings, and thesis.

4. Social Pathology

Mr. SMITH

Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 1 or 2.

Charities and corrections, dealing especially with problems of poverty, crime, insanity, and social degeneration; a discussion of the child problem and methods of social amelioration.

5. Social Groups

Mr. REEP

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 1 or 2.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. Ethnology

Mr. JENKS

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 1.

The different races of men natural to America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races; the causes of the origin and distribution of several races and sub-races; the future development of races; ethnological problems. Text-books, lectures, assigned readings, and thesis.

7. The Study of Institutions

Mr. SMITH

Three credits (three hours per week); first semester. Open to juniors and seniors who have completed Course 1 or 2.

The genesis of custom and the beginnings of law with the geographical and race influence in the growth of states will be studied as well as the various forms of the family and their relation to forms of civilization.

9. Social Theory

Mr. REEP

Three credits (three hours per week); second semester. Open to juniors, seniors, and graduate students who have completed Course 2 or 8 and one other course.

A study of the foundations of sociology. A study of the leading American, English, French, and German writers to discover their methods of approach to the science and the leading results they have secured.

STUDENTS

CANDIDATES GRANTED M. A. DEGREE, 1911—3

Frederick Butler Harrington, Morgan B.A. '07, Oberlin Major, Education Minor, Psychology Thesis, Some Considerations in Connection with a Modern Course of Study.	Erwin Stearns Hatch, St. Louis Park B.A. '03, Steinman College, Ill. Major, Education Minor, Psychology Thesis, A Present Demand of our Educational System.
---	---

Freeman, E. Lurton, Anoka
B.S., '94, M.S. '97, Carleton
Major, Education
Minor, Psychology
Thesis, Repeating and Retardation in the Schools of Minnesota

CANDIDATES GRANTED B. A. DEGREE, 1911—34

Joseph Elmer Anderson, Amboy	Ruth Elizabeth Hermann, Minneapolis
Fred A. Andert, Morris	Dora Jensen, Minneapolis
Kate J. Bartholf, Minneapolis	Hermine Rosalie König, Minneapolis
Frances Elvira Blake, St. Paul	Nettie C. Moulton, Dawson
Minnie Brattland, Ada	Wesley E. Peik, Jordan
Georgia L. Burgett, Faribault	Ruth Esther Peterson, Ortonville
Harold Kendall Chance, Gheen	Ilse Gertrud Probst, St. Paul
Jennie Clark, St. Paul	Alla Burtis Ransom, Minneapolis
Alice Louise Corbett, St. Paul	Frances Helen Relf, St. Paul
Helen Lois Currier, Minneapolis	Bess Lois Shannon, Minneapolis
Ida Frances Davison, Granada	Mary Ethel Spencer, Hankinson, N. D.
Vivienne Rose Doherty, St. Paul	Theodor Herman Steffen, New Ulm
Grace Fern Doremus, Duluth	Vera E. Strickler, New Ulm
Marie Erd, Duluth	Earl Sweet, Blue Earth
Blanche Bernice Grand-Maitre, Chipewa Falls, Wis.	Elsie L. Switzer, Minneapolis
Pearl Catherine Hansen, Duluth	Paul Vander Eike, Minneapolis
	Clementine Regina Whaley, St. Paul
	Robert James White, Amboy

GRADUATE STUDENTS—14

Major in Education

Benson, William A. C., St. Anthony Park	Hickey, D. Edward, St. Paul
Bieri, Margaret E., Blue Earth	Olson, Adolph, Hopkins
Blake, Frances E., St. Paul	Shavere, C. L., Minneapolis
Campbell, Carl G., Burkeville, Va.	Stearns, Kaia, Minneapolis
Ebert, Michael H., St. Paul	Street, Claude Winship, Northfield
Hansen, Anna M. K., Minneapolis	Tollefson, S. T., St. Anthony Park
	Winsted, Hulda Lucile, Minneapolis

SENIORS—40

Anderson, E. Ruth, Minneapolis	Brockway, Truma F., Minneapolis
Anderson, Edna V., St. Paul	Brotherton, Eunice H., Duluth
Armstrong, Marjorie, Duluth	Covel, Susan A., Alexandria
Bergh, Herman N., Hendrum	Davis, Margaret G., Minneapolis
Bergh, Maybelle A., Spring Grove	Dedolph, Louise G., St. Paul
Braden, Elizabeth B., Minneapolis	Eustis, Stella A., Owatonna

Everdell, Eudell D., Minneapolis
 Frances, Florence M., Minneapolis
 Geyman, Emilie L., Minneapolis
 Geyman, Grace C., Minneapolis
 Groettum, Rosetta, Minneapolis
 Hall, Gertrude B., Minneapolis
 Hamilton, Floy K., Minneapolis
 Jessup, Ruth, Minneapolis
 McElroy, Monica M., Minneapolis
 Mason, Dorothea, Somerset, Wis.
 Morrison, M. Edna, Excelsior
 Muckley, Rose M., Minneapolis
 Nelson, Adelya M., Center City
 Nelson, Anna E., Minneapolis

Norman, Ebba M., Minneapolis
 Norman, Mabel J., Ortonville
 Norwood, Vivian H., Minneapolis
 O'Neil, Grace L., Minneapolis
 Overn, Oswald B., Albert Lea
 Owen, Eunice B., Minneapolis
 Palmer, Mary J., Minneapolis
 Rankin, Janet R., Minneapolis
 Shelley, Marie M., Minneapolis
 Smith, Ethel M., Minneapolis
 Sorenson, Ruth G., Minneapolis
 Wheelock, Nellie, Minneapolis
 Wicklund, Effie M., Bingham Lake
 Winter, Edna R., Faribault

JUNIORS—35

Ackerman, Emma H., Pipestone
 Andersen, Olaf B., Jeffers
 Atwood, Marjorie, St. Cloud
 Batzer, Eliza A., Royalton
 Bowman, Edith K., St. Paul
 Brown, Clara M., International Falls
 Burrall, Jessie L., Little Falls
 Campton, Charles E., Hubbard
 Child, Marjorie W., Minneapolis
 Clark, Mrs. Addie M., Janesville
 Davy, Margaret, Minneapolis
 De Leo, Bessie N., Minneapolis
 Dix, Esther M., Minneapolis
 Ellertson, Otilia, Minneapolis
 Gaughan, Sarah, St. Paul
 Giessler, Margaret, Minneapolis
 Haigh, Margaret, Mankato

Hall, Ruth E., Minneapolis
 Halvorson, Florence A., Duluth
 Hansen, Ruth M., Duluth
 Harkness, Ida M., Mabel
 Hilton, Geneva M., Minneapolis
 Langvick, Mina M., Richville
 Leavitt, Minnie S., Minneapolis
 Livermore, Laura L., Minneapolis
 Lumm, Fannie M., Duluth
 McLaughlin, Alce M., Fergus Falls
 Mauseth, Geneva M., Minneapolis
 Mayer, Alma L., New Ulm
 Miller, Daisy M., Minneapolis
 Mountain, Luella E., Good Thunder
 Pfeiffer, Eleanor L., Mankato
 Rader, Vera, Delano
 Rugland, Helen I., Ashby

Zeien, Rosalie, North Branch

UNCLASSED—15

Brown, Anna L., Minneapolis
 Conary, Helen B., Minneapolis
 Gerry, Leila E., Minneapolis
 Granner, John P., Minneapolis
 Hegel, Edith, Minneapolis
 Hellesen, Anne E., Deer Park, Wis.
 Irle, Maude, St. Paul

Jones, Addie M., Minneapolis
 Mach, Joseph J., Montgomery
 Roberts, Margaret K., Minneapolis
 Robinson, Harriet M., Minneapolis
 Robinson, Helen E., Minneapolis
 Rowell, Katherine M., Minneapolis
 Sand, Anna, Elbow Lake

Tomlinson, Bessie A., Minneapolis

The University of Minnesota

THE SCHOOL OF CHEMISTRY

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 11. JULY 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

1912							1913													
JULY							JANUARY							JULY						
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST						
..	..	..	..	1	2	3	..	..	..	..	..	..	1	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..	..	..
SEPTEMBER							MARCH							SEPTEMBER						
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	..	..	..	..	..	..	30	31	..	..	..	..	..	..	..	..	..	..	..	..
OCTOBER							APRIL							OCTOBER						
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER						
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	1	
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..
DECEMBER							JUNE							DECEMBER						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	7	1	2	3	4	5	6
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
Sept. 30 - Oct. 5		Week	Second semester condition examinations
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
March 31-Apr. 5		Week	First semester condition examinations
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday,	Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
		2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday,	Sept. 11	9 a. m.	English
		2 p. m.	German, French, Latin, Scandinavian
Thursday,	Sept. 12	9 a. m.	Elementary Algebra
		2 p. m.	Higher Algebra
Friday,	Sept. 13	9 a. m.	Plane Geometry
		2 p. m.	Solid Geometry

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.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	- - 1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis The President of the University	- - <i>Ex-Officio</i>
The Hon. ADOLPH O. EBERHART, Mankato The Governor of the State	- - - - - <i>Ex-Officio</i>
The Hon. C. G. SCHULZ, St. Paul The State Superintendent of Public Instruction	- - - - - <i>Ex-Officio</i>
The Hon. W. J. MAYO, Rochester	- - - - - 1913
The Hon. MILTON M. WILLIAMS, Little Falls	- - - - - 1913
The Hon. HENRY B. HOVLAND, Duluth	- - - - - 1914
The Hon. A. E. RICE, Willmar	- - - - - 1915
The Hon. CHARLES L. SOMMERS, St. Paul	- - - - - 1915
The Hon. B. F. NELSON, Minneapolis	- - - - - 1916
The Hon. PIERCE BUTLER, St. Paul	- - - - - 1916
The Hon. CHARLES A. SMITH, Minneapolis	- - - - - 1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature,
 and the Arts
 FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and
 Mechanic Arts
 ALBERT F. WOODS, M.A., Dean and Director of the Department of
 Agriculture
 WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
 FRANK FAIRCHILD WESBROOK, M.A., M.D., C. S., Dean of the College of
 Medicine and Surgery
 ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Den-
 tistry
 FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
 WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
 GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
 GEORGE F. JAMES, Ph.D., Dean of the College of Education
 HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
 ADA L. COMSTOCK, M.A., Dean of Women

SCHOOL OF CHEMISTRY

FACULTY

- GEORGE EDGAR VINCENT, Ph.D., LL.D., President
1005 5th St. S. E.
- CYRUS NORTROP, LL.D., President, Emeritus
519 10th Ave. S. E.
- GEORGE B. FRANKFORTER, M.A., Ph.D., Dean and Professor of Chemistry
525 E. River Road
- CEPHAS D. ALLIN, LL.B., M.A., Assistant Professor of Political Science
112 Church St. S. E.
- WILLIAM R. APPLEBY, M.A., Professor of Metallurgy
911 5th St. S. E.
- GEORGE N. BAUER, Ph.D., Professor of Mathematics
1115 E. River Road
- WILLIAM E. BROOKE, B.C.E., M.A., Professor of Mathematics and Mechanics
416 Walnut St. S. E.
- OSCAR C. BURKHARD, M.A., Assistant Professor of German
610 13th Ave. S. E.
- WILLIAM H. BUSSEY, Ph.D., Assistant Professor of Mathematics
8 Melbourne Ave. S. E.
- *EDMUND L. BUTTS, Major U. S. A., Professor of Military Science and Tactics
Hotel Plaza
- PETER CHRISTIANSON, B.S., E.M., Professor of Metallurgy
208 Beacon St. S. E.
- FREDERIC E. CLEMENTS, Ph.D., Professor of Botany
800 4th St. S. E.
- IRA H. DERBY, Ph.D., Assistant Professor of Chemistry
2157 Commonwealth Ave., St. Paul
- JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
1115 5th St. S. E.
- J. FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics
312 State St. S. E.
- HENRY T. EDDY, C.E., Ph.D., LL.D., D.Sc., Professor of Mathematics and Mechanics
916 6th St. S. E.
- WILLIAM H. EMMONS, Ph.D., Professor of Geology and Mineralogy
1120 6th St. S. E.
- HENRY A. ERIKSON, B.E.E., Ph.D., Assistant Professor of Physics
424 Harvard St. S. E.

*Term of service expires September 1, 1912.

- JOHN J. FLATHER, Ph.B., M.M.E., Professor of Mechanical Engineering
315 11th Ave. S. E.
- FRANCIS C. FRARY, Ph.D., Assistant Professor of Chemistry
608 13th Ave. S. E.
- JOHN H. GRAY, Ph.D., Professor of Economics 412 Walnut St. S. E.
- FRANK F. GROUT, M.S., Assistant Professor of Mineralogy
1202 7th St. S. E.
- EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
1316 7th St. S. E.
- HANS JUERGENSEN, M.A., Assistant Professor of German
1612 11th Ave. S.
- WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
118 State St. S. E.
- WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive
Geometry 217 Beacon St. S. E.
- ALOIS F. KOVARIK, M.A., Ph.D., Assistant Professor of Physics
1105 6th St. S. E.
- JOHN V. MARTENIS, M.E., Assistant Professor of Mechanical Engineering
217 Harvard St. S. E.
- JOHN G. MOORE, B.A., Professor of German
2810 University Ave. S. E.
- HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
905 6th St. S. E.
- EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
914 7th St. S. E.
- LEVI B. PEASE, M.S., Professor of Metallurgy 1070 16th Ave. S. E.
- EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
827 7th St. S. E.
- CARL OTTO ROSENDAHL, Ph.D., Professor of Botany
2191 Commonwealth Ave., St. Paul
- WILLIAM T. RYAN, E.E., Assistant Professor of Electrical Engineering
3228 4th St. S. E.
- WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
625 Fulton St. S. E.
- GEORGE D. SHEPARDSON, M.A., M.E., D.Sc., Professor of Electrical
Engineering 717 E. River Road
- S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construc-
tion 1517 E. River Road
- CHARLES F. SHOOP, B.S., Assistant Professor of Experimental Engineer-
ing 108 Beacon St. S. E.
- ROYAL R. SHUMWAY, B.A., Assistant Professor of Mathematics
716 12th Ave. S. E.
- CHARLES F. SIDENER, B.S., Professor of Chemistry
1320 5th St. S. E.
- FRANK W. SPRINGER, E.E., Professor of Electrical Engineering
316 12th Ave. S. E.
- JOSEPH M. THOMAS, Ph.D., Professor of Rhetoric ●
623 14th Ave. S. E.

- JOSEPHINE E. TILDEN, M.S., Professor of Botany
1288 County Road, St. Paul
- ANTHONY L. UNDERHILL, Ph.D., Assistant Professor of Mathematics
615 6th St. S. E.
- JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science
1120 6th St. S. E.
- ANTHONY ZELENY, M.S., Ph.D., Professor of Physics
613 Fulton St. S. E.
- JOHN ZELENY, B.A., Ph.D., Professor of Physics
712 10th Ave. S. E.

INSTRUCTORS

- FRANK W. BLISS, M.S., Instructor in Chemistry
511 15th Ave. S. E.
- OLIVER BOWLES, M.A., Instructor in Mineralogy and Crystallography
321 19th Ave. S. E.
- HAROLD H. BROWN, M.A., Instructor in Chemistry
914 4th St. S. E.
- LILLIAN COHEN, M.S., Instructor in Chemistry
415 E. 14th St.
- LOUIS J. COOKE, M.D., Director of the Gymnasium
909 6th St. S. E.
- JAMES DAVIES, Ph.D., Instructor in German
616 12th Ave. S. E.
- ROBERT W. FRENCH, B.S., Instructor in Drawing
1035 13th Ave. S. E.
- WILLIAM H. HUNTER, Ph.D., Instructor in Chemistry
112 Church St. S. E.
- A. WALFRED JOHNSTON, M.A., Instructor in Geology
417 Union St. S. E.
- LOUIS W. MCKEEHAN, Ph.D., Instructor in Physics
- FRANKLIN R. MCMILLAN, C.E., Instructor in Experimental Engineering
321 Oak St. S. E.
- LILLIAN L. NYE, M.A., Instructor in Chemistry
1625 7th St. S. E.
- PETER E. PETERSON, Instructor in Foundry Practice
3709 Clinton Ave.
- EARL PETTIJOHN, M.S., Instructor in Chemistry
3012 James Ave. S.
- FREDERICK POPPE, M.S., Instructor in Chemistry
1110 7th St. S. E.
- EDWARD P. QUIGLEY, Instructor in Forge Work
2442 15th Ave. S.
- WILLIAM H. RICHARDS, Instructor in Shop Work
1423 W. 27th St.
- FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing
414 Oak St. S. E.
- JAMES C. SANDERSON, Ph.D., Instructor in Physics
710 13th Ave. S. E.
- RUFUS C. SHELLNBARGER, M.A., Instructor in Physics
1105 6th St. S. E.
- EDGAR K. SOPER, B.A., Instructor in Economic Geology
417 Union St. S. E.
- WOLDEMAR M. STERNBERG, B.S. Chem., Instructor in Chemistry
2109 Lyndale Ave. S.
- STERLING TEMPLE, M.A., Instructor in Chemistry

RICHARD WISCHKAEMPER, M.A., Instructor in German

504 Beacon St. S. E.

ASSISTANTS

ROGER WILSON, M.A., Shevlin Fellow in Chemistry

ELMER A. DANIELS, B.S. in Chem., Assistant in Chemistry

HENRY J. HOFFMANN, B.S. in Chem., Assistant in Chemistry

ARTHUR C. DENNIS, B.A., Assistant in Chemistry

WILLIAM METHLEY, Lecture Assistant

JUNIUS EDWARDS, B.S., Assistant in Chemistry

ADMISSION

Examinations for admission will be held at the beginning of the year. See calendar and program of examinations.

No student will be registered for first semester's work after September 28, 1912 or for the second semester's work after February 15, 1913.

All applicants should present themselves to the Registrar who will furnish them with application blanks and directions covering examinations and registration.

GENERAL REGULATIONS GOVERNING ADMISSION*

Admission is either by certificate or by examination. In either case, candidates must present:

(1) Four years of English, or three years of English accompanied by four years of one foreign language.

(2) A major series of three or more units and a minor series of two units, each series chosen from one of the admission groups, B, C, D, E. Either the major or the minor series must be in Mathematics†, and both may not be in the same group. To form a language series, at least two units of the same language must be offered.

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

No candidate will be admitted with less than fifteen units of the required grade. The Enrollment Committee 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.

Certificates from the College Entrance Examination Board and from the State High School Board are accepted under either plan of admission as satisfying the scholarship requirement.

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 qualifications to continue the second semester's work.

1. ADMISSION BY EXAMINATION

Entrance examinations are offered at the University during the opening week of the University year. Candidates must pass examinations in all subjects specified above, except such as may be covered by College Entrance Examination Board or State High School Board certificates.

*In September, 1913, and thereafter, admission will be governed by the rules here stated; in September, 1912, candidates will be admitted under either this plan, or the one stated in the Bulletin for 1911-12, pp. 14-18.

†Students entering the Analytical Course or the Five-Year Course in Applied Chemistry must present one-half unit in Higher Algebra.

2. ADMISSION BY CERTIFICATE

The following are admitted to the freshman class by certificate:

(a) Graduates of a four-year course of a Minnesota State High School or other accredited school in Minnesota, provided they meet the general requirements stated above, and the following special requirements as to grades.

(1) The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted toward graduation. All records shall be entered on this certificate as *passed*, *passed with credit*, or *passed with honor*.*

To facilitate the operation of this rule, each accredited school is expected to keep its record of standings in these three grades or else show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these grades.

(2) Candidates for admission on certificate must have an average record in the subjects counted for admission of *pass with credit*. For the purpose of this average a *pass* is offset by a *pass with honor*. Candidates are therefore admitted provided they have at least as many semester marks of *pass with honor* as they have semester marks of *pass*.

Candidates entering on certificate shall not be examined for admission on subjects which are lacking or below the required grade, except on presentation to the Enrollment Committee of satisfactory evidence that they have done adequate special work in preparation for the examination. A certificate from the principal of the last school attended, or other person approved by the Enrollment Committee, shall constitute satisfactory evidence; and adequate special preparation shall consist of not less than thirty 60-minute hours under competent instruction on each semester subject presented for examination. (See (c), last paragraph.)

(b) Graduates of the Advanced Latin and Advanced English courses of the Minnesota State Normal Schools.

(c) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state, provided such candidates satisfy all the requirements as to major and minor series, subjects, and grades demanded of the graduates of Minnesota High Schools. (See 2(a) above.)

In case the records of any candidate from another state cannot be translated into the grades used in this state, the Enrollment Committee shall order examinations in English and also in three other subjects chosen from three different admission groups. The results of such examinations shall be final.

The examinations authorized under 2 (a) and 2 (c) shall be held at the same time and according to the same schedule as the regular entrance examinations mentioned under 1.

*In per cent, these three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, passed = 65-75, passed with credit = 75-90, passed with honor = 90-100.

(2) In schools having 75 as a passing mark, passed = 75-80, passed with credit = 80-90, passed with honor = 90-100.

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: Foreign Languages

Latin—

Grammar, one unit

Caesar, 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

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

Manual Subjects—

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

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 Subjects Accepted for Admission

A description of subjects accepted for admission to the University will be found in the Bulletin of General Information which will be sent to any address upon application to the Registrar, The University of Minnesota, Minneapolis, Minnesota.

ADVANCED STANDING

The University accepts records from all reputable colleges for credit toward advanced standing. Such records are accepted as far as they are equivalent to the work done in this University. In bringing records from other institutions the certificate must be upon the official blank of the institution granting the certificate, and should show:

1. The subjects studied; if a language, the work read, etc.
2. The time spent on each subject.
3. Ground covered in laboratory work in case of laboratory subject.
4. The result. It is sufficient to state that the subject was creditably completed.

Records from institutions whose entrance requirements are not essentially equivalent to the requirements of the University, will not be accepted unquestioned; the credit to be allowed will be decided in individual cases by the Enrollment Committee.

Credit in Shop Work and Drawing will be given for work in Manual Training, or for practical experience; provided the applicant can give 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 the advanced credit.

GENERAL INFORMATION

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 B.S. in Chemistry, while the five-year course leads to the degree of B.A., after four years, and B.S. in Chemistry at the end of the fifth.

The third or Applied course extends over five years, leading to the degree of B.S. 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.

DAILY ROUTINE

The morning session begins at 8:00 o'clock. A general assembly of the Faculty and students is held on Tuesdays, Thursdays, and Saturdays, at 12:00 o'clock, at which there are brief and simple religious exercises. Work extends through six days of the week.

FEEES

All students in the college are charged an incidental fee of fifty-five dollars (\$55.00) a year, one-half of which is payable at the beginning of each semester. This incidental fee includes laboratory charges. No reduction is made for late entrance or for leaving before the end of the semester. The incidental fee is increased by a penalty fee of one dollar in case of students who register or pay fees after the prescribed time. (See calendar, page 3.) After the day previous to that on which classes begin, the penalty for delay increases at the rate of twenty-five cents a day.

Every student in this School is assigned, at the time of registration, a post-office box, for which a rental charge of fifty cents per year is made. Students are held responsible for the receipt of official notices sent through the University post-office.

A deposit fee of five dollars, payable at the beginning of the first semester, is required of every student. Against this deposit is charged rentals of post-office box and lockers, penalties for late registration or late payment of fees, and condition examination fees. The unused balance is returned at the end of the year. If, at any time during the year, the charges against a student exceed the amount of the deposit, a second deposit of five dollars is required.

EQUIPMENT

Buildings.—The two buildings occupied by the School contain six large laboratories and about twenty smaller ones, well equipped for carry-

ing on a wide range of work. An appropriation of \$405,000 was granted by the last legislature for the erection of a new chemical laboratory. It is expected that this building will be ready for occupancy by the opening of the school year 1913-14.

Library.—The chemical library contains complete sets of most of the important journals. It contains besides these special sets, a well represented list of analytical and technical works, as well as many rare old works of great historical value. Most of the important journals are taken, thus enabling the student to keep abreast of the times. All books are easily accessible, with only the necessary restrictions to guard against injury and loss.

Industrial Museum.—Considerable space is given to a collection in industrial, technical, and applied chemistry. There is a large collection of chemicals, with specimens of each in the various stages of preparation and purification; a collection of nearly all the elements, with most of their important salts; a large number of mining and metallurgical specimens, including most of the important ores, together with many rare specimens in crystallography. The collection of coals and petroleums is especially valuable for lecture and technical work. There is a large collection of dyes, organic and inorganic, mordants, textiles, and other materials used in dyeing and bleaching, with a rapidly increasing collection of clays and materials used in making glass, earthenware, porcelain, and brick. A collection of furnace products, models and series of charts, blue prints and photographs illustrating a wide range of technical and chemical processes is being added.

Industrial Photography.—The photographic laboratories are equipped with process lenses, copying cameras, printing frames, presses, etching tubs, etc., for the production of half-tone, zinc etching, and color work. Students who desire to study photoengraving may specialize in this work during the junior and senior years.

CHEMICAL SOCIETIES

American Chemical Society.—A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

School of Chemistry Society.—The School of Chemistry Society is an organization of the students of the School, which meets once a month to consider topics of general interest. The society also procures lecturers to address the School.

Industrial Excursion.—At the close of the senior year the class with certain members of the Faculty make a trip of about a week's duration where industrial chemical plants can be seen and studied in actual operation.

COURSES OF STUDY

ANALYTICAL CHEMISTRY

FRESHMAN YEAR

First Semester

Chemistry 2b, General and Analytical, four credits
Drawing 21, Technical, three credits
Mathematics 3a, Algebra, Trigonometry, and Analytical Geometry,
five credits
Mineralogy 18, Elements, three credits
Rhetoric 1, Rhetoric and Composition, three credits
Military Drill, three hours
Physical Training, one hour, (for men), or
Physical Training, three hours, (for women)

Second Semester

Chemistry 2b, General and Analytical, four credits
Drawing 21, Technical, three credits
Mathematics 3a, Algebra, Trigonometry, and Analytical Geometry, five
credits
*Metallurgy 1, Assaying, six credits
Rhetoric 1, Rhetoric and Composition, three credits
Military Drill, three hours
Physical Training, one hour, (for men), or
Physical Training, three hours, (for women)

SOPHOMORE YEAR

First Semester

Animal Biology 1, General Zoology, three credits
or
Botany 1, General, three credits
Chemistry 4, Quantitative Analysis, four credits
Chemistry 5, Organic, four credits
Chemistry 8, Inorganic Preparations, three credits
German 1a or 4, five or three credits
Mathematics 8, Differential Calculus, three credits
Military Drill, three hours

Second Semester

Animal Biology 1, General Zoology, three credits
or
Botany 1, General, three credits
Chemistry 4, Quantitative Analysis, four credits

*Women must take Mineralogy 19 instead of Metallurgy 1.

Chemistry 5, Organic, four credits
 German 1a or 4, five or three credits
 Mathematics 9, Integral Calculus, three credits
 Military Drill, three hours

JUNIOR YEAR

First Semester

†Chemistry 9, Sugar, three credits
 Chemistry 10, Special Problems, three credits
 Chemistry 29, Photochemistry, three credits
 Geology 1a, General, three credits
 *Metallurgy 2, General and Iron, three credits
 Mineralogy 24a, Morphology of Minerals, three credits
 Physics 1, General, three credits
 Physics 2, Laboratory, one credit

Second Semester

†Chemistry 7, History, two credits
 Chemistry 6, Theoretical, two credits
 Chemistry 13, Glass Blowing, one credit
 Chemistry 11a, Iron and Steel Analysis, three credits
 Chemistry 12, Mineral Analysis, two credits
 *Metallurgy 3, Wrought Iron and Steel, three credits
 Physics 3, General, three credits
 Physics 4, Laboratory, one credit

SENIOR YEAR

First Semester

Chemistry 14, Water Analysis, two credits
 Chemistry 16, Industrial, three credits
 Chemistry 18, Physical, four credits
 Chemistry 19, Gas and Coal Analysis, three credits
 Chemistry 15a, Food Analysis, three credits
 *Metallurgy 4, Base Metals, four credits
 Thesis

Second Semester

Chemistry 20, Colloquium, two credits
 Chemistry 22, Electrochemistry, three credits

*These courses are not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee.

†During the junior and senior years the student, if prepared, has the privilege of specializing for not less than two semesters along one of the following lines:

1. Industrial Art including Photochemistry and Photoengraving.
2. Industrial and Chemical Botany.
3. Physiology and Physiological Chemistry.
4. Iron and Steel Analysis.

†Chemistry 23, Microchemistry, two credits
 Chemistry 15b, Food Analysis, three credits
 *Metallurgy 5, Precious Metals, four credits
 Thesis

FIVE-YEAR COURSE IN ARTS AND CHEMISTRY

The degree of Bachelor of Arts will be conferred upon any student who completes the work prescribed in the first four years of the following course.

The degree of Bachelor of Science in Chemistry will be conferred upon the completion of the fifth year of the course.

FRESHMEN YEAR

First Semester

Chemistry 1, General, three credits
 or
 Chemistry 2a, Advanced General, three credits
 Mathematics 1, Higher Algebra, Part I, five credits
 or
 Mathematics 3, Higher Algebra, Part II, three credits
 German 1a or 4, five or three credits
 Rhetoric 1, Rhetoric and Composition, three credits
 Military Drill, three hours
 Physical Training, one hour, (for men), or
 Physical Training, three hours, (for women)

Second Semester

Chemistry 1, General, three credits
 or
 Chemistry 2a, Advanced General, three credits
 Mathematics 2, Higher Algebra and Plane Trigonometry, five credits
 or
 Mathematics 4, Logarithms and Trigonometry, three credits
 German 1a or 4, five or three credits
 Rhetoric 1, Rhetoric and Composition, three credits
 Military Drill, three hours
 Physical Training, one hour, (for men), or
 Physical Training, three hours, (for women)

*These courses are not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee.

†During the junior and senior years the student, if prepared, has the privilege of specializing for not less than two semesters along one of the following lines:

1. Industrial Art including Photochemistry and Photoengraving.
2. Industrial and Chemical Botany.
3. Physiology and Physiological Chemistry.
4. Iron and Steel Analysis.

SOPHOMORE YEAR

First Semester

Chemistry 3, Qualitative Analysis, three credits
 Mathematics 7, Analytical Geometry, three credits
 *German 3a or 7, three credits
 Drawing 21, Technical, three credits
 Mineralogy 18, Elements, three credits
 Chemistry 8, Inorganic Preparations, three credits
 Military Drill, three hours

Second Semester

Chemistry 3, Qualitative Analysis, three credits
 Mathematics 8, Differential Calculus, three credits
 *German 3a or 7, three credits
 Drawing 21, Technical, three credits
 †Metallurgy 1, Assaying, six credits
 Military Drill, three hours

JUNIOR YEAR

First Semester

Animal Biology 1, General Zoology, three credits
 or
 Botany 1, General, three credits
 Chemistry 4, Quantitative Analysis, four credits
 Chemistry 5, Organic, four credits
 **German 7, three credits
 Electives, three credits

Second Semester

Animal Biology 1, General Zoology, three credits
 or
 Botany 1, General, three credits
 Chemistry 4, Quantitative Analysis, four credits
 Chemistry 5, Organic, four credits
 **German 7, three credits
 Electives, three credits

SENIOR YEAR

Same as junior year in Analytical Course.

POST SENIOR YEAR

Same as senior year in Analytical Course.

*Those who have completed German 4 must take German 7.

†Women must take Mineralogy 19 instead of Metallurgy.

** Those who have taken German 7 will take Economics 1, first semester, and Political Science 1, second semester.

APPLIED CHEMISTRY

FRESHMAN YEAR

Chemistry 2b, General and Analytical, six credits
Drawing 1, Freehand, two credits, (first semester)
Drawing 2, Mechanical, two credits, (second semester)
Drawing 3 and 4, Descriptive Geometry, four credits
Mathematics 3a, Algebra, Trigonometry, and Analytical Geometry, ten credits
Mechanical Engineering 1, Carpentry and Pattern Making, four credits
Mechanical Engineering 2, Blacksmithing, two credits
Rhetoric 1, Rhetoric and Composition, six credits
Military Drill, three hours

SOPHOMORE YEAR

First Semester

Chemistry 4, Quantitative Analysis, four credits
Drawing 5, Drafting, three credits
German 1a or 4, five or three credits
Mathematics 8, Differential Calculus, three credits
Mechanical Engineering 3, Foundry Practice, three credits
Physics 5, Mechanics of Solids and Fluids, four credits
Military Drill, three hours

Second Semester

Chemistry 4, Quantitative Analysis, four credits
Drawing 5, Drafting, three credits
German 1a or 4, five or three credits
Mathematics 9, Integral Calculus, three credits
Mechanical Engineering 4, Machine and Bench Work, three credits
Physics 6, Heat, Magnetism, and Electrostatics, four credits
Military Drill, three hours

JUNIOR YEAR

First Semester

Chemistry 5, Organic, four credits
Mechanical Engineering 11, Mechanism, three credits
Mineralogy 18, Elements, three credits
Physics 7, Electrokinetics, four credits
Physics 11, Theoretical Mechanics, three credits

Second Semester

Chemistry 5, Organic, four credits
Mechanical Engineering 12, Kinematics, three credits
Physics 8, Sound and Light, four credits
Physics 11, Theoretical Mechanics, three credits
Metallurgy 1, Assaying, six credits

SENIOR YEAR

First Semester

Chemistry 14, Water Analysis, two credits
 Chemistry 19, Gas and Coal Analysis, three credits
 Electrical Engineering 5, Electric Power, three credits
 †Geology 1a, General, three credits
 Mechanical Engineering 13, Machine Design, five credits
 Metallurgy 2, General and Iron, three credits

Second Semester

Chemistry 6, Theoretical, two credits
 Chemistry 11a, Iron and Steel, three credits
 †Economics 1, Elements, three credits
 Electrical Engineering 5, Electric Power, three credits
 Mechanical Engineering 20, Steam Engine, three credits
 Metallurgy 3, Wrought Iron and Steel, three credits

POST SENIOR YEAR

First Semester

Chemistry 9, Sugar, three credits
 Chemistry 16, Industrial, three credits
 Chemistry 18, Physical, four credits
 †Elective, two or three credits
 Mechanical Engineering 19, Steam Boilers, one credit
 Political Science 16, American Government, two credits
 Thesis, six hours

Second Semester

†Chemistry 15b, Food Analysis, three credits
 Chemistry 17, Industrial, three credits
 Chemistry 22, Electrochemistry, three credits
 †Elective, two or three credits
 Political Science 6, Engineering Law, two credits
 Thesis, six hours

†Students wishing to specialize in Electrochemistry, Gas Engineering, or Sugar Technology, may elect special subjects in place of subjects marked thus.

DEPARTMENTAL STATEMENTS

ANIMAL BIOLOGY

HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
205 Pillsbury Hall
CHARLES P. SIGERFOOS, Ph.D., Professor of Zoology 201 Pillsbury Hall
HAL DOWNEY, M.A., Ph.D., Assistant Professor of Comparative Histology
203 Pillsbury Hall
OSCAR W. OESTLUND, M.A., Ph.D., Assistant Professor of Animal Biology
220 Pillsbury Hall
CHARLES E. JOHNSON, Ph.D., Instructor in Comparative Anatomy of
Vertebrates 2 Pillsbury Hall

1. General Zoology Messrs. NACHTRIEB and SIGERFOOS

Six credits (six hours per week); both semesters. No prerequisite.

A general survey of the animal kingdom, aiming at an appreciation of the principles of organization, physiology, and development of animals. In the laboratory representatives of the chief branches of the animal kingdom are studied in detail, and three or four weeks are devoted to a study of the development of the chick and some invertebrate. Lectures, quizzes, and laboratory work.

2. Essentials of Histology and Embryology Mr. DOWNEY

Six credits (six hours per week); both semesters. Prerequisite, Course 1.

The development and minute structure of the animal as an organism built up of tissues combined into organs, and practice in general methods and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

3. Essentials of Histological and Embryological Technique

Mr. DOWNEY

Three credits (six hours per week); second semester. Open to sophomores, juniors, and seniors who have completed Course 1 and the first semester of Course 2.

4. General Physiology

Mr. NACHTRIEB

Six credits (six hours per week); both semesters. Prerequisite, Course 1. Both semesters must be completed before credit can be obtained for the first semester.

In the first semester, the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester, the life of the cell in its relation to that of other cells.

For advanced and special courses, see the Bulletin of the College of Science, Literature, and the Arts.

BOTANY

FREDERIC E. CLEMENTS, Ph.D., Professor of Botany	207 Pillsbury Hall
CARL OTTO ROSENDAHL, Ph.D., Professor of Botany	18 Pillsbury Hall
JOSEPHINE E. TILDEN, M.S., Professor of Botany	214 Pillsbury Hall
FREDERIC K. BUTTERS, B.S., B.A., Assistant Professor of Botany	206 Pillsbury Hall
NED L. HUFF, M.A., Assistant Professor of Botany	214 Pillsbury Hall
ALICE MISZ, M.A., Instructor	16 Pillsbury Hall

1. General Botany Messrs. CLEMENTS, HUFF, and BUTTERS, and
Miss MISZ

Six credits (four hours laboratory, two lectures per week); both semesters. No prerequisite. Both semesters must be completed before credit is given for the first semester.

Laboratory study of the structure of flowering plants, from organs through parts and tissues to cells, followed by a brief study of the common types of flowerless plants, leading to the origin of the flower and seed habit, and the classification of flowering plants; greenhouse study of the behavior of plants, correlated with the study of organs and tissues; field work and classification of trees and shrubs, fruits and seeds, buds and shoots, and spring flowers.

2. Advanced Botany Messrs. CLEMENTS and ROSENDAHL, and
Miss MISZ

Six credits (three hours laboratory, three lectures per week); both semesters. Prerequisite, Course 1.

Greenhouse and field study of the important flower families from the standpoint of evolution, classification, and identification, with especial reference to woody plants, composites, weeds and grasses; in the second semester, the emphasis is upon pollination and seed production, following the life history from the origin of pollen grains and ovules through fertilization, development of the embryo, germination and growth; during the spring, particular attention is given to the correlation of the year's results by means of the chart method of identification and classification.

11. Industrial Botany Miss TILDEN

Six credits (six hours per week); both semesters. Prerequisite, Course 1.

A study of the origin, distribution, and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics, and laboratory work.

15. Botanical Microchemistry Mr. CLEMENTS

Six credits (six hours per week); both semesters. Prerequisite, Course 1.

This course is designed especially for students in the School of Chemistry. It comprises a microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory, and reference work.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Dean and Professor of Chemistry
114 Chemistry Building

CHARLES F. SIDENER, B.S., Professor of Chemistry
203 Chemistry Building

IRA H. DERBY, Ph.D., Assistant Professor of Chemistry
220 Chemistry Building

EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
209 Chemistry Building

EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
104 Chemistry Building

FRANCIS C. FRARY, Ph.D., Assistant Professor of Chemistry
108 Chemistry Building

FRANK W. BLISS, M.S., Instructor in Chemistry
205 Chemistry Building

HAROLD H. BROWN, M.A., Instructor in Chemistry
LILLIAN COHEN, M.S., Instructor in Chemistry 106 Chemistry Building

WILLIAM H. HUNTER, Ph.D., Instructor in Chemistry
207 Chemistry Building

LILLIAN L. NYE, M.A., Instructor in Chemistry 106 Chemistry Building

EARL PETTIJOHN, M.S., Instructor in Chemistry
216 Chemistry Building

FREDERICK POPPE, M.S., Instructor in Chemistry

WOLDEMAR M. STERNBERG, B.S.Chem., Instructor in Chemistry

ELMER DANIELS, B.S., Assistant in Chemistry

HENRY J. HOFFMANN, B.S., Assistant in Chemistry

ROGER WILSON, M.A., Shevlin Fellow

ARTHUR C. DENNIS, B.A., Assistant in Chemistry

JUNIUS EDWARDS, B.S., Assistant in Chemistry

1. General Chemistry Mr. FRANKFORTER, Miss COHEN, and ASSISTANTS
Six credits (two lectures, four hours laboratory per week); both semesters. No prerequisite.

The course includes a study of the chemical properties of the metallic and non-metallic elements, with a brief introduction to organic chemistry.

2a. Advanced General Chemistry Mr. FRANKFORTER, Miss COHEN,
Miss NYE, and ASSISTANTS
Six credits (two lectures, four hours laboratory per week); both semesters. Prerequisite, entrance credit in Chemistry.

The course includes besides descriptive and metallurgical chemistry, an introduction to physical and organic chemistry.

2b. General and Analytical Chemistry Mr. FRANKFORTER
Eight credits (two lectures, five hours laboratory per week); both semesters. Required of freshmen in School of Chemistry and School of Mines.

The course includes an introduction to descriptive, physical, and metallurgical chemistry, and qualitative analysis.

3. Qualitative Analysis Messrs. NICHOLSON, BLISS, and ASSISTANTS
Six credits (one lecture, four hours laboratory per week); both semesters. Prerequisite, Course 1 or 2a.

The course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. Quantitative Analysis Messrs. SIDENER, PETTIJOHN, and STERNBERG
Eight credits (four credit hours per week); both semesters. Prerequisite, Course 2b or 3.

The course includes a 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.

5. Organic Chemistry Messrs. FRANKFORTER, DERBY, HUNTER,
BROWN, and ASSISTANTS
Eight credits (two lectures, four hours laboratory per week); both semesters. Prerequisite, Course 2b or 3.

This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.

6. Theoretical Chemistry Mr. DERBY
Two credits (one lecture and one recitation per week); second semester. Prerequisite, Course 5.

The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.

7. History of Chemistry Miss COHEN
Two credits (two recitations per week); second semester. Prerequisite, Course 5.

This course includes a full historical discussion of alchemy and chemistry.

8. Inorganic Preparations Mr. HARDING
Three credits (six hours laboratory); first semester. Prerequisite, Course 2b.

The preparation of inorganic salts, supplemented by Thorpe's *Inorganic Preparations*.

9. Sugar Chemistry Mr. NICHOLSON
Three credits (one lecture, four hours laboratory per week); first semester. Prerequisite, Course 5.

The course includes the technology and chemical control of sugar manufacture.

10. Special Problems Messrs. SIDENER, PETTIJOHN, and STERNBERG
Three credits (six hours laboratory per week); first semester. Prerequisite, Course 4.

The course includes the working out of various mineralogical, technological, and metallurgical problems.

- 11a. Iron and Steel Analysis Messrs. SIDENER, PETTIJOHN, and STERNBERG
Three credits (six hours laboratory per week); second semester. Prerequisite, Course 4.

This course includes the methods for the determination of the common constituents of iron ores, iron and steel.

11b. Special Iron and Steel Analysis Mr. SIDENER
Four credits (four hours laboratory per week). Prerequisite, Course

11a.
This course includes the analysis of special steels and steel-making alloys.

12. Mineral Analysis Mr. SIDENER
Two credits (four hours laboratory per week); second semester.
Prerequisite, Course 4.

This course includes refined methods for the complete analysis of rocks.

13. Glass Blowing Mr. FRARY
One credit (two hours laboratory per week); second semester.

The course includes the methods used in the construction and repair of simple glass apparatus.

14. Water Analysis Mr. FRANKFORTER
Two credits (four hours laboratory per week); first semester. Pre-
requisite, Course 4.

The course includes an exhaustive discussion of the chemical and sanitary properties of water.

15a. Food Analysis Mr. HARDING
Six credits (six hours laboratory per week); both semesters. Pre-
requisite, Course 5.

The course includes the chemical analysis of the various food products and the detection of the common adulterants.

15b. Food Analysis Mr. HARDING
Second semester. Continuation of Course 15a.

16. Industrial Chemistry Mr. FRARY
Three credits (two lectures, two hours laboratory per week); first
semester. Prerequisite, Course 5.

The course includes the discussion of methods and apparatus used in chemical technology, the testing of commercial chemical products, and excursions.

17. Industrial Chemistry Mr. FRARY
Second semester. Continuation of Course 16.

18. Physical Chemistry Mr. DERBY
Four credits (one lecture, six hours laboratory per week); first semes-
ter. Prerequisite, Chemistry 5, Physics 3 and 4.

The course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

19. Gas and Coal Analysis Mr. HARDING
Three credits (one lecture, four hours laboratory per week); first
semester. Prerequisite, Course 4.

The course comprises the method of collecting and storing gases previous to their analysis; the methods of manufacturing commercial gases; their chemical analysis, calorific and photometric determination; also the ultimate and proximate analysis of coals and their calorific determination.

20. Colloquium Mr. FRANKFORTER
Two credits (two hours per week); second semester. Prerequisite, Course 5.

A thorough quiz in general organic and inorganic chemistry.

21. Organic Analysis Mr. HUNTER
Three credits (one hour lecture or recitation, four hours laboratory per week); both semesters. Prerequisite, Course 5.

This course includes all the ordinary methods for the elementary analysis of carbon compounds, together with some special methods, such as determinations of important radicals.

22. Electrochemistry Mr. FRARY
Three credits (one lecture, four hours laboratory per week); second semester. Prerequisite, Course 4 and also Course 3 in Physics.

The course includes a discussion of electro-analytical methods and industrial electro-chemical processes, and their underlying principles.

23. Microchemistry Mr. HARDING
Two credits (four hours laboratory per week); second semester. Prerequisite, Course 4.

This course includes the methods for the identification of minute quantities of substances by means of the microscope.

24. Radiochemistry Mr. DERBY
Three credits; second semester.

This course has to do with the phenomena associated with the various radio-active elements including the chemical changes which these elements undergo and the chemical reactions which may be induced while the changes are in progress.

25. Teachers' Course Miss COHEN
One credit (two hours per week); second semester. Prerequisite, Course 3.

The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

26. Household and Sanitary Science
Elective for women. Prerequisite, Course 3. Offered by the Departments of Bacteriology, Botany, Animal Biology, Chemistry, Hygiene, Economics, Sociology, and Mechanical and Municipal Engineering.

The course includes, for the most part, a discussion of foods and foodstuffs from the botanical, biological, chemical, and physiological points of view; also a discussion of sanitary engineering, hygiene, heating, lighting, and ventilation.

29. Photochemistry Mr. FRARY
Three credits (one lecture, four hours laboratory per week); first semester. Prerequisite, Course 5.

The course includes a discussion of the general principles of photochemistry and their application to dry-plate photography and the ordinary printing processes.

30. Elements of Photoengraving Mr. FRARY
 Three credits (one lecture and four hours laboratory per week);
 second semester. Prerequisite, Course 29.
 This course includes a study of the preparation of wet plates, zinc etchings, and heliogravures.
31. Advanced Photoengraving Mr. FRARY
 Three credits (one lecture and four hours laboratory per week);
 first semester. Prerequisite, Course 30.
 This course includes the preparation of screen negatives and copper half-tones.
32. Color Photography Mr. FRARY
 Three credits (one lecture and four hours laboratory per week);
 second semester. Prerequisite, Course 31.
 This course includes the theory and practice of the production of photographs and photoengravings in natural colors.
33. Electric Furnaces Mr. FRARY
 Three credits; first semester. Prerequisites, Course 4, and Course 3
 in Physics.
 Theory and practice in the design and construction of electric furnaces.
34. Inorganic Electrochemical Preparations Mr. FRARY
 Three credits; first semester. Prerequisites, Course 4, and Course 3
 in Physics.
 Theory and practice in the electrochemical preparation of inorganic compounds.
35. Organic Electrochemical Preparations Messrs. FRANKFORTER and
FRARY
 Three credits; second semester. Prerequisites, Course 5, and Course
 3 in Physics.
 Preparation of organic compounds by electrolytic oxidation and reduction.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive
 Geometry 209 Main Engineering Building
 FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing
209 Main Engineering Building
 ROBERT W. FRENCH, B.S., Instructor in Drawing
209 Main Engineering Building

1. Freehand Mr. FRENCH
 Two credits (four hours per week); first semester. Required of
 freshmen, Applied Course, in conjunction with Course 3.
 Sketching and lettering. Exercises in reading and making drawings from objects,
 drawings, dictation, and memory.

2. Mechanical Mr. FRENCH
Two credits (four hours per week); second semester. Prerequisites, Courses 1, 3.
Continuation of Course 1. The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations, and explanatory notes.
Sketching, lettering, tracing, and blue printing. Representation of details of machines and structures, and the interpretation of working-drawings.
3. Descriptive Geometry Mr. KIRCHNER
Two credits (three hours per week); first semester. Open to students pursuing Course 1.
Introductory course in descriptive geometry. Systems of representation, methods, loci, and constructive geometry. Recitations and drawing room exercises.
4. Descriptive Geometry Mr. KIRCHNER
Two credits (two hours per week); second semester. Prerequisites, Courses 1, 3.
Continuation of Course 3. Central projection and special cases; principles and applications. Representation of lines, planes, and solids, and of their relations; tangencies, intersections, and developments. Recitations, lectures, and the solution of problems.
5. Drafting Messrs. KIRCHNER and ROWLEY
Six credits (six hours per week); both semesters. Prerequisites, Courses 2, 4.
Graphics, machine drafting, structural drafting, and topography. Instruction in drafting methods.
21. Technical Drawing Messrs. KIRCHNER and FRENCH
Six credits (six hours per week); both semesters. Required of freshmen, Analytical Chemistry Course.
Theoretical and practical graphics, the reading and making of drawings. Projection, sketching, lettering, conventions, renderings, and translations.

ECONOMICS AND POLITICAL SCIENCE

- JOHN H. GRAY, Ph.D., Professor of Economics
Mechanic Arts Building
- EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
Mechanic Arts Building
- WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
Mechanic Arts Building
- CARL W. THOMPSON, M.A., Associate Professor of Economics
Mechanic Arts Building
- THOMAS WARNER MITCHELL, Ph.D., Assistant Professor of Economics
Mechanic Arts Building
- JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science
Mechanic Arts Building
- J. FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics
Mechanic Arts Building
- CEPHAS D. ALLIN, M.A., LL.B., Assistant Professor of Political Science
Mechanic Arts Building

ECONOMICS

1. Elements of Economics Messrs. ROBINSON, MITCHELL, and EBERSOLE
Three credits (three recitations per week); each semester.

A thorough course in the elements of economic theory, with special reference to present-day economic and social problems. Marshall, Wright, and Field's *Outlines* and a text-book, supplemented by lectures and problems, with a weekly quiz. This is a beginning course designed for those desiring a general knowledge of Economics, as well as for those who mean to take advanced work in the department.

- 2b. Economic Geography Mr. ROBINSON
Three credits (three hours per week); second semester.

The economic basis of modern civilization; the causes, both in nature and man, which control the localization of industries; the geographic factor in American history and economic development; natural resources and the economic problem of their use and conservation; the principal extractive, manufacturing, and distributive industries of the United States, its outlying possessions, and the leading foreign countries, especially those which have a large prospective value as markets for American manufactures and as fields for the investment of American capital. Text-book with lectures and special reports.

5. Money and Banking Mr. EBERSOLE
Three credits (three hours per week); second semester. Prerequisite, Course 1.

The nature, functions, and theories of money, with special reference to the monetary history of the United States; the nature and uses of credit, including foreign exchange; the functions of banks and trust companies; types of banking systems in this and other countries. Lectures, text-book, assigned readings, and discussions.

9. Commercial Policies Mr. ROBINSON
Three credits (three hours per week); second semester. Prerequisite, Course 1.

Theory and mechanism of international commerce; free trade, reciprocity, and protection, with special emphasis on the tariff history and policy of the United States; organization of the export trade; commercial treaties and foreign politics; the consular and diplomatic service as a factor in commerce. Lectures, assigned readings, and reports on special topics.

11. The Modern Business Corporation Mr. GRAY
Three credits (three recitations per week); first semester. Prerequisite, Course 1.

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 varied phases. Lectures, class discussions, and reports. Text-books: Ripley, *Trusts, Pools, and Corporations*; Meade's *Trust Finance*; Wyman's *Cases*.

16. Principles of Accounting Mr. MITCHELL
Three credits (three recitations per week); first semester. Prerequisite, Course 1.

Aims and essentials of a desirable system of accounts; tabular books and ledger systems; proper treatment of discounts, contingent liabilities, and anticipated losses; depreciation; expense classification; preparation and interpretation of revenue accounts, balance sheets, and other business statements. A laboratory course, with supplementary lectures.

21. Elements of Business Law Mr. YOUNG
Six credits (three recitations per week); both semesters. Prerequisite, Course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in everyday business affairs. Assigned readings, lectures, and quizzes.

15. Business Organization Mr. MITCHELL
Three credits (three recitations per week); second semester. Prerequisite, Course 1.

Forms of organization to effect business control; executive committees; the main departments of a business and the principles governing sub-departmentization and office organization of each. Based on Parson's *Business Administration*, with lectures, theses, and class discussions.

For other courses in Economics open as electives, see Bulletin of the College of Science, Literature, and the Arts.

POLITICAL SCIENCE

1. American Government Messrs. SCHAPER, YOUNG, and ALLIN
Three credits (three hours per week); each semester.

An elementary course in American government intended as a preparation for the advanced courses in Political Science, for teaching in secondary schools, and for good citizenship; a study of the organization and actual workings of the national and local governments; a series of lectures on the nature and origin of the American governmental system precedes a study of the text and assigned topics; special attention will be given to important statutes on naturalization, organization of the judiciary, and of executive departments, interstate commerce, trusts, etc. Text, lectures, and special topics.

15. State and Local Government Mr. YOUNG
Three credits (three hours per week); second semester. Prerequisite, Course 1.

A comparative study of our state constitutions; relation of the states to the United States and to the local units of government; recent experiments such as the initiative and referendum, the recall, primary systems of nominating, the preferential plan of voting, modification of the judicial system, and the extension of the police power. Texts, lectures, and special reports.

7. Municipal Administration Mr. SCHAPER
Three credits (three hours per week); second semester. Prerequisite, Course 1.

Modern city charters and methods of administration, the relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of municipal corruption and merits of proposed reforms. A text, lectures, and special topics.

16. American Government Mr. YOUNG
Two credits (two hours per week); first semester. Not open to those who have taken Political Science 1.

An introductory course in Political Science. It includes a study of the organization and present workings of our national, state, and local government, and serves as an introduction to Course 6.

6. Commercial Law

Mr. YOUNG

Two credits (two hours per week); second semester. Prerequisite, Course 16. Not open to those who have taken Economics 21.

A course in the elements of law, especially designed for engineering students. It includes a study of the system of federal and state courts, the jury system, the law of contracts, corporations, partnerships and limited partnerships, administrative law, the rights and duties of citizenship, and some leading features of the law of real and personal property and the law of riparian rights.

ELECTRICAL ENGINEERING

GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering
30 Electrical Engineering Building

WILLIAM T. RYAN, E.E., Assistant Professor of Electrical Engineering
14 Electrical Engineering Building

5. Electric Power

Mr. RYAN

Six credits (four hours per week); both semesters. Prerequisites, Physics 5 and 6.

An elementary study of the electrical problems involved in the generation, distribution, measurement, and utilization of power. Lectures, recitations, and laboratory work, supplemented by numerous practical problems. Text-book: Thomaelen, *Electrical Engineering Practice*.

EXPERIMENTAL ENGINEERING

WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
107 Experimental Engineering Building

CHARLES F. SHOOP, B.S., Assistant Professor of Experimental Engineering
107 Experimental Engineering Building

FRANKLIN R. McMILLAN, C.E., Instructor in Experimental Engineering
106 Experimental Engineering Building

1. Materials Testing Laboratory

Messrs. KAVANAUGH and SHOOP

Two credits (lecture and laboratory); first semester.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains, and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

2. Steam Laboratory

Messrs. KAVANAUGH and SHOOP

Two credits (lecture and laboratory); second semester. Open to those pursuing Mechanical Engineering 20.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists, and other machines.

GEOLOGY AND MINERALOGY

WILLIAM H. EMMONS, Ph.D., Professor of Geology and Mineralogy

108 Pillsbury Hall

FRANK F. GROUT, M.S., Assistant Professor of Geology and Mineralogy

102 Pillsbury Hall

- OLIVER BOWLES, M.A., Instructor in Mineralogy and Crystallography
102 Pillsbury Hall
- EDGAR K. SOPER, B.A., Instructor in Economic Geology
112 Pillsbury Hall
- A. WOLFRED JOHNSTON, M.A., Instructor in Geology
112 Pillsbury Hall

GEOLOGY REQUIRED AND ELECTIVE

- 1a. General Geology Messrs. EMMONS and JOHNSTON
Three credits (three hours per week); first semester.
A lecture, field, and laboratory course. Attendance is required at a few field trips in the vicinity of Minneapolis. For laboratory work and map conference, the classes are divided into sections of four students each, and the student is required to attend a thirty-minute conference about once a week. These meetings will be arranged with individual students to avoid conflicts with all other lectures or laboratory work.
The course is a synoptical treatment of the materials of the earth and of geologic processes; physiographic, structural, and dynamic geology, with a brief introduction to historical geology. Geologic structure is emphasized and the lectures are reinforced by the study of geologic maps.
- 1c. Laboratory Work Mr. JOHNSTON and ASSISTANTS
One credit (two hours per week); optional; first semester.
This course is intended to supplement Geology 1a. It includes especially the study of rocks and ores, of topographic and geologic maps, with a small amount of reference reading. It is designed for those who are preparing to teach the elements of Geology and it is an introduction to geologic methods for those who intend to specialize in Geology.
- 3a. Historical Geology Mr. SARDESON
Three credits (three hours per week); second semester. Prerequisite, Course 1.
The history of the North American continent. The more important types of fossils in their geological relations. Lectures and demonstrations.
- 3b. Historical Geology (laboratory) Mr. SARDESON
One credit (two hours per week); second semester. Open to students who are taking Course 3a.
The course includes the interpretation of geologic profile sections and maps, and general formational relations, with a study of fossils and rock specimens.
4. Elements of Rock Study Messrs. GROUT and BOWLES
Three credits (six hours per week); first semester. Prerequisites, Courses 1a, 3, 18, and 19.
A laboratory course with reference reading. The composition of the earth's crust, a general treatment of the origin, occurrence and genesis of igneous, sedimentary, and metamorphic rocks; their mineral and chemical composition; their structure, texture, and physical constitution; the alteration of rocks; the classification of igneous rocks; an introduction to the use of the microscope.
5. Petrology Messrs. GROUT and BOWLES
Three credits (six hours per week); second semester. Prerequisite, Course 4.
Laboratory work, lectures and reference reading. The identification of minerals and rocks by optical study; a study of igneous rocks, followed by that of crystalline schists and metamorphic rocks; the origin and classification of rocks.

11. Economic Geology Mr. SOPER
Three credits (three hours per week); first semester. Prerequisites, Courses 1a, 3a, 18, and 19.

A study of the occurrence, genesis, distribution and uses of the metals, non-metals, and mineral fuels. Lectures and laboratory work.

12. Ore Deposits Messrs. EMMONS and SOPER
Four credits (four hours per week); first semester. Prerequisite, Courses 1a, 3a, 4, 18, and 19.

A discussion of ore deposition; the nature, distribution, and genesis of metalliferous ore deposits of the United States. A study of the relation of ore deposits to geologic structure and of the changes which ore deposits undergo through oxidation and related processes. The course includes laboratory work illustrating the use of mine maps and geologic cross sections through mines, and detailed laboratory studies of reports on mining districts.

- 13a. Special Problems in Ore Deposits Messrs. EMMONS and SOPER
Two credits (four hours per week); second semester. Prerequisite, Course 12.

Lectures on field and laboratory methods. A study of metallogenic epochs and metallographic provinces, particularly those of the United States.

MINERALOGY REQUIRED AND ELECTIVE

18. Elements of Mineralogy Messrs. GROUT and BOWLES
Three credits (six hours per week); first semester. No prerequisite.

The systems of crystallization; the morphological, physical, and chemical characters of minerals; classification and description of common minerals; the occurrence, genesis, and uses of minerals. Laboratory work, involving the application of chemical and blow-pipe tests to the identification of species; determination of minerals by physical properties and sight identification.

19. Descriptive Mineralogy Messrs. GROUT and BOWLES
Three credits (six hours per week); second semester. Prerequisite, Course 18.

A continuation of Course 18, special attention being given to economic and rock-forming minerals; mineral determination and sight identification; the use of the goniometer and microscope. Laboratory, reference reading, and field excursions.

22. Physico-chemical Methods with their Applications Mr. GROUT
Three credits (three hours per week); second semester. No prerequisite.

The leading elements found in minerals are determined through the aid of crystalline precipitates. Special attention is given to the study and determination of the rock-making minerals and the contents of mineral veins. Thin sections of rocks and minerals are prepared and subjected to reagents of known composition.

- 24a. Morphology of Minerals Mr. BOWLES
Three credits (three hours per week); first semester. Prerequisite, Course 18.

A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.

- 24b. Crystal Measurement Mr. BOWLES
 Three credits (three hours per week); second semester. Prerequisite,
 Course 24a.

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.

25. Optical Mineralogy Mr. GROUT
 Three credits (six hours per week); second semester. Prerequisite,
 Course 18.

A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauoscopic practice, embracing the elements of lithology. Lectures and laboratory work.

28. Original Problems in Morphological and Physical Mineralogy
Messrs. GROUT and BOWLES
 Hours and credits to be arranged; both semesters. Prerequisites,
 Courses 18 and 19.

Any branch of mineralogy and many groups of materials will furnish problems.

GEOGRAPHY REQUIRED AND ELECTIVE

33. The Western Hemisphere Mr. LEHNERTS
 Three credits (three hours per week); second semester. Prerequisite,
 Course 29a or 29b.
 Regional geography of the continents and countries of the Western Hemisphere.
 Lectures, maps, and library work.

GERMAN LANGUAGE AND LITERATURE

JOHN G. MOORE, B.A., Professor of German	210 Folwell Hall
*CARL SCHLENKER, B.A., Professor of German	211 Folwell Hall
HANS JUERGENSEN, M.A., Assistant Professor of German	215 Folwell Hall
OSCAR C. BURKHARD, M.A., Assistant Professor of German	214 Folwell Hall
ALFRED E. KOENIG, M.A., Instructor in German	216 Folwell Hall
JAMES DAVIES, Ph.D., Instructor in German	211 Folwell Hall
RICHARD WISCHKAEMPER, M.A., Instructor in German	216 Folwell Hall
ARTHUR C. BURKHARD, M.A., Assistant in German	

- 1a. Beginning Messrs. SCHLENKER, JUERGENSEN, WISCHKAEMPER,
 KOENIG, DAVIES, and A. C. BURKHARD
 Ten credits (five hours per week); both semesters. Open to those
 who do not present German for entrance.

*On leave of absence 1912-13.

Pronunciation, grammar, conversation and composition; selected reading in easy prose and verse.

To follow this course, students may take Course 2 or Course 3, and Course 5 as a supplementary course to either.

3a. Scientific Intermediate Messrs. JUERGENSEN, WISCHKAEMPER,
and DAVIES

Six credits (three hours per week); both semesters. Prerequisite, Course 1a.

Wait's *German Science Reader* (or equivalent). The course aims to give the student a reading knowledge of German for use in scientific studies.

4. Classic Prose and Poetry Messrs. JUERGENSEN, O. C. BURKHARD,
WISCHKAEMPER, KOENIG, and DAVIES

Six credits (three hours per week); both semesters.

Open to students who have presented two years of German for entrance. Selections of prose and poetry. Geography, history, and legend. Review of German grammar throughout the year.

7. Advanced Scientific Reading Messrs. JUERGENSEN, WISCHKAEMPER,
and DAVIES

Six credits (three hours per week); both semesters. Prerequisite, Course 3a or 4.

Reading of scientific monographs and periodicals.

MATHEMATICS

JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
119 Folwell Hall

GEORGE N. BAUER, Ph.D., Professor of Mathematics
100 Folwell Hall

WILLIAM H. BUSSEY, Ph. D., Assistant Professor of Mathematics
122 Folwell Hall

ANTHONY N. UNDERHILL, Ph.D., Assistant Professor of Mathematics
121 Folwell Hall

*GEORGE P. PAINE, M.A., Assistant Professor of Mathematics
120 Folwell Hall

ROYAL R. SHUMWAY, B.A., Assistant Professor of Mathematics
122 Folwell Hall

HERMON L. SLOBIN, Ph.D., Instructor in Mathematics
121 Folwell Hall

JAMES S. MIKESH, B.A., Instructor in Mathematics
120 Folwell Hall

1. Higher Algebra, Part I Messrs. UNDERHILL, SHUMWAY, PAINE,
SLOBIN, and MIKESH

Five credits (five hours per week); first semester. Required of freshmen who have not an entrance credit in the subject; must be followed by Course 2; not open to those who have taken the subject in the preparatory schools.

*Resigned June 1, 1912.

The fundamental rules, factoring, highest common divisor, lowest common multiple, fractions, involution, evolution, surds, imaginaries, simple equations with one, two and several unknown quantities, inequalities, ratio and proportion, arithmetical and geometrical progressions, quadratic equations and numerous problems requiring both simple and quadratic equations. The examples and problems are more difficult than those under the same subjects in Elementary Algebra and demonstrations are an important part of the work.

2. Algebra Continued and Plane Trigonometry

Messrs. UNDERHILL, SHUMWAY, PAINE, SLOBIN, and MIKESH

Five credits (five hours per week); second semester. Required of freshmen who have not an entrance credit in Course 1.

A continuation of Course 1 and consists of Algebra through logarithms, and Plane Trigonometry.

3. Higher Algebra, Part II

Messrs. BAUER, BUSSEY, UNDERHILL,
SHUMWAY, PAINE, SLOBIN, and MIKESH

Three credits (three hours per week); first semester. Open to those who have an entrance credit in Course 1; must be followed by Course 4.

Variation, quadratic equations reviewed, irrational equations, special higher equations, simultaneous quadratic equations, differentiation of algebraic functions, development of functions (by the method of indeterminate coefficients, Taylor's formula and the binomial theorem), theory of equations and solution of numerical higher equations, permutations and combinations.

4. Logarithms and Trigonometry

Messrs. BAUER, BUSSEY, UNDERHILL,
SHUMWAY, PAINE, SLOBIN, and MIKESH

Three credits (three hours per week); second semester. Prerequisite, Course 3.

Text, tables, and numerous problems.

3a. Algebra, Trigonometry, and Analytical Geometry

Mr. UNDERHILL

Ten credits (five hours per week); both semesters.

7. Analytical Geometry

Messrs. BAUER, BUSSEY, SHUMWAY, PAINE,
and SLOBIN

Three credits (three hours per week); first semester. Prerequisite, Course 2 or 4.

Rectilinear and polar co-ordinates, producing equations of loci whose law of development is known, constructing and discussing such equations, transformation of co-ordinates, properties of the straight line, the conic sections and higher plane curves by means of their equations.

8. Differential Calculus

Mr. UNDERHILL

Three credits (three hours per week); each semester. Prerequisite, Course 3a or 2 or 4.

Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, sub-tangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes, and singular points.

9. Integral Calculus

Mr. UNDERHILL

Three credits (three hours per week); second semester. Prerequisite, Course 8.

Graphical diagrams of the paths, speeds, and accelerations of important mechanisms; centroids, analysis of mechanisms; construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.

13. Machine Design Messrs. FLATHER and MARTENIS
Five credits (ten hours per week); first semester. Open to those pursuing Mechanics 7.

Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys, and spur gearing. Recitations, lectures, and drawing-room practice.

19. Steam Boilers Mr. MARTENIS
One credit (one hour per week); first semester. Open only to students pursuing Mechanics 7.

Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

20. Steam Engine Mr. FLATHER
Three credits (three hours per week); second semester. Prerequisite, Mechanics 7.

Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

21. Gas Engines and Producers. Elective Mr. MARTIN
Two credits (two hours per week); second semester. Prerequisite, Chemistry 19.

Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition, and cooling. Application of the indicator and consideration of indicator diagrams. A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

METALLURGY

WILLIAM R. APPLEBY, M.A., Professor	27 School of Mines Building
PETER CHRISTIANSON, B.S., E.M., Professor	25 School of Mines Building
LEVI B. PEASE, B.Sc. Chem., M.S., Professor	26 School of Mines Building
EDMUND NEWTON, E.M., Instructor	25 School of Mines Building

1. Assaying Mr. APPLEBY and ASSISTANTS
Six credits (four lectures and four laboratory hours per week); second semester. Prerequisite, Mineralogy 18.

Determination of values of ores, metallurgical products, and bullion.

2. General Metallurgy and Metallurgy of Iron Mr. CHRISTIANSON
Three credits (three lectures per week); first semester. Prerequisite, Course 1.
Combustion, fuels, refractory materials and furnaces. Lectures and recitations on metallurgy of iron.
3. Metallurgy of Wrought Iron and Steel Mr. CHRISTIANSON
Three credits (three lectures per week); second semester. Prerequisite, Course 2.
Consideration of the principles of manufacture, details of plant construction, and chemical and physical phenomena. Metallography.
4. Metallurgy of the Base Metals Mr. PEASE
Four credits (four lectures per week); first semester. Prerequisite, Course 3.
Lead, copper, zinc, and mercury. Consideration of smelting methods and principles involved in refining methods.
5. Metallurgy of the Precious Metals Mr. PEASE
Four credits (four lectures per week); second semester. Prerequisite, Course 4.
Gold, silver, and platinum. Methods and principles of cyanidation, chlorination, amalgamation, and lixiviation as applied to treatment of above.
9. Metallography Mr. NEWTON
Four credits (two lectures, four laboratory hours per week); second semester. Prerequisite, Course 3.
A study of the microstructure of metals and alloys as affected by heat and industrial treatments, together with the influence of changes of structure on their properties. Special attention is given to siderurgical products.

MILITARY SCIENCE AND TACTICS

*EDMUND L. BUTTS, Major, 25th Infantry, U. S. A., Professor Armory
BERT ROSE, Instructor of Band

1. Military Drill MAJOR BUTTS
Three hours per week; both semesters. Drill is required of all men in the freshman and sophomore classes.
Freshman: Practical instruction in schools of the soldier, company, and battalion; signals, ceremonies; schools of the cannoneer and battery.
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.
For the instruction in Military Drill and administration the students are organized into a corps of cadets, consisting of three battalions of infantry, a band and a platoon of artillery.

*Term of service expires September 1, 1912.

A uniform of prescribed pattern is worn by all cadets during drill. It consists of blouse, trousers and cap, modeled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about \$15.

Military Drill may be taken voluntarily by others outside of the freshman and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, a year's drill is allowed to count as a three-hour credit for one semester. Students who voluntarily register for drill beyond the required amount must register for the entire year and be subject to the same regulations as other cadets. No credit will be allowed for such drill for less than one year.

An encampment of cadets is held at the beginning of each year. Sophomore cadets attending the encampment are excused from all military drill of the first semester except on Saturdays. Students due but not reporting for encampment are required to report for all military exercises during the semester and, unless excused for satisfactory reasons, will be required to report at the next encampment.

2. Military Science

MAJOR BUTTS

Two hours per week; second semester. Optional with juniors and seniors.

Theoretical instruction—advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

This work when satisfactorily completed taken in connection with the year's drill will give a four-hour credit for the semester.

Military instruction is intended to be so conducted as to develop a soldierlike bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company, battalion, and regimental manoeuvres, guards and the theoretical and practical use of firearms.

On graduation of each class the Commandant will report to the Adjutant General of the Army the names of the graduates who may have shown special aptitude for the military service and furnish a copy thereof to the Adjutant General of the State.

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; the sergeants from the junior class; and the corporals from the sophomore class.

PHYSICAL TRAINING

FOR MEN

LOUIS J. COOKE, M.D., Director
WILLIAM K. FOSTER, LL.M., Assistant Director

Armory
Armory

A well-equipped gymnasium in charge of a professional medical director is open for the young men. The training and exercise is under the immediate oversight and authority of the medical director and is wholly with a view to the healthful physical development of the whole student body.

All young men are required to be examined by the medical director of physical training upon registration and during the course as often as the indications of the physical condition may require.

The decision of the director will be either:

1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or
2. Mandatory, requiring the students to pursue the course of hygiene and physical exercise necessary for the proper care of health and the discharge of their duties as students.

Gymnasium work is required of all men in the freshman class, one hour per week (in two half-hour periods, if the director so decides) throughout the year. The required work includes a course of lectures on personal hygiene during the first semester.

FOR WOMEN

Physical training for women students is under the direction of a Health Officer—a woman trained in medicine, but not engaged in practice—who will have general oversight of the health of the women students. She will have as an assistant a specialist in physical training, who will have charge of the games and other exercises prescribed.

Among the duties of the Health Officer will be the following: To give a physical examination to all women students at the beginning of each year; to prescribe for each the type and amount of exercise that should be taken; to receive at regular intervals reports from each as to her exercise and physical condition; to give instruction in hygiene to the entering class; to give sanitary inspection to lodging houses; to examine into cases of illness in the dormitory and lodging houses; to co-operate with the Women's Athletic Association in providing tennis, basket ball, hockey, aesthetic dances, skating, etc.

The department possesses corrective apparatus, and physically defective women students are required to take, under supervision, suitable corrective exercises.

Indoor physical training for women in large classes, which has been elective during the past year, is discontinued until adequate floor space, dressing rooms, and baths can be provided. The same expenditure of money will be made and as great care will be exercised as heretofore, but along different lines. It is believed that care for all women students in the manner proposed will be better than care for part of them in the inadequate quarters at their disposal in the past.

PHYSICS

JOHN ZELENY, B.A., Ph.D., Professor of Physics 15 Physics Building
ANTHONY ZELENY, M.S., Ph.D., Professor of Physics 20 Physics Building

HENRY A. ERIKSON, E.E., Ph.D., Assistant Professor of Physics	18 Physics Building
ALOIS F. KOVARIK, Ph.D., Assistant Professor of Physics	18 Physics Building
LOUIS W. MCKEEHAN, Ph.D., Instructor in Physics	17 Physics Building
JAMES C. SANDERSON, Ph.D., Instructor in Physics	32 Physics Building
RUFUS C. SHELLNBARGER, M.A., Instructor in Physics	17 Physics Building

- 1. General Physics** Messrs. A. ZELENY and SANDERSON
 Three credits (three recitations per week); first semester. Required of juniors in Analytical Chemistry and in Arts and Chemistry Courses.
 Mechanics of solids and fluids, heat and sound. This is the first part of a general course in Physics. The treatment is experimental rather than mathematical. The course is designed to give the student a general knowledge of the fundamental principles of the subject and will be found especially useful to those pursuing other sciences.
- 2. General Laboratory Practice** Messrs. ERIKSON and SANDERSON
 One credit (two hours laboratory work per week); first semester. Required of juniors in Analytical Chemistry and in Arts and Chemistry Courses.
 Physical measurement in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods. This course is intended to accompany Course 1.
- 3. General Physics** Messrs. A. ZELENY and SANDERSON
 Three credits (three recitations per week); second semester. Prerequisites, Physics 1 and 2.
 Light, electricity, and magnetism. This is the second part of a general course in Physics which began with Course 1.
- 4. General Laboratory Practice** Messrs. ERIKSON and SANDERSON
 One credit (two hours laboratory work per week); second semester. Prerequisites, Physics 1 and 2.
 Physical measurements in light, electricity, and magnetism, giving the student a knowledge of experimental methods. This course is intended to accompany Course 3.
- 5. Mechanics of Solids and Fluids** Messrs. KOVARIK and SHELLNBARGER
 Four credits (three recitations, one lecture or two hours laboratory); first semester. Prerequisite, Mathematics 3a.
 The course consists of a thorough drill in the elementary principles of mechanics and is the first part of a course continued in Courses 6, 7, and 8. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.
- 6. Heat, Magnetism, and Electrostatics** Messrs. KOVARIK and SHELLNBARGER
 Four credits (one lecture, two recitations and two hours laboratory); second semester. Prerequisite, Course 5.

7. Electrokinetics Messrs. J. ZELENY and SHELLNBARGER
 Four credits (one lecture, two recitations and two hours laboratory);
 first semester. Prerequisite, Course 6.

8. Sound and Light Messrs. J. ZELENY and SHELLNBARGER
 Four credits (one lecture, two recitations and two hours laboratory);
 second semester. Prerequisite, Course 5.

11. Theoretical Mechanics Mr. ERIKSON
 Six credits (three hours per week); both semesters. Prerequisites,
 Courses 5 and 6, and Mathematics 8 and 9 (Calculus).
 A study of some problems in dynamics which are important in the study of advanced
 Physics and Chemistry.

For other courses offered, see Bulletin of College of Science, Literature,
 and the Arts.

RHETORIC

JOSEPH M. THOMAS, Ph.D., Professor of Rhetoric 310 Folwell Hall
 WILFORD O. CLURE, B.A., LL.B., Instructor in Rhetoric 312 Folwell Hall

1. Rhetoric Messrs. THOMAS and CLURE
 Six credits (three hours per week); both semesters. Open to all
 freshmen.

This course includes the study of formal rhetoric, the writing of compositions, and the
 study and analysis of masterpieces of prose.

STUDENTS

Names preceded by * are in Analytical Course.

Names preceded by † are in Applied Course.

Names preceded by ‡ are in Arts and Chemistry Course.

SENIORS—18

- | | |
|--------------------------------------|-------------------------------------|
| *Brinton, Paul H. M. P., Minneapolis | †Martin, Edmund W., Wilson |
| †Brunkow, Herbert E., Delano | *Mitchell, Ralph W., Minneapolis |
| *Daniels, Elmer A., Dover | *Nesse, Charles O., Mabel |
| †Edwards, Junius D., Minneapolis | *Parkin, Guy G., Pine Island |
| †Goldstein, Milton M., Minneapolis | †Robinson, Rhea B., Minneapolis |
| †Harshaw, John R., Minneapolis | *Rockwood, Ralph, Madelia |
| *Hoffmann, Henry J., St. Paul | *Schmidt, George H., New Ulm |
| *Karatz, Lucien, Minneapolis | *Spriestersbach, David O., St. Paul |
| *McLeod, John R., Minneapolis | ‡Wanless, Lynn A., Minneapolis |

JUNIORS—18

- | | |
|------------------------------------|-----------------------------------|
| †Anderson, Fredolf T., Red Wing | †Nietz, Adolph H., Rochester |
| †Berman, Harry C., Minneapolis | *O'Connell, Thos. C., Pipestone |
| *Bertram, Edward H., Minneapolis | *Otterstein, Earl T., Minneapolis |
| *Cohen, Jacob G., Minneapolis | †Peterson, Henry, Minneapolis |
| ‡Dennis, Arthur C., Minneapolis | †Porter, Ralph E., Center City |
| *Felton, Arthur J., Akeley | *Sutter, Hedwig M., St. Paul |
| †Kern, Herbert A., Lake Elmo | *Taylor, Cyril S., Minneapolis |
| *Mastin, M. Gordon, Minneapolis | *Tibbling, Ernest F., St. Paul |
| *Miller, Ralph H., Mitchell, S. D. | *Yngve, Victor, Cambridge |

SOPHOMORES—7

- | | |
|----------------------------------|----------------------------------|
| *Bergstrom, David F., St. Paul | †May, R. Darwin, Adrian |
| *Doherty, Cecil W., Tracy | †Morse, Guilford A., Minneapolis |
| ‡Gauger, Alfred W., St. Paul | *Stuart, Clyde J., Minneapolis |
| †Tinkham, Willis M., Minneapolis | |

FRESHMEN—17

- | | |
|---------------------------------------|-----------------------------------|
| *Becker, Chas. W., Jr., Browns Valley | †Kindseth, Graham, Red Lake Falls |
| †Bertram, Chas. M., Minneapolis | *Marshall, Olive W., Rochester |
| *Brotherton, Geo. P., Minneapolis | †Merrill, Sherlock, Minneapolis |
| *DuShane, James R., St. Paul | †Nathanson, Morris, Minneapolis |
| †Erickson, Carl I., Litchfield | †O'Brien, Harold T., St. Paul |
| *Fegan, Elmer T., Aberdeen, S. D. | *Olsen, Leslie R., New Ulm |
| †Johnsen, Carl J., St. Paul | *Peterson, Lloyd R., Minneapolis |
| †Kennedy, Geo. L., Minneapolis | *Smith, Lloyd K., Brainerd |
| *Sneller, Chas. D., Minneapolis | |

FIRST YEAR—15

†Brooberg, F. Clement, Minneapolis	†Horn, De Witt S., Minneapolis
†Dunnigan, Merton, Minneapolis	†Larrabee, Weldon C., Minneapolis
†Erickson, Eric A., Minneapolis	†Metzdorf, Myrtle, St. Paul
†Field, Cyrus O., Minneapolis	†Nienhauser, Ralph P., St. Paul
†Greig, William T., St. Paul	†Petrauborg, Jarrold, Aitkin
†Haedge, Carl, St. Paul	†Pyke, Robert W., Minneapolis
†Haldeman, Wellington W., Minneapolis	†Sly, Earle C., Minneapolis
†Strong, Arthur D., Minneapolis	

UNCLASSED—6

†Hardt, Paul J., Winona	†Nelson, William K., Minneapolis
*Hovdesven, Orvin C., Cottonwood	*Schroeder, William F., Minneapolis
*Merten, Howard V., Charles City, Ia.	*Toncheff, Stanil, St. Paul

The University of Minnesota

THE COLLEGE OF FORESTRY

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 12. JULY 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

1912							1913														
JULY							JANUARY							JULY							
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12	
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19	
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26	
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST							
..	1	2	3	1	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23	
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30	
..	31
SEPTEMBER							MARCH							SEPTEMBER							
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27	
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	30	31
OCTOBER							APRIL							OCTOBER							
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	1	2	3	4	
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11	
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18	
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25	
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER							
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8	
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15	
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22	
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29	
..	30
DECEMBER							JUNE							DECEMBER							
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6		
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27	
29	30	31	29	30	28	29	30	31

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
Sept. 30 - Oct.	5	Week	Second semester condition examinations
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
March 31-Apr.	5	Week	First semester condition examinations
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday,	Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
		2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday,	Sept. 11	9 a. m.	English
		2 p. m.	German, French, Latin, Scandinavian
Thursday,	Sept. 12	9 a. m.	Elementary Algebra
		2 p. m.	Higher Algebra
Friday,	Sept. 13	9 a. m.	Plane Geometry
		2 p. m.	Solid Geometry

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.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
 FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
 ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
 WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
 FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery
 ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
 FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
 WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
 GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
 GEORGE F. JAMES, Ph.D., Dean of the College of Education
 HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
 ADA L. COMSTOCK, M.A., Dean of Women

THE COLLEGE OF FORESTRY

FACULTY OF INSTRUCTION

- GEORGE EDGAR 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., Dean and Director Agricultural Department
1199 Raymond Ave., St. Paul
- EDWARD G. CHEYNEY, B.A., Professor of Forestry, Director College of Forestry
2116 Knapp St., St. Paul
- JOHN P. WENTLING, M.A., Associate Professor of Forestry
2160 Carter Ave., St. Paul
- AUSTIN CARY, M.A., Professor of Forestry in charge of Lumbering
2219 Knapp St., St. Paul
- WILLIAM T. COX, B.S.F., State Forester, Special Lecturer
1540 Lincoln Ave., St. Paul
- DILLON P. TIERNEY, M.F., Assistant State Forester, Special Lecturer
State Capitol, St. Paul
- JOHN E. RHODES, Special Lecturer, Lumbering
808 Fairmont Ave., St. Paul
- DANIEL E. WILLARD, M.A., Special Lecturer, Forest Soils
1128 Hague Ave., St. Paul

IN OTHER COLLEGES

- EDMUND L. BUTTS, Major U. S. Army, Professor of Military Science
Hotel Plaza, Minneapolis
- LE ROY CADY, B.S.Agr., Associate Professor of Horticulture
2081 Buford St., St. Paul
- FREDERIC E. CLEMENTS, Ph.D., Professor of Botany
800 4th St. S. E., Minneapolis
- J. FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics
312 State St. S. E., Minneapolis
- GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
525 E. River Road, Minneapolis
- EDWARD M. FREEMAN, Ph.D., Professor of Plant Pathology
2196 Carter Ave., St. Paul
- JOHN H. GRAY, Ph.D., Professor of Economics
412 Walnut St. S. E., Minneapolis
- ROBERT C. LANSING, M.A., Assistant Professor of English
2237 Knapp St., St. Paul

- EDWARD M. LEHNERTS, M.A., Assistant Professor of Geography
800 4th St. S. E., Minneapolis
- THOMAS W. MITCHELL, Ph.D., Assistant Professor of Economics
1092 15th Ave. S. E., Minneapolis
- HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
905 6th St. S. E., Minneapolis
- EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
914 7th St. S. E., Minneapolis
- MYRON H. REYNOLDS, B.S., D.V.M., M.D., Professor of Veterinary
Science
2145 Knapp St., St. Paul
- CARL O. ROSENDAHL, Ph.D., Professor of Botany
2191 Commonwealth Ave., St. Paul
- ARTHUR G. RUGGLES, M.A., Assistant Professor of Entomology
1465 Raymond Ave., St. Paul
- CHARLES P. SIGERFOOS, Ph.D., Professor of Zoology
1023 University Ave. S. E., Minneapolis
- JOHN T. STEWART, C.E., Professor of Agricultural Engineering
2223 Knapp St., St. Paul
- CARL W. THOMPSON, M.A., Associate Professor of Economics
1322 6th St. S. E., Minneapolis
- FREDERIC L. WASHBURN, M.A., Professor of Entomology
1112 6th St. S. E., Minneapolis
- JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science
1120 6th St. S. E., Minneapolis

INSTRUCTORS

- RENE M. DELAMARE, B.L., Instructor in French
501 8th Ave. S. E., Minneapolis
- ALLEN D. JOHNSTON, Instructor in Blacksmithing
2111 Knapp St., St. Paul
- LEON METZINGER, Ph.B., Instructor in German
319 Oak St. S. E., Minneapolis
- HARRY B. ROE, B.S., Instructor in Mathematics
2105 Scudder Ave., St. Paul
- E. C. STAKMAN, M.A., Instructor in Plant Pathology
1485 Cleveland Ave., St. Paul
- HALL B. WHITE, B.S. in Agr., Instructor in Carpentry
University Farm, St. Paul
- LLOYD R. WHITSON, E.M., Instructor in Mechanical Drawing
1125 8th St. S. E., Minneapolis
- ANNA M. SMITH, Librarian
1485 Cleveland Ave., St. Paul

FACULTY COMMITTEES

1912-1913

Executive Committee.—Dean WOODS, BOSS, MAYNE, HAECKER, STEWART,
F. L. WASHBURN, REYNOLDS, HOAGLAND, FREEMAN, CHEYNEY,
CADY, WILSON

College Council.—Chiefs of Division and Sections

Enrollment and Program.—STEWART, C. P. BULL, MOWRY, LANSING,
CADY

Curriculum and Catalogue.—The Executive Committee

Students' Work.—FREEMAN, WEST, ROE, BEMIS, RUGGLES

Military.—BUTTS, WENTLING, HOAGLAND

Library.—MAYNE, REYNOLDS, ANNA SMITH, LANSING, WALKER, DORSEY

Student Organizations.—F. L. WASHBURN, BOUTELLE, DREW, WEST,
MAYNE, BLAIR

Graduate.—HAECKER, STEWART, RUGGLES, H. R. SMITH, F. L. WASHBURN

Athletics.—CHEYNEY, MOWRY, WILLIAMS, OSWALD

Demonstration and Exhibit.—C. P. BULL, FRAZIER, SHEPPERD, WILSON,
R. M. WASHBURN

Sanitation.—REYNOLDS, MAYNE, BOUTELLE, F. L. WASHBURN, A. M.
BULL, PEARCE

Grounds.—BOSS, CADY, STEWART

Rules and Records.—WEST, MOWRY, DREW

Publications.—WILSON, HAECKER, BOSS, DORSEY

Auditing.—ROE, ARNY, LANSING

Registrar.—JAMES M. DREW

Secretary of Faculty.—EDWARD M. FREEMAN

ENROLLMENT

INSTRUCTIONS TO PROSPECTIVE STUDENTS

Read this bulletin carefully, giving particular attention to *Rules and Regulations*.

Students who are not graduates of accredited schools and those graduates who have conditions as specified in paragraphs under *Admission to Freshman Class—By Certificate*, should report in time to take the entrance examinations in such subjects as may be required. The dates for entrance examinations are given on the sixth page of this Bulletin, and examinations are given only on the dates scheduled.

New students should report in time to have their registration completed, and to enter classes on the date scheduled for the beginning of the semester, as new students cannot enter classes after they are once started.

Graduates of the accredited schools should read carefully the conditions under which high school work can be accepted for entrance without examination.

Credentials.—All students upon entering this College for the first time, shall submit their credentials to the Enrollment Committee.

ADMISSION TO FRESHMAN CLASS—ALL APPLICANTS

Admission is either by certificate or by examination.

(a) *Number of Credits Required*.—No candidate will be admitted with less than fifteen units of the required grade. The Enrollment Committee 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.

(b) *Character of Credits Required*.—Candidates must present:

(1) Four years of English or three years of English accompanied by four years of one foreign language.

(2) Mathematics, three units, including Elementary Algebra, one unit; Plane Geometry, one unit; Higher Algebra, one-half unit; Solid Geometry, one-half unit.

(3) A minor series of two units each, chosen from one of the admission groups, B, C, E.

To form a language series at least two units of the same language must be offered.

(4) Physics, one unit, must be presented if it is not included in the group selected.

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

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: Foreign Languages

Latin—

- Grammar, one unit
- Caesar, 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

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

Manual Subjects—

Freehand Drawing, two units	Shop Work, two units
Mechanical Drawing, two units	Modeling and Wood Carving, one unit

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 Subjects Accepted for Admission

A description of subjects accepted for admission to the University may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

ADMISSION TO FRESHMAN CLASS—BY CERTIFICATE

(a) General.—Certificates from the College Entrance Examination Board, and from State High School Board are accepted as satisfying the scholarship requirement.

(b) From Minnesota State High Schools or other accredited schools.—Graduates of a four-year course of a Minnesota State High School or other accredited school in Minnesota, provided they meet the general requirements stated above, and the following special requirements as to grades.

(1) The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted toward graduation. All records shall be entered on this certificate as *passed*, *passed with credit*, or *passed with honor*. *

To facilitate the operation of this rule, each accredited school is expected to keep its record of standings in these three grades or else show

*In per cent, three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark; passed=65-75; passed with credit=75-90; passed with honor=90-100.

(2) In schools having 70 as a passing mark; passed=70-78; passed with credit=78-90; passed with honor=90-100.

(3) In schools having 75 as a passing mark; passed=75-80; passed with credit=80-90; passed with honor=90-100.

by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these grades.

(2) Candidates for admission on certificates must have an average record in the subjects counted for admission of *pass with credit*. For the purpose of this average a *pass* is offset by a *pass with honor*. Candidates are therefore admitted provided they have at least as many semester marks of *pass with honor* as they have semester marks of *pass*.

Candidates entering on certificate shall not be examined for admission on subjects which are lacking or below the required grade, except on presentation to the Enrollment Committee of satisfactory evidence that they have done adequate special work in preparation for the examination. A certificate from the principal of the last school attended, or other person approved by the Enrollment Committee, shall constitute satisfactory evidence; and adequate special preparation shall consist of not less than thirty 60-minute hours under competent instruction on each semester subject presented for examination. (See (d), last paragraph.)

(3) *List of Accredited Schools*.—A list of accredited schools, including state high schools and private schools, may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

(c) Graduates of the Advanced Latin and Advanced English courses of the Minnesota State Normal Schools.

(d) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state, provided such candidates satisfy all the requirements as to major and minor series, subjects, and grades demanded of the graduates of Minnesota High Schools. (See (b) (2) above.)

(e) Graduates of the Schools of Agriculture,* who have a grade of 75 per cent in all subjects and can present additional credits as follows:

(1) Before September, 1913:

The subjects prescribed in the Intermediate Course or fourth year provided no subject has a grade lower than 75 per cent.

(2) After and including September, 1913:

English, two years, in advance of that taken in the three-year course of the School of Agriculture;

Mathematics, three years, selected from Group D;

History, one or two years, selected from Group C;

One or two years, each chosen from Groups B, C, D, or E;

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 *Entrance by Examination*.

*Includes West Central School, at Morris; Northwestern School, at Crookston, and Central School, at University Farm, St. Paul.

ADMISSION TO FRESHMAN CLASS—BY EXAMINATION

(a) *General.*—Entrance examinations are offered at the University during the opening week of the University year. Candidates must pass examinations in all subjects specified above, except such as may be covered by College Entrance Examination Board or State High School Board certificates.

(b) *Candidates from other States.*—In case the records of any candidate from another state cannot be translated into the grades used in this state, the Enrollment Committee shall order examinations in English and also in three other subjects chosen from three different admission groups. The results of such examinations shall be final.

(c) The examinations authorized under 2 (b) (2) and 2 (d) shall be held at the same time and according to the same schedule as the regular entrance examinations mentioned under 1.

ADMISSION TO ADVANCED STANDING

1. *All Applicants.*—(a) 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 the qualifications to continue the second semester's work.

(b) Students who desire to obtain advanced standing must, within six weeks after the beginning of the semester, present their applications and certificates to the Enrollment Committee, who will consult departments concerned in determining the credit to be given. Applications presented after the six weeks have expired will be rejected or \$5.00 charged for the transfer made.

2. *By Transfer from other Universities or Colleges.*—(a) Applicants transferring from other universities or colleges must furnish a certificate showing that they have no entrance conditions and are honorably dismissed.

(b) The College accepts records from other colleges for credit to advanced standing. Such records are accepted so far as they are equivalent to the work done in this College, subject to the approval of the divisions concerned. In bringing certificates from other institutions, the records must be on the official blank of the institution granting the certificates, and should show:

(1) The subject studied and ground covered.

(2) The time spent upon each subject.

(3) In the case of laboratory subjects a concise statement of the work done.

(4) *The Result.*—It is sufficient to state that the subject was creditably completed.

(c) Graduates of the Advanced Graduate Course of a Minnesota State Normal School are admitted, and may substitute for college work such normal work as will be approved by the Enrollment Committee after consulting with the divisions concerned.

(d) 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 certificates of special fitness from the President of the normal school, will be admitted with advanced standing under the same regulations and proviso.

3. *By Examination.*—(a) Any student upon first registration at the University, may, with the approval of the Enrollment Committee, be allowed without charge to take examinations toward advanced standing for which the student declares himself ready, such examinations to be taken within the first six weeks of the college year. (Cf. *Administration B. 3.*)

(b) Students who desire advanced standing on subjects taken in accredited schools, and not used for entrance credits, will be required to take an examination.

(c) Students desiring credit for practical work must present a detailed statement showing the nature of the work done, and should have reference letters and recommendations, and take an examination.

(d) Applicants who have taken a college subject in their preparatory work may petition the Enrollment Committee to elect another subject in lieu of the one they have had. Before granting this petition the Committee may, if they desire, require the applicant to take an examination.

ADMINISTRATION

A. REGISTRATION

1. *Defined.*—Registration shall consist of a written application to the Registrar of the College for enrollment in some one course of study in that College and of payment of the required fees.

2. *Time for.*—(a) Registration must be indicated two weeks before the day set for classes to begin. Penalty for delay, in either indicating registration or in payment of fees, \$1.00, and after the day set for classes to begin, 25 cents per day in addition for each day's delay. The fees for any semester must be paid before the day set for classes to begin, and the Cashier's receipt must be returned to the Registrar as evidence of such payment before the registration is complete. Fines for delayed registration will be considered a part of the regular fees for the semester.

(b) No student will be allowed to register after the semester opens except by permission of the Faculty.

(c) Cf. 13 below.

3. *Quantity of Work.*—(a) No student shall be permitted to register in any course for more than the regular schedule, nor for less than fifteen credit hours in any one semester, without permission of the Students' Work Committee.

(b) Students desiring to carry extra work shall notify the Committee on Students' Work at least one week before the beginning of the semester.

(c) Application for work in excess of the prescribed course shall be granted by the Committee only when the applicant has a record for good scholarship in all lines of his work for the previous year.

(d) No student who has been unable to carry successfully the regular work of any year shall be allowed to carry extra work in the succeeding years.

(e) Cf. 13 below and C 7.

4. *Preferred Classes.*—When the same course is offered both at University Farm and in the Departments located on the Minneapolis campus, students must register for the classes at University Farm, unless they have permission from the Students' Work Committee.

5. *Electives.*—(a) All students in the College of Forestry must advise with the Director concerning all electives.

(b) Not later than May 1st, each sophomore shall indicate to the Registrar the Division in which he expects to specialize. This selection must be approved by the Director. The student will then be registered only for such electives as are approved for that Division. After selecting a division in which to specialize, no change shall be made except by permission of the Students' Work Committee.

6. *Evidence of.*—The class card is the only evidence of registration to be accepted by any instructor. No student shall be admitted to class after the first week unless his card is in the possession of the instructor.

7. *Credit according to.*—(a) Students shall not receive credit for work for which they have not been registered, except as otherwise provided in these regulations.

(b) Cf. *Admission with Advanced Standing* and B 3 (b).

8. *Change of.*—(a) The Registrar has authority to grant change of registration from one subject to another any time during the first week of the semester without charge.

9. Cf. 14 below.

10. *Cancellation of.*—(a) When students leave the College and request the cancelling of their registration, the instructor shall send to the Registrar a report of such students' work up to the date of leaving.

(b) Cf. C 1, 2, and 4.

11. *Refusal of.* Cf. C 3 and 5.

12. *Re-registration.* Cf. C 6 and 10.

13. *Classification of Students.*—(a) In order to rank with a class a student must have not more than three credits short of the number required in the outline of the course.

(b) Any student having not more than three credits short, but who has not completed the full work of the class with which he ranks, will be listed in the catalogue with a footnote reference preceding his name.

(c) Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions, four-fifths of the work during the first year must be taken from the subjects offered to freshmen. The Committee on Enrollment may allow exceptions in cases of persons of mature age, upon recommendation of the division concerned. A new application must be made each semester to the Enrollment Committee.

(d) Unclassed students shall not be admitted to the work of either semester after the fourth week.

14. *Fees.*—(a) *Incidental:* All students who are residents of the State of Minnesota are charged an incidental fee of fifteen dollars a semester. Non-residents are charged double the fee required of residents of the State, or thirty dollars a semester. This fee covers all laboratory expenses. No reduction is made for late entrance or for leaving before the end of the semester. Students going to Itasca Park for the summer are charged an additional fee of five dollars.

(b) *Deposit.*—Students are required to deposit five dollars which will be credited to them in settlement of their accounts.

(c) *Nurse.*—Students rooming off the campus have the privilege of taking nurse cards at \$1.00 each semester. These cards entitle the holder to office consultation and office treatment by regular nurses.

(d) *Post-Office.*—Fifty cents will be deducted from the five-dollar deposit as rental for a post-office box.

(e) *Condition Examination.* Cf. C 9.

(f) *Special Examination.* Cf. B 3.

(g) *Fines.* Cf. 2 above.

(h) *Change of Registration.*—After the first week of any semester no change of registration shall be made except by permission of the Students'

Work Committee and on payment of two dollars and fifty cents change of registration fee. This fee will not be charged when the change is ordered by the Students' Work Committee.

B. CONTROL OF CLASSES

1. *Daily Routine.*—The daily session is divided into recitation periods of forty-five minutes each. The morning session begins at 8:00 and closes at 12:25. From 11:40 to 12:25 o'clock on Wednesday is reserved for a general assembly of the Faculty and students of the College, and, once each month, for an all-University Convocation meeting. The afternoon session begins at 2:00 and continues until 5:25 o'clock. Work extends through six days of the week.

2. *Absences.*—(a) Tardiness and absences shall be controlled by the division on the general principle that each student must do the full work of the class.

(b) Students shall be required to make up work lost through delay in registration just as in the case of any other absence.

(c) No student whose absences in any semester exceed four weeks in the aggregate shall be admitted to examination without special permission of the Faculty.

(d) When a student has been absent six times consecutively, the instructor shall notify the Registrar that the student has ceased to attend class. The Registrar shall then notify the Chairman of the Students' Work Committee and all instructors concerned that the student's registration has been suspended. Such student will be re-instated only on an order of the Students' Work Committee.

(e) *Leave of Absence.*—Any student intending to absent himself from college during any part of the college year must obtain a leave of absence from the Students' Work Committee.

3. *Examinations and Reports.*—(a) Regular written examinations shall be held at the close of each semester in all classes in the freshman and sophomore years.

(b) All classes in the senior and junior years shall be examined, at the close of each semester, either orally or in writing as the professor may direct; provided that in the special subjects requiring course examinations the regular semester examinations may be omitted with the approval of the Dean, in which case the time assigned for examinations shall be given to some form of recitation or instruction.

(c) The presentation of note book or theme shall not be accepted in lieu of examination.

(d) Cf. 2 (c) above.

(e) No examination shall be given by any instructor except for the work of the current semester, unless the student surrenders a permit for such examination signed by the Registrar. This permit must be returned to the Registrar with the record of the examination.

(f) *Examination for Credit.*—Students who have made up work by themselves may, by permission of the Committee on Students' Work,

obtain credit for the same through examinations, on payment of five dollars, special examination fee. Cf. *Admission with Advanced Standing—By Examination.*

(g) *Condition Examinations.* Cf. C 9.

(h) *Special Examinations.*—The Registrar will issue permits for special examinations on orders from the Students' Work Committee and the Cashier's receipt for payment of five dollars.

(i) *Cheating.*—In all cases of cheating in examinations or written exercises, the offender may be reported to the Students' Work Committee for such action as the case may require.

C. DELINQUENTS

1. *Warned of Delinquency.*—Any student of the freshman class who has been warned that he is deficient in sixty per cent of his work at the end of the first eight weeks of either semester and whose work is similarly deficient at the end of the first twelve weeks, shall be immediately dropped from the rolls. He may be reinstated on probation by the Students' Work Committee subject to further action by the Faculty.

2. *Probation.*—Any student who has been placed on probation by the Students' Work or Enrollment Committees may be dropped from the rolls by the Students' Work Committee at any time when one-half of his work is reported below grade.

3. *Registration Refused.*—Each division shall report to the Registrar two weeks before the end of the semester the names of any students pursuing any continuous course of study who have been doing such poor work as to make it impractical for them to do the work of the following semester and such students shall be refused registration for said course.

4. *Registration Cancelled.*—It is provided, also, that in case the final examination shows any student, who has not been previously reported to be incapable of further pursuing the subject in a satisfactory manner, at the written request of the head of the division concerned, the Registrar shall cancel the student's registration for that subject.

5. *Dropped from the Rolls.*—Any student receiving conditions or failures in sixty per cent of his work in any semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the corresponding semester of the following year, and may be required to pursue again all the subjects of the semester unless excused by the Committee on Students' Work.

6. *Pursue Work Again.*—(a) Any student of the freshman class who fails to pass in one-half the prescribed work of the year shall be required on re-entering the University to pursue again all the subjects of the year, unless excused by the Students' Work Committee.

(b) Any student receiving a failure in any subject shall be required to re-register for this subject the following corresponding semester in preference to any advanced work, unless excused by the Students' Work Committee.

7. *Work Limited.*—Students who receive a condition or failure in the work of the first semester shall not be allowed to elect another subject in the place of the subject in which the condition or failure was received, but shall be required to devote their full time to the remaining subjects of the course. Exceptions to the rule shall be made only by the Students' Work Committee after a full investigation.

8. *Incompletes.*—(a) When a student's work in a subject is in the main satisfactory, but incomplete, owing to absence from class, or failure to do on time a certain definite portion of the work which is only a small part of the entire work, and the reason for such absence or failure is satisfactory to the instructor the work may be reported as incomplete.

(b) An incomplete not removed before the end of the first month of the following semester becomes a condition. The Students' Work Committee may, in special cases, extend this time limit.

(c) Cf. 12 below.

9. *Conditions.*—(a) A condition not made up before the subject is offered again becomes a failure, subject to the rules governing failures.

(b) Students conditioned in the work of the first semester are given an opportunity to remove their conditions in April. Students conditioned in the work of the second semester are given an opportunity to remove their conditions in October. All condition examinations must be taken at the dates regularly set by the program for such examinations and at no other time.

(c) The Registrar will issue permits for condition examinations on receipt of the Cashier's receipt for the payment of one dollar examination fee, provided that the student has taken no previous examination for the removal of this condition, and provided that the condition is of not more than one semester's standing.

10. *Failures.*—(a) Failures must be taken over in class.

(b) Cf. 6 above.

11. *Eligibility Regulation.*—No student in this College with any conditions or failure standing against him shall be eligible (a) as a competitor in inter-collegiate debate, oratory, or athletic contests.

(b) For membership on the editorial board of any student publication.

(c) For membership in the Dramatic Club or in any student dramatic or musical organization which gives entertainments outside the University.

12. *Special Rules Governing Seniors.*—(a) *Excused from Examinations:* All seniors who have received no conditions or failures since the close of the freshman year shall be excused from their last semester final examinations in all subjects in which their work and attendance have been satisfactory to the instructor concerned.

(b) *Second Semester Registration:* No senior shall be allowed to register for the second semester who has a condition back of the senior year. No student shall be considered eligible for graduation whose conditions and other deficiencies are not completely removed by May 1st.

D. REQUIREMENTS FOR GRADUATION AND DEGREES

1. *Number of Credits.*—After the completion of the prescribed course of study, including all the required work and the requisite amount of elective work equivalent to a total of 148 credits hours, candidates will be recommended for graduation with the degree of Bachelor of Science.

2. *Exempted from.*—Every student shall do the work of the class with which he graduates, except that the student shall be free from any additional requirements for any year of which he has already completed the full work without condition.

3. *Delinquencies.*—No person shall be permitted to graduate who has an incomplete, condition, or failure standing upon the books of the Registrar.

4. *Professional Certificates.*—Diplomas of graduates of the College who have taken specified courses in the College of Education are valid as first-grade professional certificates for two years, and at the expiration of two years of successful teaching, such diplomas, properly endorsed, have the force of first-grade professional certificates for life.

E. MISCELLANEOUS

1. *Faculty Meetings.*—The Faculty meets regularly at 9 a. m. on the second Monday of each month of the college year.

2. *Petitions.*—(a) Every petition to be acted upon at any particular meeting of the Faculty must be presented to the Dean and Secretary of the Faculty not later than forty-eight hours previous to the time set for such meeting.

(b) Every student who desires to be heard in regard to his petition shall be given such an opportunity by the Committee or Faculty.

3. *Excused from Drill.*—In military matters where students ask to be excused from Military Drill, the matter shall go first to the Commandant. If he approves, the Students' Work Committee may take such action as they please. If he does not approve, and the Committee does approve, the matter shall go to the President of the University for final decision.

4. *Disturbances.*—Class meetings are held to be solely for the class calling the said meeting, and in case of disturbance and damage to property those who are known to be present and not members of the class, shall be held responsible for the damage done even though it may be shown that they did not do the actual damage.

5. *Class Parties.*—No class party or public entertainment for which members of the class shall be held bound in honor to contribute shall be given without previous permission of the Committee on Student Organizations.

6. *Student Organizations.*—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. Before any new student organization is formed permission must be obtained from the chairman of the Committee on Student Organizations.

The Forestry Club is an organization of students in the Minnesota College of Forestry. Enthusiasm and good fellowship are the sole requirements for admission. The club runs a house for the benefit of its members. Meetings are held fortnightly and speakers of prominence are presented. The object of the club is threefold: to keep its members up-to-date on forestry matters, to promote goodfellowship, and to create and cherish true college spirit.

EQUIPMENT

The College of Forestry is now located in the Horticultural Building at University Farm, St. Paul, about two and one-half miles from the University in Minneapolis. This location has the double advantage of the greater freedom of the Agricultural Campus and at the same time ample opportunity to mingle with the Academic students, giving increased breadth to the view.

The College is equipped with a small, but good technical library, an herbarium, and a comprehensive collection of woods. Its close connection with the Agricultural College gives access to those practical courses which could not be obtained in any other way. The shops of the mechanical division are open to the foresters.

The College is operating at University Farm a small plant for experimental work in the preservative treatment of fence posts. This plant is used as a laboratory and gives the students a touch of real practice and some idea of experimental work.

SUB STATIONS

Itasca Park.—The law passed by the Legislature of 1907, putting Itasca State Park under the State Forestry Board, gave the University the privilege of using with the consent of the Forestry Board a portion of it for a demonstration ground and experimental station. In pursuance of this the summer headquarters of the College have been established there.

Seven log buildings have been erected, including a library and school-house, a dining hall, a large bunk house, four cottages for the instructors, a barn, a boathouse; also frame icehouse, shop, and seed house. These buildings are equipped with the necessary furniture. In the summer the instruments and books needed in the class work are shipped up from University Farm.

The Park itself is a tract of 22,000 acres including about every type of forest found in the Lake states. This makes an ideal place for practice work in mensuration, forest description, management, and surveying. It furnishes virgin forest conditions, yet is connected with the outside world by daily mails. It is a great asset in the efficiency of the school, an ideal laboratory for the demonstration of class room theory.

Cloquet Forest Experiment Station.—This tract of 2,500 acres located three miles from the city of Cloquet is conducted by the College of Forestry as a forest experiment station for the study of the fundamental principles of forest growth and management, the study of climatological conditions and silvicultural methods.

There is a commodious log cabin for use as headquarters. The tract has been surrounded by a firebreak and a system of roads and trails is under construction.

The station will be equipped with all the necessary instruments for the measuring of temperature above and below the the surface of the ground, both in the forest and in the open, the measurement of precipitation, soil moisture, and humidity, measurements of plant growth, and light intensity. Studies will be made of all the different methods of reproduction, thinnings, and ecological formations.

This makes a splendid place for the students to become familiar with the fundamentals of silvicultural experimental work.

COURSES OF STUDY

The field of forestry at present is so large that it is no longer possible to train a man, in a four-year course, to handle all the branches of the work. A few years ago this was not only possible but was expected of every school. Now it is necessary to specialize and to specialize early in the course. Therefore a student should consider well before he starts in what line of work offers the greatest attractions for him. He must choose between the following groups:

1. *Technical Forestry*.—This group corresponds most closely to the old all-inclusive course and is best suited to the needs of the man who intends to enter the U. S. Forest Service as a Forest Assistant or to go into private work where he must handle all phases of the technical work and such other executive and administrative problems as may present themselves in connection with it. It is a well-rounded course which will not only prepare a man for the work of a forester, but is a splendid preparation for graduate work along any scientific line. It is this course that the man who likes science, without being absorbed in any particular line, and the free life of the open, should choose. It is a branch where there is always room for good men. This course is outlined on page 26.

2. Besides these two large branches there is another very important one which will probably appeal to a smaller number of men, but will afford good openings to men of a scientific turn of mind. This is the work of the experimental silviculturist. Men are needed to take charge of the forest experiment work in the country, the exact scientific work necessary to determine the factors controlling tree growth and the underlying principles of silviculture. The work is very largely pure science and not likely to involve much executive or administrative work. The student who wishes to follow this branch should specialize in botany and silviculture. In order to do this he must consult with the Director of the College before registering, or take a year of graduate work.

In addition to these two larger branches there are other special lines which may be elected. There are places for a limited number of men in grazing studies, tree diseases, wood utilization, and forest entomology. Most of these lines must be taken up in the graduate school to obtain satisfactory results, but the student who has a leaning toward any of these specialties should consult with the director before registration that he may have the advantage of the proper preparation in his undergraduate work. There is a splendid field for lumbermen and every effort is made to prepare the student for that line of work, but a special course of study leading to that end has not yet been organized.

TECHNICAL FORESTRY COURSE

Leading to Degree of Bachelor of Science

FRESHMAN YEAR

First Semester

Agr. Eng. 1, Math. 1 (3)
 Botany 1, General (3)
 German or French 1 (3)
 Rhetoric 1, General (3)
 Forestry 1, General (3)
 Chemistry 3, General (3)
 Military Drill

Second Semester

Agr. Eng. 2, Math. 2 (3)
 Botany 1, General (3)
 German or French 1(3)
 Rhetoric 1, General (3)
 Geology 4, Meteorology (3)
 Chemistry 4, Qualitative (3)
 Military Drill

At Itasca Park, June 1 to August 1

Elementary Sylviculture (3)
 Elementary Mensuration (3)
 Botany (2)

SOPHOMORE YEAR

First Semester

Agr. Eng. 4, Mechanical Drawing (3)
 Rhetoric 2, Argumentation (3)
 German or French 2 (3)
 Zoology 1, General (3)
 Forestry 2, Dendrology (3)
 Veg. Path. 2, Wood Technology (3)
 Military Drill

Second Semester

Agr. Eng. 13, Forest Engineering (3)
 Rhetoric 2, Argumentation (3)
 German or French 2 (3)
 Zoology 1, General (3)
 Forestry 2, Dendrology (1½)
 Hort. 3, Plant Propagation (1½)
 Botany 2, Taxonomy (3)
 Military Drill

JUNIOR YEAR

First Semester

Hort. 6, Landscape Gardening (3)
 For. 3, Sylviculture (3)
 Geol. 2, Physiography (3)
 Ent. 3, Forest Entomology (3)
 Veg. Path. 1, Plant Pathology (3)
 Botany 3, Ecology (3)

Second Semester

First Half
 Agr. Eng. 7, Forest Mechanics (2)
 For. 3, Sylviculture (2)
 Ent. 3, Forest Entomology (1)
 Ent. 8, Game and Fish (1)
 Vet. Sci. 1, General (2)
 Botany 3, Ecology (2)

Itasca Park

(April to September 1)
 For. 3, Sylviculture (4)
 For. 5, Mensuration (4)
 Agr. Eng. 14, Surveying (4)
 Veg. Path. Tree Diseases (1)

SENIOR YEAR

First Semester

For. 8, Forest Management (3)
 For. 7, Lumbering (6)
 For. 9, Forest By-Products (3)
 Econ. 1, Elements (3)
 For. 19, Wood Preservation (1)
 Econ. 21, Business Law (2)

Second Semester

For. 15, Seminar (6)
 For. 12, Lumber Manufacturing (2)
 For. 4, Forest Protection (2)
 (April 15 to June 1)
 For. 14, Working Plans (6)

DEPARTMENTAL STATEMENTS

EDWARD G. CHEYNEY, B.A., Professor of Forestry, Director of College
3 1st fl. Horticultural Building

JOHN P. WENTLING, M.A., Associate Professor of Forestry
3 1st fl. Horticultural Building

AUSTIN CARY, M.A., Professor of Forestry in Charge of Lumbering
3 1st fl. Horticultural Building

FORESTRY

1. General Forestry Mr. CHEYNEY
Three credits (three hours per week); first semester. Required of freshmen in Forestry Course.

A brief history of the development of forestry in Europe and America, with the idea of explaining the possibilities of forestry work and the problems which must be solved in this country. The location and brief description of the forests of the world, and more detailed sectional descriptions of the forests of the United States. Lectures and collateral reading.

2. Dendrology Mr. WENTLING
Six credits (three hours per week); first semester and first half second semester. Required of sophomores in Forestry Course. Prerequisite, Bot. 1.

A general and comprehensive study of the forest trees of the United States. Their classification, characteristics, range, etc., with special attention to prominent and constant characters as a means of ready identification. Special attention to the important timber trees of the United States. Lectures, assigned reading, special papers, field work.

3. Sylviculture
Seven and one-half credits. Required of juniors. Prerequisites, Bot. 1, For. 1 and 2.

a. Sylvics Mr. WENTLING
Three credits (three hours per week); first semester.

Study of the fundamental principles forming the basis of sylviculture, the life history of trees, the influence of environment on tree life in the forest. The origin and determination of forest types, their modification, and treatment. Methods of sylvical research. Special attention to the sylvical characteristics of the important commercial species in the United States. Lectures and assigned work.

b. Sylviculture Mr. WENTLING
One and one-half credits (three hours per week); first half second semester.

Theoretical discussion of the different sylvicultural systems of crop production and reproduction. The practice of sylviculture in the United States and abroad. Consideration of the methods of treatment of woodlands preliminary to the actual field practice of these methods in the forest. Lectures and reference work.

c. Seeding and Planting Mr. WENTLING
Three credits. In Itasca Park.

Production, collecting, testing, vitality, storage, and sowing of tree seeds. Location and preparation of nurseries and seed beds. Various methods of nursery practice and seeding. Planting. Examinations, reports, and planting plan. Each student must make a complete report and plan for a specified area. The course aims to give the student sufficient practice to enable him to carry on any work in forest planting. Field work with lectures.

d. Forest Soils
In Itasca Park.

Mr. WILLARD

This course is given in connection with seeding and planting and is required of each student. It consists chiefly of field studies in forest soils, as to origin, formation, and physical characteristics, with special emphasis on physical analysis. Soil surveys and the making of soil maps. Each student is required to make a complete soil survey of a portion of forest area and to complete a map of same.

4. Forest Protection

Mr. CARY

Two credits (three hours per week); first half of second semester. Required of juniors in Forestry Course. Prerequisites, For. 2 and 3, and For. Eng. 13.

Consideration of practical measures for the protection of forests from fires, trespass, grazing, etc. State and Federal forest fire and trespass laws. Protection from forest insects and forest tree diseases will be considered in the particular courses for those subjects. Lectures, assigned reading, and original papers.

5. Forest Mensuration

Mr. CHEYNEY

Four credits. Two months in summer. Required of sophomores in Forestry Course.

The measurement of lumber and of logs by different units; the contents of individual felled trees. The height of a standing tree; the volume of individual standing trees and of whole forests. The rate of growth of individual trees and of whole stands. The formation of log rules, stand tables, volume tables, height tables, and yield tables. A study of cruising methods. Text-book, lectures, and field work at Itasca Park.

7. Lumbering

Mr. CARY

Six credits (six hours per week); first semester. Required of seniors. Prerequisites, For. 1, 3, 5.

This course is designed to give the student a clear and balanced view of the lumber industry in its different branches and relations and an understanding of operating methods, particularly of logging. By reading, lectures, and watching lumber journals, a student's information will be built up on the lumbering regions of the United States, their timber supplies, manufacturing points, markets, and lines of distribution. Systematic lectures will cover the logging methods of the country comparatively, the cost, operation, and efficiency of different classes of sawmills, and treat briefly of grading, marketing, etc. Visits will be made to mills, woodworking plants, and factories making mill machinery in the vicinity and in January the students will go on a trip of two or three weeks to some lumbering region at a distance, making a careful study and report.

8. Forest Management

Mr. CHEYNEY

Three credits (three hours per week); first semester. Required of seniors in Forestry Course. Prerequisites, For. 1, 2, 3, 4, and 5.

Policy of forest owners; principles 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. The different methods of management and the principles underlying them. The outlines of a working plan. Lectures and collateral reading.

9. Forest By-Products

Mr. WENTLING

Three credits (three hours per week); first semester. Required of seniors in Forestry Course. Prerequisite, Veg. Path. 2.

In this course a special study is made of the products of the forest other than for timber and fuel. The products studied include cellulose for the manufacture of paper, sugar, tanning materials, turpentine, tar, oils, resin, waxes, gum, creosote, wood alcohol, acetic acid, acetone, essential oils, charcoal, camphor, and medicinal products.

10. Farm Forestry

Mr. CHEYNEY

Three credits (three hours per week); first semester.

This course is designed to give a general definition of forestry in its different branches, and in its relation to Agriculture. It takes up in detail the formation, care, and utilization of the woodlot, the planting and influence of windbreaks, the preservation of timber and the principles which should underlie the selection of species and arrangement in ornamental planting around the homestead. Lectures, recitations, and reference reading.

GRADUATE COURSES

16. Special Sylvicultural Problems

Mr. WENTLING

Six credits (minimum). Open to those who have had Bot. 1 and 3, and For. 2 and 3, or their equivalent.

The choice of subject must be made by the candidate and approved by the director and instructor. The laboratories of the Botany Department and the facilities of the Forest Experiment Station at Cloquet are available to students taking this work. May be elected as a major or a minor.

13. Forest Policy and Administration

Three credits (three hours per week); first semester.

A study of the economic conditions in regard to the forests of the United States. The consequent policy developed for the management of those forests, public and private. The administration of the Federal and State Forests.

14. Forest Working Plans

Mr. CARY

Three credits; second half second semester. Required of seniors in Forestry Course. Prerequisite, For. 8.

This subject will be given in the woods. A course of lectures paralleling the field work will deal with the principles and methods involved. Each class will be obliged to work out a complete plan including surveys, sylvicultural plans, estimates, field tables, maps, and systems of management. Lectures and field work.

15. Forest Seminar

Six credits (twelve hours per week); first half second semester.

Required of seniors in Forestry Course. Prerequisites, For. 1 and 14.

This is not, as the term generally implies, 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. Assigned questions and problems; discussions.

19. Wood Preservation

Mr. CHEYNEY

One and one-half credits (three hours per week); first semester.

Required of seniors in Forestry Course. Prerequisites, Veg. Path. 1 and 2.

The course will consist largely of demonstration work at the plant at University Farm. Experiments will be conducted to test the value of different methods of treating, special attention being given to post and pole treatment. The practical work will be supplemented by lectures and collateral reading upon the history of wood preservation, the development of the various methods, and a study of the antiseptics used.

AGRICULTURAL ENGINEERING

JOHN T. STEWART, C.E., Professor of Agricultural Engineering and Chief of Division	7 Main Building
ALVAH M. BULL, Instructor in Farm Structures	4 Drill Hall
HALL B. WHITE, B.S. in Agr., Instructor in Carpentry	6 Drill Hall
HARRY B. ROE, B.S., Instructor in Mathematics	6 Drill Hall
ALLEN D. JOHNSTON, Instructor in Blacksmithing	Blacksmith Shop
_____, Assistant in Drawing	

1. Mathematics 1

Mr. ROE

Three credits (three hours per week); first semester. Open to and required of all freshmen in Forestry and Agricultural Courses who have completed all entrance mathematics. Prerequisites, all entrance mathematics.

This course is mainly demonstration and development of certain fundamental principles of higher mathematics with continuous application to the solution of a great variety of geometrical, physical, and other practical problems. The subjects covered are: variation and quadratic equations reviewed; special forms of higher equations; simultaneous quadratics; graphics; theory and development of functions, including maxima and minima, indeterminate forms, differentiation, Taylor's formula, and the binomial formula, theory and practice of logarithms; indeterminate equations; and the general solution of cubics and biquadratics.

2. Mathematics 2

Mr. ROE

Three credits (three hours per week); second semester. Open to and required of all freshmen in Forestry and Agricultural Courses. Prerequisites, Mathematics 1.

This course covers the entire theory of plane trigonometry and numerous practical applications in problems solved with and without the use of logarithms and also the fundamental formulas of spherical trigonometry with such practical application as time permits.

4. Mechanical Drawing

Mr. BULL

Three credits (six hours per week); either semester. Required.

This course includes lectures on drawing; preliminary exercises in the use of drawing instruments; lettering; water coloring; the making of working drawings from models; and the practical value of drawing in arranging buildings, machinery, household equipment, etc.

7. Forest Mechanics

Mr. JOHNSTON and Mr. WHITE

Two credits (six hours per week); second semester. Required of juniors in Forestry Course. Given only between February 1 and April 15.

(a) Blacksmithing; instruction and practice work in the handling of forge and anvil, the bending, shaping, and welding of iron and steel, the tempering of steel tools, the grinding and care of the axe and similar work.

(b) Carpentry; practice work in the use and care of tools used in lumbering, saw filing, etc.

13. Forest Engineering Mr. STEWART
 Three credits (six hours per week); second semester. Required in Forestry Course. Prerequisites, Agr. Eng. 2 and 4.

Method of making the original land surveys, and the principles of retracing lines and relocating corners, method of representing and arranging field data on plats, a study of topographic symbols and the elements of topographic drawing, including tracing and blue printing; lectures and demonstration on man and horse packing, camp equipment, and camp discipline.

14. Forest Engineering Mr. STEWART
 Three credits (120 hours); at Itasca Park. Required in Forestry Course. Prerequisite, Agr. Eng. 13.

Field practice in mensuration, surveying, pacing, and rapid methods of field topography, use of transit, level, and plane table, preparing report of field work which will include finished plats, and maps of survey notes.

Note: Students taking any of the above courses must provide themselves with the necessary drafting instruments, regulation note books, drawing paper, etc.

At the beginning of the courses in Agricultural and Forest Engineering there will be some duplication of lecture work. A student taking both courses will be given extra work in lieu of that which is duplicated in the other course.

BOTANY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

FREDERIC E. CLEMENTS, Ph.D., Professor, Head of Department of Botany	207 Pillsbury Hall
JOSEPHINE E. TILDEN, M.S., Professor	214 Pillsbury Hall
CARL O. ROSENDAHL, Ph.D., Professor	18 Pillsbury Hall
NED L. HUFF, M.A., Assistant Professor	214 Pillsbury Hall
FREDERIC K. BUTTERS, B.S., B.A., Assistant Professor	206 Pillsbury Hall
EDITH CLEMENTS, Ph.D., Instructor	207 Pillsbury Hall
ALICE M. MISZ, M.A., Instructor	16 Pillsbury Hall

1. General Botany Messrs. CLEMENTS, HUFF, and BUTTERS, and
Miss MISZ

Six credits (six hours per week); both semesters. Open to freshmen.

Greenhouse study of the behavior and structure of flowering plants, following the life cycle from germination to seed production; laboratory study of the evolution of the plant kingdom and the underlying principles of plant life; laboratory and greenhouse work in the identification and relationship of flowering plants, together with field work on the plants of forest and grassland; practical papers on selected topics, viz., bacteria, plant growth, evolution, etc.

2. Advanced Botany Messrs. CLEMENTS and ROSENDAHL, Mrs. CLEM-
ENTS and Miss MISZ

Six credits (six hours per week); both semesters. Open to sophomores. Prerequisite, Botany 1.

Systematic work in the naming and classification of plants, chiefly of the groups of economic importance, i. e., flowering plants, fungi, and algae, with emphasis on the common plants of Minnesota; ecological study in the greenhouse of the structure and meaning of the

adaptations of root, stem, and leaf, and in the field of the principles of plant distribution, migration, and grouping; cytological study of growth, production of pollen and egg-cells, fertilization, hybridization, and seed formation; one practical paper each semester, cytology of plant breeding and the botany of a group of economic plants for horticultural students; plant adaptations and the life history of a forest for forestry students.

3. Physiology and Ecology

Mr. CLEMENTS

Six credits (six hour per week); both semesters. Open to juniors.

Prerequisites, Botany 1 and 2.

Study of the factors which make the plant's home, viz., water, light, heat, soil, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization, and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation, and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc., of plants; one practical paper each semester on selected topics, e. g., acclimatization, adaptation, origin of new forms, vegetation of Minnesota, of North America, etc.

CHEMISTRY

SCHOOL OF CHEMISTRY

GEORGE B. FRANKFORDER, M.A., Ph.D., Professor, Head of Department
of Chemistry 114 Chemistry Building

EDWARD E. NICHOLSON, M.A., Assistant Professor
104 Chemistry Building

3. General Chemistry (Given at University)

Mr. FRANKFORDER, and
INSTRUCTORS

Three credits (two lectures, four laboratory hours per week); first semester. Open to freshmen.

This course includes a study of the chemical properties of the metallic and non-metallic elements, with a brief introduction to organic chemistry.

4. Qualitative Analysis (Given at University)

Mr. NICHOLSON

Three credits (one lecture, four hours laboratory per week); second semester. Open to freshmen.

This course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

JOHN HENRY GRAY, Ph.D., Professor, Head of Department of Economics
and Political Science Mechanics Art Building

CARL W. THOMPSON, M.A., Associate Professor and Director of Bureau
of Research in Agricultural Economics Mechanic Arts Building

THOMAS W. MITCHELL, Ph.D., Assistant Professor
 Mechanic Arts Building
 JEREMIAH S. YOUNG, Ph.D., Assistant Professor
 Mechanic Arts Building
 J. FRANKLIN EBERSOLE, M.A., Assistant Professor
 Mechanic Arts Building

1. Elements of Economics Mr. THOMPSON
 Three credits (three hours per week); repeated each semester. Open to sophomores, juniors, and seniors.

Designed for those who desire a general knowledge of economics and as an introduction to the more advanced courses offered in the department.

3a. Modern Industrial and Commercial History of Europe Mr. GRAY
 Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors.

The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain. The effects of mechanical invention and political change on industry and trade.

Course 3a requires no preliminary course and may be taken advantageously with Course 1 or Course 2a. (See Course 3b.) Not given in 1912-13.

3b. Industrial and Commercial History of the United States Mr. GRAY
 Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors.

Courses 3a and 3b are conducted each with a text-book, supplemented by lectures and prescribed topical readings. In each of these courses, one written report of considerable length will be required each semester. Not given in 1912-13.

5. Money and Banking Mr. EBERSOLE
 Three credits (three hours per week); second semester. Open to those who have completed Course 1.

The nature, functions, and theories of money, with special reference to the monetary history of the United States, the nature and uses of credit, including foreign exchange; the functions of banks and trust companies; types of banking systems in this and other countries. Lectures, text-book, assigned readings, and discussions.

15. Business Organization Mr. MITCHELL
 Three credits (three hours per week); second semester. Open to those who have completed Course 1.

Forms of organization to effect business control; executive committees; the main departments of a business and the principles governing sub-departmentization and office organization of each. Based on Parson's *Business Administration*, with lectures, theses and class discussions.

21a. *Business Law Mr. YOUNG
 Two credits; first semester. Open to seniors.

The fundamental feature underlying contracts; laws governing negotiable papers and their uses; courts and their jurisdiction. The course will deal especially with the application of the subjects to forest conditions.

*Forestry seniors will carry this course till the Christmas recess and receive two credits.

ENTOMOLOGY

FREDERIC L. WASHBURN, M.A., Professor of Entomology and Chief of
Division 302 3d fl. Main Building

ARTHUR G. RUGGLES, M.A., Assistant Professor of Entomology
301 3d fl. Main Building

_____, Assistant in Entomology

3. Forest Entomology Mr. RUGGLES

Four credits (six hours per week); both semesters. Required of juniors in Forestry Course. Prerequisite, Zool. 1 or equivalent.

The student is given a thorough practical training in elementary entomology. He is directed in a special study of insects affecting forest and shade trees, and will be encouraged in doing field work, collecting, identifying, and becoming familiar with the life history of forest insects. Each student will be assigned a forest insect to investigate in the forest during his summer work in the woods. A detailed report, together with specimens of the insect and its work, must be turned in to complete the course.

8. Game Protection and Fish Culture Mr. WASHBURN

One credit (three hours per week); first half second semester. Required of juniors in Forestry Course.

Relation 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 and birds.

FRENCH

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

CHARLES W. BENTON, Litt.D., Professor, Head of Department of Romance
Languages 200 Folwell Hall

RENE M. DELAMARE, B.L., Instructor

1. Beginning French Mr. DELAMARE

Six credits (three hours per week); both semesters.

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French. Thieme and Effinger's French Grammar and Reader; modern texts.

2. Intermediate French Mr. DELAMARE

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Course 1; both semesters must be completed before credit is given for the first semester.

Francois' Advanced French Prose Composition; modern texts will be read, including some of the works of Coppee, Merimee, Daudet, Scribe, etc.

GEOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

WILLIAM H. EMMONS, Ph.D., Professor, Head of Department of Geology
and Mineralogy 108 Pillsbury Hall

EDWARD M. LEENERTS, M.A., Assistant Professor 107 Pillsbury Hall

2. Physiography

Mr. LEHNERTS

Three credits (three hours per week); first semester. Open to freshmen.

This course is designed for the students in Agriculture and Forestry; and the work includes: (1) the fundamental facts and principles of mathematical and physical geography and their relation to human industries; (2) mineral, rocks, and building stones; (3) ground and surface waters; (4) physiographic regions of the United States; (5) natural resources,—their utilization and conservation; (6) map studies; (7) local field work; and (8) practical problems. Text-books, lectures, and reference reading.

4. Elements of Meteorology

Mr. LEHNERTS

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Courses 1a or 2.

The general principles of meteorology are treated, embracing properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-books, lecture, and reference reading.

5. Geography and Geology of Minnesota

Mr. JOHNSTON

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Course 1a.

(a) The physical geography of the State in its relation to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the State and the extension of these into general application. (c) The present problems of the State in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

6. Elements of Mineralogy

Messrs. BOWLES and GROUT

Three credits (six hours per week); second semester. Open to sophomores, juniors, and seniors.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations, a study of the native elements and of economic minerals; the basis of classification. (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

JOHN G. MOORE, B.A., Professor, Head of Department of German

210 Polwell Hall

LEON METZINGER, Ph.B., Instructor

1. Beginning

Mr. METZINGER

Six credits (five hours per week); both semesters. Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2. Intermediate

Mr. METZINGER

Six credits (three hours per week); first semester. Open to those who have completed Course 1 or its equivalent; both semesters must be completed before credit is given for the first semester. This course may be supplemented by Course 5. It should be followed by Course 6 or Course 7. Students who obtain credit for this course cannot receive credit also for either Course 3 or Course 4.

First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe, or Schiller.

3. Scientific Intermediate

Mr. JUERGENSEN

Six credits (three hours per week); both semesters. Open to all who have completed Course 1; both semesters must be completed before credit is given for the first semester.

First semester: Hodge's German Science Reader (or equivalent). Second semester; Brandt and Day's German Scientific Reading. This course aims to give the students a reading knowledge of German for use in scientific studies.

HORTICULTURE

LE ROY CADY, B.S. in Agr., Associate Professor of Horticulture, Acting
Chief of Division 22 2d fl. Horticulture Building

3. Plant Propagation

Mr. CADY

One and one-half credits (six hours per week); last half second semester. Required of sophomores in Forestry Course.

Study of seeds; vitality and germination tests; propagation of plants by seeds, cuttings, grafting, and budding; nursery and forest plantation work. Laboratory work and practicum.

6. Landscape Gardening

Mr. CADY

Three credits (three hours per week); first semester. Required of seniors in Forestry Course.

A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.

RHETORIC

ROBERT C. LANSING, M.A., Assistant Professor of English

36 2d fl. Dairy Hall

1. General Rhetoric

Mr. LANSING

Six credits (three hours per week); both semesters. Required of freshmen.

Theme course: Lectures and recitations on the principles of themes, the construction of sentences, and the use of words. The papers written in the classes and examinations of the various departments of the college will be turned over to the English Department for correction of the English. These will be the subject of personal interviews with the student, and will partly determine his final grade in English.

2. Argumentation

Mr. LANSING

Six credits (three hours per week); both semesters. Required of sophomores. Prerequisite, Rhetoric 1.

The course consists of a study of the rules of reasoning, the tests of evidence, and effective presentation. There is frequent practice in writing, briefing, and speaking both from the floor and formal debate.

VEGETABLE PATHOLOGY AND BOTANY

EDWARD M. FREEMAN, Ph.D., Professor of Vegetable Pathology and Botany and Chief of Division 30 3d fl. Horticulture Building

E. C. STAKMAN, M.A., Instructor in Vegetable Pathology 35 3d fl. Horticulture Building

1. Plant Pathology

Mr. FREEMAN

Three credits (six hours per week); first semester. Required of juniors. Prerequisite, Botany 1.

General outline of the diseases of plants due to fungus organisms; a special study of the life histories and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Thesis work and specialization according to the interests of the students; for instance, for forestry students, diseases of forest trees; for agronomy students, diseases of cereal crops, etc. Special attention is paid to methods of prevention and cure. Lectures, reference reading, laboratory, and thesis work.

2. Wood Technology

Mr. FREEMAN

Three credits (six hours per week); first semester. Required of juniors. Prerequisite, Bot. 1.

A comprehensive study of the structural features of types of the most important woods of commerce; special reference to the woods of the United States and particularly to those of this State. Structural development in the life of the tree. Physical and mechanical characters as related to the structural features. A comparative study of a large number of woods with a view to identification and classification. Thesis work on the detailed studies in the histology of the woods.

VETERINARY SCIENCE

MYRON H. REYNOLDS, B.S., D.V.M., M.D., Professor of Veterinary Medicine and Surgery and Chief of Division

16 2d. fl. Veterinary Building

_____, Assistant Professor of Veterinary Medicine and Surgery

1. Veterinary Work

Mr. REYNOLDS

Three credits (three hours per week); second semester. Required of juniors.

This course is given by lecture, by practicum, and by library work. Its purpose is to fit students for intelligent care of farm stock. The work will cover animal physiology, anatomy, elementary pathology, causes and prevention of disease, lameness, unsoundness, diseases, and common medicines; and will be illustrated by stereopticon, charts, skeletons, and manikins. Students in forestry complete the work April fifteenth and receive two credits.

ZOOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

HENRY F. NACHTRIEB, B.S., Professor, Head of Department of Animal
Biology 205 Pillsbury Hall
CHARLES P. SIGERFOOS, Ph.D., Professor 201 Pillsbury Hall

1. General Zoology Messrs. NACHTRIEB and SIGERFOOS
Six credits (six hours per week); both semesters. Required of
sophomores.

This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla of branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the star-fish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's Manual of Zoology.

STUDENTS

SENIORS—14

Allen, Philip T., 2095 Commonwealth Ave., St. Paul
Beyer, Walter F., 632 Dayton Ave., St. Paul
Blodgett, Harvey P., 330 W. 3rd St., St. Paul
Clymer, William R., 718 St. Anthony Ave., St. Paul
Conzet, Grover M., Nevis
Harris, S. Grant, 1383 Langford Ave., St. Paul
Hodgman, Arthur W., 470 Dayton Ave., St. Paul
Norman, Sigvald, Ortonville
Orr, J. Elliott, Michigan City, Ind.
Pearce, William R., 1609 University Ave. S. E., Minneapolis
Pettibone, Herman N., 2127 Commonwealth Ave., St. Paul
Spellerberg, Frederick E., 383 W. 11th St., Dubuque, Iowa
Stevenson, John A., 2706 Blaisdell Ave., Minneapolis
Wilson, Robert, Stillwater

JUNIORS—8

Griffin, Thomas A., 1510 Lyndale Ave. N., Minneapolis
Hall, E. Howard, 981 Bayless Ave., St. Paul
*Henchel, Norman O., Rochester
Moir, John, 1819 Emerson Ave. S., Minneapolis
Nuffer, Harry D., Rochester N. Y.
Simpson, Charles D., Northfield
*Tobin, Paul H., 3028 Hennepin Ave., Minneapolis
Wiggin, Gilbert H., 523 Ontario St. S. E., Minneapolis

SOPHOMORES—23

Aldworth, Donald R., Rochester
Braden, Kenneth J., 1814 E. 1st St., Duluth
Brodrick, Martin J., 603 Delaware St. S. E., Minneapolis
Brunelle, Henry D., Cloquet
Clymer, Arthur E., 718 St. Anthony Ave., St. Paul
*Cummings, Thomas S. C., 11 Summit Court, St. Paul
Dunn, Frank D., 902 Lake Ave., Waseca
Freeman, George F., 1991 St. Anthony Ave., St. Paul
Graham, Samuel A., Winona
Haworth, Robert B., 932 Forest Ave., Des Moines, Iowa
Hayward, Herman E., 615 5th Ave. S. E., Minneapolis
Kellogg, Joseph M., 770 Ashland Ave., St. Paul
Lindeberg, George C., 478 St. Anthony Ave., St. Paul
Renshaw, David L., Monona, Iowa
Ringold, Stanley L., 1004 Hague Ave., St. Paul
Rogers, Ernest C., Hammond
*Rose, Logan, 810 S. Broad St., Mankato
St. Marie, Adrian A., Crookston
Savre, Oliver M., Northwood, Iowa
Shanahan, Thomas J., 503 15th St. S. E., Plat 6, Minneapolis
Spink, Harold W., Havana, Ill.
Waterman, John F., 1316 7th St. S. E., Minneapolis
Wyman, Hiram E., Dundas

FRESHMEN—19

Armstrong, Carroll W., 3709 Baring St., Philadelphia, Pa.
Barker, Howard F., 1804 University Ave., Minneapolis
Chance, Jenner D., Little Falls
Collar, James W., 654 Selby Ave., St. Paul

*Students whose names are marked with an asterisk have not carried the full work of the class.

Dennis, Henry M., 809 6th St. W.,
Ashland, Wis.
Dillman, Edwin K., 508 12th Ave. S. E.,
Minneapolis
Fay, Clifford, 2118 Marshall Ave., St
Paul
Fry, Gilbert, Cedar Rapids, Iowa
Hansen, Thorwald S., Cedar Falls, Iowa
Hawkinson, Carl M., Virginia
Hilts, Harry N., Augusta, Wis.

Johnson, George K., Marshall
Keltner, Ralph J., South Bend, Ind.
Lampman, Leo O., Southerland, Iowa.
Lundmark, Charles W., 609 Hemlock St.
Virginia
Moe, Norman, Lake Crystal
Mueller, Alfred T., Markesan, Wis.
Sischo, Paul C., 1024 Ashland Ave., St.
Paul
Wilder, Myron E., Canandaigua, N. Y.

The University of Minnesota

THE SCHOOL FOR NURSES

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 13. AUGUST 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college and one for the Summer Session is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota

TABLE OF CONTENTS

Calendar, 1912-13	4-6
General University Information	7
Board of Regents	8
Executive Officers	8
Department of Medicine	9
The College of Medicine and Surgery—	
Faculty	10-16
The School for Nurses	17-35
The Corps of School Instructors	18-19
Clinical Facilities	20-22
The Hospital Service	19-22
Libraries, etc.	23
The Course of Training	23
Requirements for Admission	23-25
Courses of Study	26
Preliminary Course	26-30
Hospital Training	30-35
Students	36

1912							1913													
JULY							JANUARY							JULY						
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST						
..	..	..	..	1	2	3	..	..	..	..	..	..	1	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..	..	..
SEPTEMBER							MARCH							SEPTEMBER						
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	..	..	..	..	..	..	30	31	..	..	..	..	..	..	..	..	..	..	..	..
OCTOBER							APRIL							OCTOBER						
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER						
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..
DECEMBER							JUNE							DECEMBER						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	..	1	2	3	4	5	6
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..

UNIVERSITY CALENDAR

1912-1913

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

1912			
September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.
1913			
January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday, Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
	2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday, Sept. 11	9 a. m.	English
	2 p. m.	German, French, Latin, Scandinavian
Thursday, Sept. 12	9 a. m.	Elementary Algebra
	2 p. m.	Higher Algebra
Friday, Sept. 13	9 a. m.	Plane Geometry
	2 p. m.	Solid Geometry

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.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
FRANK FAIRCHILD WESBROOK, M.A., M.D., C. S., Dean of the College of Medicine and Surgery
ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
GEORGE F. JAMES, Ph.D., Dean of the College of Education
HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
ADA L. COMSTOCK, M.A., Dean of Women

THE COLLEGE OF MEDICINE AND SURGERY

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.
AMOS W. ABBOTT, M.D., Emeritus Professor of Gynecology
21 S. 10th St.
EVERTON J. ABBOTT, B.A., M.D., Emeritus Professor of Clinical Medicine
425 Dayton Ave., St. Paul
JOHN W. BELL, M.D., Emeritus Professor of Clinical Medicine and Physi-
cal Diagnosis 5127 Lake Harriet Blvd.
CHARLES A. WHEATON, M.D., Emeritus Professor of Surgery
329 Summit Ave., St. Paul

EXECUTIVE FACULTY

- FRANK F. WESBROOK, M.A., M.D., C.M., Dean, and Professor and Direc-
tor of the Department of Pathology, Bacteriology, and Hygiene
906 5th St. S. E.
RICHARD OLDING BEARD, M.D., Professor of Physiology and Director of
the Department of Physiology and Pharmacology
The Virginia, Lowry Hill
GEORGE B. FRANKFORTER, M.A., Ph.D., Professor and Director of the
Department of Chemistry 525 E. River Road
CHARLES LYMAN GREENE, M.D., Professor and Chief of the Department
of Medicine 421 Summit Ave., St. Paul
THOMAS G. LEE, B.S., M.D., Professor and Director of the Department of
Anatomy, and Librarian, Department of Medicine
509 E. River Road
JAMES E. MOORE, M.D., Professor and Chief of the Department of
Surgery 616 Syndicate Bldg.
C. EUGENE RIGGS, M.A., M.D., Professor and Chief of the Department
of Mental and Nervous Diseases 10 Crocus Hill, St. Paul
PARKS RITCHIE, M.D., Professor and Chief of the Department of Obstet-
rics and Gynecology 910 Lowry Bldg., St. Paul
FRANK C. TODD, M.D., Professor and Chief of the Department of Eye,
Ear, Nose, and Throat 506 Donaldson Bldg.
-
- LOUIS B. BALDWIN, M.D., Superintendent, University Hospitals
304 State St. S. E.
LOUISE M. POWELL, R.N., Superintendent of the School for Nurses
417 Delaware St. S. E.

GENERAL FACULTY

- E. T. BELL, B.S., M.D., Assistant Professor of Pathology and Bacteriology
222 Harvard St. S. E.
- EDGAR D. BROWN, Phm.D., M.D., Professor of Materia Medica and Pharmacology
3525 3d Ave. S.
- FRANK E. BURCH, M.D., Assistant Professor of Ophthalmology and Otology
930 Lowry Bldg., St. Paul
- ABRAHAM B. CATES, M.A., M.D., Professor of Obstetrics
413 Pillsbury Bldg.
- JAMES T. CHRISTISON, M.D., Professor of Pediatrics
535 Lowry Bldg., St. Paul
- ALEXANDER R. COLVIN, M.D., Clinical Professor of Surgery
342 Lowry Bldg., St. Paul
- J. FRANK CORBETT, M.D., Associate Professor of Experimental Surgery
2446 Park Ave.
- JOHN GROSVENOR CROSS, M.S., M.D., Clinical Professor of Medicine
910 Donaldson Bldg.
- WARREN A. DENNIS, B.L., M.D., Clinical Professor of Surgery
942 Lowry Bldg., St. Paul
- IRA H. DERBY, Ph.D., Assistant Professor of Chemistry
2157 Commonwealth Ave., St. Paul
- ARTHUR W. DUNNING, M.D., Clinical Professor of Nervous and Mental Diseases
803 Lowry Bldg., St. Paul
- FREDERICK A. DUNSMOOR, M.D., Professor of Clinical Surgery
100 Andrus Bldg.
- CHARLES A. ERDMANN, M.D., Professor of Gross and Applied Anatomy
612 9th Ave. S. E.
- BURNSIDE FOSTER, B.A., M.D., Professor of Dermatology and Syphilology, and Lecturer upon the History of Medicine
821 Lowry Bldg., St. Paul
- ROBERT B. GIBSON, Ph.B., Ph.D., Assistant Professor of Physiologic Chemistry
222 Harvard St. S. E.
- JAMES GILFILLAN, M.D., Clinical Professor of Medicine
910 Lowry Bldg., St. Paul
- ARTHUR J. GILLETTE, M.D., Professor of Orthopedic Surgery
Seven Corners, St. Paul
- EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
1316 7th St. S. E.
- GEORGE D. HEAD, B.S., M.D., Associate Professor of Medicine
503 Donaldson Bldg.
- ALBERT C. HEATH, B.A., M.D., Clinical Professor of Rhinology and Laryngology
339 Lowry Bldg., St. Paul
- HIBBERT W. HILL, M.D., D.P.H., Assistant Professor of Bacteriology
Minnesota State Board of Health, Minneapolis
- JOHN B. JOHNSTON, Ph.D., Professor of Comparative Neurology and Secretary of the Executive Faculty
715 Fulton St. S. E.

- WILLIAM A. JONES, M.D., Professor of Nervous and Mental Diseases
513 Pillsbury Bldg.
- ARTHUR A. LAW, M.D., Clinical Professor of Surgery
413 Pillsbury Bldg.
- FREDERICK E. LEAVITT, M.D., Clinical Professor of Obstetrics and Gynecology, and Clerk of Clinics
910 Lowry Bldg., St. Paul
- JENNINGS C. LITZENBERG, B.S., M.D., Associate Professor of Gynecology and Obstetrics, and Chief of the Out-Patient Service
910 Donaldson Bldg.
- ARCHIBALD MACLAREN, B.S., M.D., Clinical Professor of Surgery
Lowry Bldg., St. Paul
- JOHN S. MACNIE, B.A., M.D., Clinical Professor of Ophthalmology and Otolaryngology
506 Donaldson Bldg.
- ARTHUR T. MANN, B.S., M.D., Clinical Professor of Surgery and Clerk of Clinics
910 Donaldson Bldg.
- ROBERT H. MULLIN, B.A., M.B., Associate Professor of Pathology and Bacteriology
1023 University Ave. S. E.
- WILLIAM R. MURRAY, Ph.B., M.D., Professor of Rhinology and Laryngology
510 Pillsbury Bldg.
- LOUIS A. NIPPERT, M.D., Clinical Professor of Medicine
307 Reid Corner
- HENRY J. O'BRIEN, M.D., Clinical Professor of Surgery
541 Lowry Bldg., St. Paul
- ELMER H. PARKER, B.S., M.D., Assistant Professor of Rhinology and Laryngology
2401 Sheridan Ave. S.
- WALTER R. RAMSEY, M.D., Clinical Professor of Pediatrics
214 S. Grotto St., St. Paul
- SOREN P. REES, B.S., M.D., Clinical Professor of Medicine
1964 Penn Ave. S.
- THOMAS S. ROBERTS, M.D., Clinical Professor of Pediatrics
1603 4th Ave. S.
- HAROLD E. ROBERTSON, B.A., M.D., Associate Professor of Pathology and Bacteriology and Pathologist to the University Hospitals
508 Essex St. S. E.
- JOHN T. ROGERS, M.D., Clinical Professor of Surgery
342 Lowry Bldg., St. Paul
- JOHN L. ROTHROCK, M.A., M.D., Clinical Professor of Gynecology
514 Lowry Bldg., St. Paul
- RICHARD E. SCAMMON, Ph.D., Assistant Professor of Anatomy
112 Church St. S. E.
- FREDERICK H. SCOTT, Ph.D., M.B., D.Sc., Associate Professor of Physiology
1023 University Ave. S. E.
- JULIUS PARKER SEDGWICK, B.S., M.D., Assistant Research Professor in Physiologic Chemistry and Clinical Instructor in Pediatrics
820 Donaldson Bldg.
- GEORGE E. SENKLER, M.D., Clinical Professor of Medicine
514 Lowry Bldg., St. Paul

- WALTER D. SHELDEN, B.S., M.D., Clinical Professor of Medicine
3233 Irving Ave. S.
- ANTON SHIMONEK, M.D., Clinical Professor of Surgery
514 Lowry Bldg., St. Paul
- HALDOR SNEVE, M.D., Clinical Professor of Nervous and Mental Diseases
814 Lowry Bldg., St. Paul
- HENRY L. STAPLES, M.A., M.D., Clinical Professor of Medicine
405 Andrus Bldg.
- J. CLARK STEWART, B.S., M.D., Professor of Principles of Surgery
616 Syndicate Bldg.
- ARTHUR SWEENEY, B.A., M.D., Professor of Medical Jurisprudence
821 Lowry Bldg., St. Paul
- HORATIO B. SWEETSER, M.D., Clinical Professor of Surgery
2509 Pillsbury Ave.
- *MAX P. VANDER HORCK, M.D., Professor of Diseases of the Skin and
Genito-Urinary Organs
- S. MARX WHITE, B.S., M.D., Associate Professor of Medicine
910 Donaldson Bldg.
- M. RUSSELL WILCOX, M.D., Assistant Professor of Physiology
802 Donaldson Bldg.
- LOUIS B. WILSON, M.D., Assistant Professor of Clinical Pathology
830 W. College St., Rochester
- FRANKLIN R. WRIGHT, D.D.S., M.D., Clinical Professor of Genito-
Urinary Diseases
707 Donaldson Bldg.
-
- FRED L. ADAIR, B.S., M.D., Instructor in Obstetrics and Gynecology
820 Donaldson Bldg.
- WILLIAM F. ALLEN, M.A., Instructor in Histology and Embryology
92 N. 17th St.
- CHARLES R. BALL, B.A., M.D., Clinical Instructor in Nervous and Mental
Diseases
942 Lowry Bldg., St. Paul
- GEORGE C. BARTON, M.D., Clinical Instructor in Gynecology
1028 Andrus Bldg.
- ARTHUR E. BENJAMIN, M.D., Clinical Instructor in Gynecology
1020 Donaldson Bldg.
- FRANK S. BISSELL, M.D., Clinical Instructor in Medicine, and Radiog-
rapher to University Hospitals
4412 Lake Harriet Blvd.
- CHARLES H. BRADLEY, M.D., Clinical Instructor in Medicine
1016 Donaldson Bldg.
- JOHN B. BRIMHALL, M.D., Clinical Instructor in Orthopedic Surgery
303 Moore Blk., St. Paul
- WILLIAM H. CONDIT, B.S., M.D., Clinical Instructor in Therapeutics
636 Syndicate Bldg.
- HENRY WIREMAN COOK, B.A., M.D., Instructor in Clinical Medicine
N. W. Nat'l Life Ins. Bldg.
- PAUL B. COOK, M.D., Instructor in Genito-Urinary Diseases
710 Lowry Bldg., St. Paul

*Deceased

- LESLIE O. DART, M.D., Clinical Instructor in Pediatrics
304 Masonic Temple
- CHARLES F. DIGHT, M.D., Lecturer in Pharmacology and Materia Medica
4818 39th Ave. S.
- CHARLES R. DRAKE, M.D., Assistant Pathologist to University Hospitals
- ROBERT E. FARR, M.D., Clinical Instructor in Surgery
301 Reid Corner
- EMIL S. GEIST, M.D., Clinical Instructor in Orthopedic Surgery
820 Donaldson Bldg.
- *JUDD GOODRICH, M.D., Clinical Instructor in Surgery
- ADDISON GULICK, M.A., Ph.D., Instructor in Physiologic Chemistry
524 12th Ave. S. E.
- ARTHUR S. HAMILTON, B.S., M.D., Instructor in Pathology of the Nervous
System and Clinical Instructor in Mental and Nervous Diseases
513 Pillsbury Bldg.
- EARLE R. HARE, B.A., M.D., Clinical Instructor in Surgery
505 Donaldson Bldg.
- WILLIAM A. HILTON, Ph.D., Instructor in Histology and Embryology
113 Church St. S. E.
- PEDER A. HOFF, M.D., Clinical Instructor in Medicine
939 Lowry Bldg., St. Paul
- JOHN E. HYNES, M.D., Clinical Instructor in Medicine
3349 University Ave. S. E.
- WILLIAM C. JOHNSON, B.A., M.D., Demonstrator in Pathology and Bacteriology
827 University Ave. S. E.
- HERBERT W. JONES, M.D., Clinical Instructor in Nervous and Mental
Diseases
513 Pillsbury Bldg.
- WINFORD P. LARSON, M.D., Demonstrator in Pathology and Bacteriology
614 9th Ave. S. E.
- C. NAUMANN McCLOUD, Phm.D., M.D., Clinical Instructor in Pediatrics
524 Lowry Bldg., St. Paul
- FLETCHER O. MACFARLAND, B.S., M.D., Instructor in Physiology
417 Union St. S. E.
- JENNETTE M. McLAREN, M.D., Clinical Instructor in Obstetrics
803 Lowry Bldg., St. Paul
- GUSTAV A. MAGNUSSON, M.D., Demonstrator in Pathology and Bacteriology
- CHARLES J. MEADE, M.D., Clinical Instructor in Medicine
Moore Blk., St. Paul
- JOHN H. MORSE, B.A., M.D., Clinical Instructor in Ophthalmology and
Otology
2511 Washburn Ave. S.
- LOUIS A. NELSON, M.D., Clinical Instructor in Ophthalmology and
Otology
734 Lowry Bldg., St. Paul
- HENRY T. NIPPERT, M.D., Clinical Instructor in Medicine
339 Lowry Bldg.
- OLOF A. OLSON, M.D., Clinical Instructor in Surgery
221 Cedar Ave.

*Deceased

- OSCAR OWRE, M.D., C.M., Clinical Instructor in Genito-Urinary Diseases
707 Masonic Temple
- FREDERICK H. POPPE, B.A., M.D., Clinical Instructor in Surgery
702 Donaldson Bldg.
- CHARLES A. REED, B.S., M.D., Clinical Instructor in Orthopedic Surgery
310 Pillsbury Bldg.
- ERNEST T. F. RICHARDS, M.D., C.M., Clinical Instructor in Medicine
914 Lowry Bldg., St. Paul
- HARRY P. RITCHIE, Ph.B., M.D., Clinical Instructor in Surgery
914 Lowry Bldg., St. Paul
- FREDERIC W. SCHLUTZ, B.A., M.D., Clinical Instructor in Pediatrics and
Research Associate in Physiologic Chemistry
802 Donaldson Bldg.
- CHARLES N. SPRATT, B.S., M.D., Clinical Instructor in Ophthalmology
and Otology
900 Nicollet Ave.
- ARTHUR C. STRACHAUER, M.D., Clinical Instructor in Surgery
616 Syndicate Bldg.
- EUGENE S. STROUT, M.D., Clinical Instructor in Ophthalmology and
Otology
910 Donaldson Bldg.
- THOMAS W. STUMM, M.D., Clinical Instructor in Medicine
744 Lowry Bldg., St. Paul
- SAMUEL E. SWEITZER, M.D., Clinical Instructor in Dermatology and
Genito-Urinary Diseases
1517 Stevens Ave.
- HENRY L. ULRICH, B.S., M.D., Clinical Instructor in Medicine
310 Pillsbury Bldg.
- H. JOURNEAY WELLES, M.D., Clinical Instructor in Ophthalmology and
Otology
306 Masonic Temple
- ARCHA E. WILCOX, M.D., Clinical Instructor in Surgery
204 Donaldson Bldg.
- HENRY L. WILLIAMS, B.A., M.D., Instructor in Gynecology
1315 5th St. S. E.
- CHARLES B. WRIGHT, B.A., M.D., Clinical Instructor in Pediatrics
636 Syndicate Bldg.
-
- JOHN M. ARMSTRONG, M.D., Clinical Assistant in Genito-Urinary Dis-
eases
409 Lowry Bldg., St. Paul
- SEILER J. ASPELUND, B.A., M.D., Clinical Assistant in Obstetrics and
Gynecology
315 Masonic Temple
- WILLIAM H. AURAND, M.D., Clinical Assistant in Medicine
425 Oak St. S. E.
- ERNEST L. BAKER, M.D., Clinical Assistant in Medicine
503 Donaldson Bldg.
- WILLIAM D. BEADIE, M.D., C.M., Clinical Assistant in Pediatrics
334 Lowry Bldg., St. Paul
- HALLWARD M. BLEGEN, B.A., M.D., Clinical Assistant in Gynecology
1525 E. Franklin Ave.
- ELWYN R. BRAY, B.A., M.D., Clinical Assistant in Ophthalmology and
Otology
69 N. Milton, St. Paul

- LEVERETT D. BRISTOL, B.S., M.D., Clinical Assistant in Medicine
923 Lowry Bldg., St. Paul
- JOHN C. BROWN, B.A., M.D., Clinical Assistant in Medicine
5 Barton Ave. S. E.
- PAUL F. BROWN, B.A., M.D., Clinical Assistant in Surgery
3733 Nicollet Ave.
- OLIVER R. BRYANT, M.D., Clinical Assistant in Medicine
802 E. Lake St.
- JOHN BUTLER, M.D., Clinical Assistant in Dermatology
403 Pillsbury Bldg.
- HARRY E. CANFIELD, M.D., Clinical Assistant in Ophthalmology and
Otology
2102 2d Ave. S.
- CHARLES D. FREEMAN, M.D., Clinical Assistant in Dermatology and
Venereal Diseases
642 Lowry Bldg., St. Paul
- JAMES W. GEORGE, B.S., M.D., Clinical Assistant in Obstetrics
412 Reid Corner
- EDWARD V. GOLTZ, M.D., Clinical Assistant in Rhinology and Laryn-
gology
394 Selby Ave., St. Paul
- EUGENE K. GREEN, B.A., M.D., Associate in Anatomy
307 Reid Corner
- JAMES F. HAMMOND, M.D., C.M., Clinical Assistant in Pediatrics
334 Lowry Bldg., St. Paul
- EDGAR J. HUENEKENS, B.A., M.D., Clinical Assistant in Medicine
1037 Andrus Bldg.
- HARRY G. IRVINE, M.D., Clinical Assistant in Dermatology
601 Syndicate Bldg.
- E. MENDELSSOHN JONES, M.D., Clinical Assistant in Surgery
541 Lowry Bldg., St. Paul
- ANTOINE A. LAURENT, M.D., Clinical Assistant in Diseases of Children
203 Donaldson Bldg.
- RAE T. LAVAKE, B.A., M.D., Clinical Assistant in Diseases of Children
203 Donaldson Bldg.
- JARL FERDINAND LEMSTROM, B.S., M.D., Clinical Assistant in Medicine
2117 4th Ave. N.
- ADOLPH E. LOBERG, M.D., Clinical Assistant in Nervous and Mental
Diseases
221 Cedar Ave.
- HENRY LYSNE, B.S., M.D., Clinical Assistant in Medicine
700 20th Ave. N.
- EDWARD MOREN, M.D., Clinical Assistant in Medicine
307 Donaldson Bldg.
- FREDERICK A. OLSON, B.A., M.D., Research Assistant in Medicine
914 Lowry Bldg., St. Paul
- REUBEN M. PEDERSON, B.A., M.D., Temporary Assistant in Genito-
Urinary Diseases
2901 Washington Ave. N.
- CHELSEA C. PRATT, M.D., Clinical Assistant in Medicine
915 E. River Road
- FRED J. PRATT, M.D., Clinical Assistant in Ophthalmology and Otology
328 Central Ave.

- LOUIS SIDNEY B. ROBINSON, B.A., M.D., Clinical Assistant in Obstetrics,
937 Lowry Bldg., St. Paul
- CHARLES L. RODGERS, M.D., Clinical Assistant in Obstetrics
59 Lyndale Ave. N.
- IVAR SIVERTSEN, M.D., Clinical Instructor in Gynecology
1028 Andrus Bldg.
- ANTON G. WETHALL, B.S., M.D., Clinical Assistant in Genito-Urinary
Diseases
325 Cedar Ave.
- ROBERT WILLIAMS, B.A., M.D., Clinical Assistant in Medicine
3408 Chicago Ave.
- CARL A. WITHAM, M.D., Clinical Assistant in Rhinology and Laryn-
gology
3128 Bloomington Ave.
- DOUGLAS F. WOOD, M.D., C.M., Clinical Assistant in Rhinology and
Laryngology
307 Donaldson Bldg.

THE SCHOOL FOR NURSES

LOUISE M. POWELL, R.N., Superintendent

In the year 1909, the Board of Regents of the University of Minnesota directed the organization of the School for Nurses, under the management of the Faculty of the College of Medicine and Surgery and in affiliation with the service of the University Hospitals.

It is the purpose of the Faculty to conduct the School, not merely for the attainment of a suitable hospital nursing service, but as a means by which the nurse may obtain the thorough scientific training which is best assured by the association of the School with the teaching hospital and by its direct University control. It is the desire of the Faculty to make the School a stepping-stone to the advancement of the profession of nursing in the Northwest.

While its requirements for admission will serve as reasonable tests of fitness, it will endeavor to attract a class of refined, educated, and earnest women to its matriculation.

The School for Nurses is subject to the general supervision of the Superintendent of the University Hospitals, Dr. L. B. Baldwin, and is under the immediate direction of the Superintendent of the School, Miss Louise M. Powell, a woman of large institutional experience.

The entire course of study will cover a period of three years. The first six months will be devoted to preliminary courses of instruction under a special matriculation fee. These courses, for a period of four months, will be conducted in several of the departments of the College of Medicine and Surgery by the Superintendent of the School and by a corps of faculty instructors. Examinations will be held at the close of this four months' work and must be satisfactorily passed in order to permit of further advancement.

Following this period, admission will be had to the hospital and the ensuing two months will be given to practical training in hospital service and economics. Upon the successful completion of this preliminary course and with due consideration to their general fitness, students will be admitted to the full hospital service. In the succeeding two and one-half years, a graded system of hospital education will be conducted, during which the student will serve in the wards, diet kitchens, pharmacies, laboratories, dressing rooms, and operating rooms and in the out-patient department and visiting service of the University Hospitals. Courses of lectures, classes, and demonstrations will be given by the Superintendent of the School, her assistants, and by members of the Faculty. At the close of each year examinations will be conducted in both practical and didactic work.

THE INSTRUCTORS OF THE SCHOOL FOR NURSES

PRELIMINARY COURSE

Anatomy, etc.

THOMAS G. LEE, B.S., M.D.
CHARLES A. ERDMANN, M.D.

Physiology

RICHARD OLDING BEARD, M.D.
M. RUSSELL WILCOX, M.D.
FREDERICK H. SCOTT, Ph.D., M.B., D.Sc.

Chemistry

GEORGE B. FRANKFORTER, M.A., Ph.D.

Materia Medica and Pharmacology

EDGAR D. BROWN, Phm.D., M.D.
CHARLES F. DIGHT, M.D.

Bacteriology and Hygiene

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean

English

JOSEPH M. THOMAS, Ph.D.

Physical Culture

ANNA M. BUTNER, Director

Hospital and Household Economy and Principles of Nursing

LOUISE M. POWELL, R.N., Superintendent of the School
BETH BENEDICT, Dietitian

Lettering and Penmanship

FRANK J. KIRCHER, M.E.

UNDERGRADUATE COURSES

Medicine, Physical Diagnosis, etc.

CHARLES LYMAN GREENE, M.D.
THOMAS S. ROBERTS, M.D.
S. MARX WHITE, B.S., M.D.
JOHN GROSVENOR CROSS, M.S., M.D.
GEORGE DOUGLAS HEAD, B.S., M.D.
WALTER R. RAMSEY, M.D.
JULIUS PARKER SEDGWICK, B.S., M.D.
JAMES T. CHRISTISON, M.D.
WALTER D. SHELDEN, B.S., M.D.
HENRY WIREMAN COOK, B.A., M.D.

Surgery

JAMES E. MOORE, M.D.
J. CLARK STEWART, B.S., M.D.
ARTHUR J. GILLETTE, M.D.
ARTHUR T. MANN, B.S., M.D.
ALEXANDER R. COLVIN, M.D.
WARREN A. DENNIS, B.S., M.D.
ARTHUR A. LAW, M.D.
EARLE R. HARR, B.S., M.D.

- J. FRANK CORBETT, B.S., M.D.
 EMIL S. GEIST, M.D.
 ARTHUR C. STRACHAUER, M.D.
- Obstetrics and Gynecology*
 ABRAHAM B. CATES, M.A., M.D.
 FREDERICK E. LEAVITT, M.D.
 JENNINGS C. LITZENBERG, B.S., M.D.
 FRED L. ADAIR, B.S., M.D.
- Bacteriology and Hygiene*
 FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M.
- Nervous and Mental Diseases*
 WILLIAM A. JONES, M.D.
- Ear and Eye, Nose and Throat Diseases*
 FRANK C. TODD, M.D.
 WILLIAM R. MURRAY, B.A., M.D.
- Therapeutics*
 EDGAR D. BROWN, Phm.D., M.D.
- Physiologic Chemistry, Hygiene and Dietetics*
 RICHARD OLDING BEARD, M.D.
 JULIUS PARKER SEDGWICK, B.S., M.D.
 LOUISE M. POWELL, R.N., Superintendent of the School
 BETH BENEDICT, Dietitian
- Hospital Administration*
 ARTHUR B. ANCKER, M.D.
- Social Economics in Relation to Nursing*
 JOHN H. GRAY, Ph.D.
- Hospital Economics and Principles of Nursing*
 LOUISE M. POWELL, R.N., Superintendent of the School

THE UNIVERSITY HOSPITALS

The attainment of its own hospital service puts the University in a position to offer the best teaching opportunities alike to students in medicine and in nursing.

While the hospitals and the School for Nurses are mutually interdependent, each serving the interests of the other, the Faculty regards the hospitals as the training laboratory of the nurse, in which her interests, together with those of the medical student body, are to be first considered. It employs and will continue to employ a sufficient number of graduate nurses to conduct the service until such time as a sufficient number of pupil nurses are entered in the School.

The University Hospitals are open only to free patients who are entered under certificates from local, city, or county physicians, who vouch for their inability to pay ordinary medical fees or hospital charges and who cite the clinical character of each case. Although the Elliot Memorial Building was opened only last September, its wards are already overfull and it has an almost continual waiting list. Applications come

from all parts of the State for the admission of patients, many of whom it is impossible to care for. It is hoped that the service can be extended to the inclusion of an adequate number of beds within a reasonably short period.

CLINICAL RELATIONS

For many years prior to the attainment of its own hospital system, the College of Medicine and Surgery has relied upon clinical opportunities, necessarily limited in scope and inevitably scattered in point of place, but still generously granted by hospitals and dispensaries of the Twin Cities.

The authorities of these institutions, in Minneapolis and St. Paul, have been most hospitable to the University. The medical service of the correctional and charitable institutions of the State also has been freely offered for purposes of clinical study and observation to the school of medicine.

The modern equipment of these hospitals and institutions enables them to entertain medical students in small groups for the close inspection of diagnostic and surgical methods. It has been possible, in this way, to utilize a large fund of clinical material, although at great cost of time and labor, since this material is widely distributed throughout both cities.

Grateful as the faculty of medicine is for these long continued hospitalities, it welcomes the greater concentration of effort which the University Hospitals, under its direct control, permit.

UNIVERSITY RELATIONS

The School for Nurses has its headquarters at the University Hospitals. The Nurses' Home is temporarily situated in the block adjoining that occupied by the Elliot Memorial Building. In the preliminary course of instruction the students of the School do their work in the lecture rooms and the laboratories of the College of Medicine and Surgery.

The medical division of the new University campus includes within it both the hospital and the laboratory buildings of the college. It occupies the high bluffs overlooking the east bend of the Mississippi River.

The Elliot Memorial Building, which was dedicated in September, 1911, stands upon the bank of the river and commands a beautiful prospect. This building, which was provided by a gift amounting, with interest, to \$120,000, from the estate of Dr. and Mrs. A. F. Elliot, by an additional appropriation from the Legislature, and by the subscription of some \$42,000 for a building site, is the first of the permanent hospital group. It has 120 beds and includes some necessary service features which should be provided for in separate service buildings. An emergency building, with a capacity of 24 beds, is maintained in the immediate neighborhood of the Elliot Building.

The new Millard Hall, which will house the Dean and his staff, the Departments of Physiology and Pharmacology, of Medicine, and of Surgery; and the Institute of Anatomy, which will house the Depart-

ments of Anatomy and of Obstetrics and Gynecology, are approaching completion and will be opened in season for the work of the coming year.

Upon the medical quadrangle of the old campus will still remain the Institute of Public Health and Pathology and the small Medical Chemistry Building. The Medical Science Building is to be surrendered to the temporary occupancy of the College of Dentistry and the College of Pharmacy. The original Millard Hall has been again destroyed by fire and is to be rebuilt for the use of the College of Pharmacy.

ASSOCIATED HOSPITALS

The St. Paul City and County Hospital has a capacity of 600 beds and is the largest and most complete institution of its kind in the Northwest. Many of the members of its staff are of the Faculty of the College of Medicine and Surgery, and its entire clinical facilities are at their disposal. It enters over 5,500 patients annually, a large proportion of whom are of the emergency order or are suffering from acute disease. The opportunities for bedside instruction are very many and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A modern fire-proof pavilion for contagious diseases has been built, where students have unexcelled means of studying diphtheria, scarlatina, erysipelas, etc. An independent obstetrical pavilion has been established, where senior students see labor cases under the personal supervision of the professors and instructors in that branch.

The State Hospital for Crippled and Deformed Children is under the control of the Professor of Orthopedic Surgery of the College of Medicine and Surgery. It has recently received the means for its independent location and support.

The City Hospital of Minneapolis places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital, with fine equipment and a capacity of 550 beds. During the year 1911, 2,759 patients were treated in the hospital and 11,887 patients in the out-patient department and dispensary. A new administration building has been completed by the city at a cost of \$55,000. A modern contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases, under the direction of the professor and instructors in diseases of children. Bed-side and amphitheatre clinics in surgery and medicine are conducted daily throughout the year by members of the Faculty. Clinics in diseases of the skin, nervous diseases, obstetrics, etc., are given in the hospital, upon appointed days, throughout the school year. A special feature is made of medical bedside clinics, to which small sections of senior students are admitted. A pavilion for the care of tuberculous patients is being built under the name of Hopewell Hospital. It is located upon the northern city limits and will provide 115 beds.

The Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building, only a portion of which is as yet occupied. It has

a present capacity of 103 beds and when the building is entirely finished will contain some 350. Many members of the Faculty are on the staff of the hospital and give clinics there.

St. Joseph's Hospital, St. Paul, with 150 beds and one of the finest amphitheatres, fitted with every modern device, contributes largely to the clinical instruction of the College of Medicine and Surgery. Members of the Faculty are on its staff and hold clinics in its wards and operating theatre.

The Northwestern Hospital, Minneapolis, affords splendid surgical material, which is available to this college. Semi-weekly clinics in surgery are given in its amphitheatre and in three operating rooms and wards by the members of the Faculty. It has a capacity of 100 beds and, during 1911, treated 1,497 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical work. Clinics of the College of Medicine are held in the hospital by members of the staff who are on the college Faculty. Two operating rooms, with conveniences for the accommodation of students, afford a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 150 beds, is housed in a newly constructed modern building. Members of the Faculty exclusively utilize the material of the hospital for teaching purposes. During the year 1911, 2,482 patients were treated.

St. Barnabas Hospital, Minneapolis, with a capacity of 150 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the preceding year, 2,222 patients were treated in this hospital.

St. Mary's Hospital, Minneapolis, also furnishes clinical opportunities to the University. The hospital is located directly across the Mississippi River from the new University Hospital. It has a capacity of 100 beds and has treated 1,540 patients during the last year.

The Thomas Hospital, Minneapolis, is situated immediately across the river from the new University Hospital. It provides a sanatorium, recently completed, for the treatment of tuberculosis, and has a capacity of 50 beds.

OUT-PATIENT DEPARTMENT AND DISPENSARY

The University owns the clinical building, situated upon the west side of the Mississippi River, within a few hundred yards of the campus, in which the dispensary service has long been conducted. This service has become the out-patient department of the University Hospitals and is manned by members of the Faculty and clinical assistants, under the direction of a chief of staff. It is divided into medical, surgical, gynecological, obstetrical, children's, eye and ear, nose and throat, skin, genito-urinary, nervous and mental, and orthopedic clinics. In these, some 15,000 consultations are recorded each year.

Students of the School for Nurses will enjoy opportunities for clinical observation in the out-patient service of the University Hospitals and will

be assigned, during their senior year, to the indoor and outdoor service of this department.

The Free Dispensary of the city of St. Paul is privately incorporated, but is conducted by members of the Faculty of the College of Medicine and Surgery, and is open to the attendance of University students who are regularly assigned to its clinics. It is centrally located in a twenty-room building at 204 W. 9th St., St. Paul. It enters 10,000 visits of patients each year.

The tuberculosis clinics of St. Paul and of Hopewell Hospital, a department of the City Hospitals at Minneapolis, are available to the College.

LIBRARY OF THE DEPARTMENT OF MEDICINE

THOMAS G. LEE, B.S., M.D., Librarian

The medical library consists of the following collections: The general clinical library, the libraries of the Colleges of Dentistry and Pharmacy, the departmental libraries of medicine, pathology and bacteriology, anatomy, physiology and pharmacology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, etc., and 200 current periodicals. To these have been added, through the generous gift of Dr. Charles A. Wheaton, his valuable private library of some 2,000 volumes; and a collection of medical works from the library of the late Dr. Max P. Vander Horck, kindly donated by his widow.

In addition to the above the libraries of the State Board of Health, of the Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medical Society with some 7,000 volumes and 150 journals, give the student additional opportunity to consult the more important medical publications.

The general University library contains some 145,000 bound volumes, 30,000 unbound volumes and pamphlets, and about 900 current periodicals.

The library has recently added to its catalogue a number of works selected with reference to the needs of students of the School for Nurses.

THE COURSE OF TRAINING

Requirements for Admission

Applicants for admission to the School for Nurses must present application in writing to the Superintendent of the School. These applications are considered by a committee in charge of the interests of the School. Applicants are entered at the opening of each semester. Applications must state the age and residence of the applicant and must be accompanied by credentials of graduation from a four years' high school of the first grade. While a high school diploma is a prerequisite of admission, preference 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 will meet the Committee in person. They must submit satisfactory evidence to the Committee of physical and mental fitness and of good character and will undergo a general physical examination by the school physician.

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.

Application blanks may be had, upon request, of Miss Louise M. Powell, Superintendent of the School for Nurses, University Hospitals, Minneapolis.

Fees and Terms

A fee of twenty-five dollars (\$25.00) will be charged upon admission to the preliminary course of instruction and will be payable at the office of the University Cashier.

During the preliminary course, students will provide for their own board and lodging, text-books and stationery.

No fees will be charged during the remaining two and one-half years of the training course. After their admission to the hospital, students will be expected to reside at the Nurses' Home, where comfortable rooms, board and laundry, together with hospital uniforms, will be provided for them at the expense of the University. Clothing, other than the hospital uniform-dress, they will provide for themselves, and in character and sufficiency of supply it must conform to the School regulations.

A vacation of two weeks will be allotted, in succession, to each nurse in each year, at her own living expense.

Graduates of other Schools for Nurses, in good standing, or matriculants of these schools, having the required preliminary qualifications, will be admitted to the preliminary course of instruction, upon the conditions of entrance cited above and upon payment of the prescribed fee.

Upon successfully passing the examinations provided in this course, they will be granted a certificate of satisfactory attendance upon, and proficiency in, such work. If they are matriculants of other schools, such certificates will be submitted to the Superintendent in charge.

Plan of Instruction

The entire course of instruction in the School for Nurses will cover a period of three years, and, successfully pursued, in conformity with the rules and regulations of the hospital service, will lead up to the degree of Graduate in Nursing, which will be conferred, upon recommendation of the Faculty, by the Board of Regents of the University of Minnesota.

The first half of the first year will be devoted to preliminary and probational courses of instruction. The first four months of study will be conducted in the lecture-rooms and laboratories of the College of Medicine and Surgery, the student being non-resident during that time. In the succeeding two months, completing the first half-year, she will be in hos-

pital residence and engaged in general hospital training, but will be assigned to no definite hospital service.

In the last half of the first year and the first half of the second year, she will be assigned to duty and will receive instruction in the men's and women's medical and surgical wards of the hospital and in the diet-kitchens.

In the second half of the second year and throughout the third year, she will be assigned to special duty in the obstetrical, gynecological, orthopedic, and children's wards; in the operating rooms and in special departments of practice.

The practical work of each year will be accompanied by courses of lectures and demonstrations, conducted by the Superintendent of the School for Nurses and by members of the Faculty, upon subjects related to each department of practice with which the nurse is concerned, and these courses will be the subjects of examination at the close of each semester.

AFFILIATED SCHOOLS

Students from affiliated training schools, or from schools of recognized standing and of general requirements equivalent to those of the University of Minnesota, who have completed two years of study and are graduates of such schools, will be admitted to the third year of the School for Nurses as affiliated students. Upon successful completion of the work of the third year, which will be adapted, so far as possible, to their further needs, they will receive a certificate of graduation, upon recommendation of the Faculty, from the Board of Regents.

This affiliated third-year course is planned especially for those students whose training has been had in schools allied to hospitals of exclusively surgical or other special character and will afford to them the opportunity of rounding out and completing their entire course of study.

POSTGRADUATE COURSE

Graduates of a three years' course of study in schools of recognized standing and of general requirements equivalent to those of the University of Minnesota in this field, will be admitted to post-graduate courses of instruction of one or two years' duration in this University. These courses will offer, in the first year, practical training in charge of hospital wards and departments, courses of study in hospital economics and administration, and experience in the teaching of undergraduate students. A certificate of postgraduation will be granted by the Board of Regents, upon the recommendation of the Faculty, at the completion of this year's work.

A second year of institutional training and of clinical and field service in the University Hospitals, the out-patient department, and the homes of patients who are attended by hospital externes will be offered to those who desire to avail themselves of this further opportunity.

COURSES OF STUDY

PRELIMINARY COURSES

ANATOMY

A course of lectures, recitations, demonstrations, and laboratory exercises, including:

1. The study of the general properties of the tissue-cell; of the development of the human embryo; and of the several types of tissue.
2. The osseous system; composition, function, growth, and repair of bone; the skeleton and its component parts; the structure and function of joints, etc.
3. The muscular system; the structure and relation of the muscles, tendons, fasciae, etc.
4. The circulatory system; including the heart and the blood and lymph channels.
5. The respiratory system; the lungs and their appendages.
6. The excretory system; the skin, kidneys, ureters, and bladder.
7. The nervous system; the special sense organs; the central and peripheral mechanisms.
8. The reproductive system; the organs of generation.

Three hours a week

PHYSIOLOGY

A course of lectures, demonstrations, and laboratory exercises, accompanied by oral and written recitations.

The course will include the study of the physiologic components of the animal body; of the nutritive media; of the vascular mechanism; of the respiratory, digestive, secretory, metabolic, and eliminative functions; and of the physiology of the nervous system in general.

Three hours a week

CHEMISTRY

Lectures, recitations, and laboratory exercises, two hours a week, four months.

This course will give the student a brief study of the general conditions of matter from the chemical standpoint; of chemical, as distinguished from physical, changes; of the fundamental laws of chemistry; of the most important chemical elements; of water, physically and chemically considered; of the law of Mass Action, particularly as applied to medicine; of the elements of the carbon compounds and particularly of those which are of especial interest to the nurse, as disinfectants, toxic and antifebrile substances.

Two hours a week

MATERIA MEDICA AND PHARMACOLOGY

A course of lectures, demonstrations, and recitations.

The following topics will be discussed: The history and uses of drugs in the treatment of disease; the definitions of terms used to designate the

different branches under which drugs are specifically studied; the classification of drugs with reference to origin, to pharmaceutical preparation, and to physiologic action; the terms used in such classifications; the common and metric systems of weights and measures; a comparison with popular measures; the definitions and methods of preparing pharmaceutical preparations; the more important plant constituents, such as alkaloids, glucosides, etc.

The course will also include a study of methods of administering drugs; of rules of dosage for children; of rules governing dosage from standpoint both of patient and of drug action; a discussion of the more important drugs of vegetable, animal, and inorganic origin, in turn; of the synthetic remedies; and of cathartics, anesthetics, and poisons and their antidotes.

Three hours a week

BACTERIOLOGY AND HYGIENE

A course of lectures, demonstrations, and recitations, dealing with the science of bacteriology in its practical relations to nursing; discussing, especially, the relations of this science and that of micro-zoology to disease and to protective measures; the life history of important bacteria and protozoa; favorable and unfavorable conditions of bacterial and parasitic growth; the fate of the pathogenic bacteria outside the body; the general principles of disease transmission; the role of the well individual as a carrier of infection; the conditions of asepsis and immunity in the nurse; the media and agencies of infection, air, contact, water, food, milk, vomites, excreta, utensils; insects and vermin as media of infection or hosts of germs; methods of destruction of bacteria; the effects of physical and chemical agents; the practical details of hospital isolation.

Two hours a week

ENGLISH

A course of recitations and reading and written exercises in rhetoric. Study and practice work in the construction and use of the sentence; in paragraphing; the writing of statements, synopses, reports, etc.; correspondence; and in voice training and reading.

Three hours a week

PRINCIPLES OF NURSING

A course of lectures, conducted by the Superintendent of the School, upon the personal and professional needs of the nurse and upon the conduct of her professional relations. The subject matter of this course will be arranged as follows:

- a. *The History of Nursing*
- b. *The Personal Status of the Nurse*
- c. *The Ethics and Etiquette of Nursing*
- d. *The Principles of Nursing*

Two hours a week

PHYSICAL CULTURE

A course of physical exercises for the physical development of the student, consisting of calisthenics, systematic work with light apparatus

and exercises especially directed to the training of the nurse in the adaptation of her movements to the best results in her practical work.

This course is not designed for the instruction of the nurse in physical exercises as a means of treatment, that feature of her training being reserved to a later part of the hospital curriculum. Two hours a week

HOSPITAL AND HOUSEHOLD ECONOMICS

This course will be introductory to the admission of the student to hospital service and will be conducted during the entire six months of preliminary work. It will deal with the general principles of hospital and household economics applied to the practice of nursing.

It will include the study of the economics of the hospital, as a whole, and in its several working units; the equipment and operation of various wards; the conduct of general and special kitchens; the methods of food serving. It will deal with the general duties of the nurse in the service of the wards. The detail of the work follows:

a. *The General Equipment and Furnishing of Hospitals*

The general halls. The linen room; its equipment. The laundry. The general kitchen; the ward kitchen; the diet kitchen. The operating rooms; the anesthesia rooms; the surgical supply rooms. The hospital pharmacy; the drug closet. The hospital laboratories. The toilet rooms and their equipment. The hospital records; method of keeping order-books; the case records; chart making; fulfillment and record of orders.

b. *The General Hospital Ward*

Its equipment; standard linen list; cost of ward maintenance; care of ward.

c. *The Isolation Ward*

Its purposes; special equipment and care.

d. *The Individual Ward or Private Room*

Its average cost of maintenance; its equipment; its personnel. The care of patient's room; cleanliness, light, ventilation, disinfection; care of bed and bed-linen; care of clothing; general toilet of patient; mechanical appliances of the sick room.

e. *The Kitchen*

Location; equipment. Stove, ranges, heaters, cookers, etc. Fuels; relative values. Refrigerators, their care and uses. Store closets; kitchen utensils; hardware; linen.

f. *The Pantry*

Its equipment. China: form and adaptation to use. Cutlery; silver, utensils of service. Table and trays; tray linens; tray serving. The esthetics of food service. Three hours a week

PRACTICAL DIETETICS

A course of practical exercises and lectures conducted in the dietetic kitchen and in the class-room.

a. *Foods*

Their definition; classes; form. Food values; economic, nutritive digestive, metabolic, esthetic. Study of food composition; energy values; caloric supply. Selection of dietaries with reference to values; market conditions. Balanced dietaries. Composition of foods; values.

b. *Preparation of Foods*

Methods of cooking in detail. Effect on food values; percentage of loss. Treatment of various classes of foods. Treatment of typical foods. Enhancement of food values. Mechanical methods of preparation. Raw foods.

c. *Food Adulteration and Deterioration*

Bacterial decomposition. Food storage; food preservation. Types of adulteration. Dilution of values. Substitution. Preservation and preservatives. Six hours a week for two months

PRACTICAL NURSING

a. *General Care of Patients*

The patient; dressing and undressing; initial bath; disposition of patient's clothing; its renovation.

The toilet of hair, mouth, teeth, hands, etc.; bedsores: causes and treatment.

The patient's clothing; changes of personal linen.

The making of beds; treatment of mattress; changing of bed-linen; rubber sheets.

Care of bed-utensils; their uses and character.

The collection, measurement, and preservation of urine. Catheterization.

The collection and preservation of feces. The collection and preservation of sputum.

The care and uses of rubber bags, ice-caps, coils, syringes, catheters, etc.

b. *Baths and Bathing*

Forms of bath; their uses and effects; their standard temperatures.

Methods of bathing; preparation and care of patient in bathing.

Hot and cold packs. Alcohol bathing. Topical applications to skin.

c. *Special Methods of Treatment*

Enemata: irrigating, evacuant, sedative, astringent, nutrient.

Douches; utensils and methods. Irrigations.

External applications; compresses; fomentations; stupes; poultices; plasters; blisters; cupping; Bier treatment.

Lavage; test meals; gavage; nasal feeding; methods of forced feeding.

Transfusion; hypodermoclysis; infusion; lumbar puncture.

Uses and administration of oxygen.

Thoracentesis; paracentesis; exploratory procedures.

The cautery; forms and uses.

d. *Modes of Administration of Medicines*

Times of administration; method; system.

Administration by mouth; by stomach tube; by rectum; by hypodermatic method.

Care of poisons. Control of medicinal agents in relation to habit.

Six hours a week for two months

HOSPITAL TRAINING

Students who have successfully completed the preliminary courses of the first six months, will be regularly entered in the hospital service. In addition to their hospital duties, which employ fifty-six hours each week, they will attend courses of lectures, demonstrations, and recitations upon subjects in general medicine and surgery and in special branches of practice related to their professional work. These courses will also include the study of practical dietetics and advanced problems in household and hospital economics. The detail of these courses follows:

UNDERGRADUATE COURSES OF STUDY

HYGIENE

a. *Respiratory Needs*

Oxygen supply; quantity; uses; waste-removal; relations of CO₂, to air pollution; causes of pollution. Requirements of ventilation; fresh air inlets; distribution; foul air outlets. Relations to heating. Influences of climate in ventilation.

b. *Water*

Quantity required; relation to age, growth, sex, etc. Relations to food supply. Purity of drinking water; temperature, etc. Purification of drinking water in the household. Care of water containers.

c. *Foods*

The principles of food selection; relation to content; relation to use. Caloric values of foods. Caloric needs with relation to age, sex, occupation, climate; in illness and in convalescence. Method of calculation. The market values of food. Food selection with reference to its commercial forms. Study of market supplies. Food values as related to food preparation.

d. *Beverages*

Their food values. Forms in ordinary use. Their preparation. Other than food values. Temperature. Combination of foods and beverages.

e. *Stimulants*

Their food values; physiological action; limits of use; relation to habit; conditions of employment; combination with foods; influence upon digestion. Types of stimulants; principles of choice.

f. *Baths and Bathing*

Types of baths. Methods of administration. Classification by temperature. Physiological effects; therapeutic influence.

g. *Exercise*

Its physiologic influence. Relation to occupation. Forms of exercise, active and passive.

h. *Clothing.*

Classification according to material; to use. Qualities of clothing in relation to use; to age, sex, climate, occupation. The care of clothing.

Twelve hours

BACTERIOLOGY

a. *Relations of Bacteriology to the Personal Hygiene of the Nurse*

Principles of personal cleanliness; personal clothing. Personal asepsis and antisepsis.

b. *Relations of Bacteriology to General Duties of the Nurse*

Bacterial precautions in service.

c. *Relations of Bacteriology to the Care of the Patient*

The patient's clothing; the patient's environment.

d. *Bacterial and Parasitic Diseases*

Their causes and means of control; their relation to hospital life; to general nursing; their special nursing.

e. *The Relations of Bacteriology to Surgery*

The micro-organisms of surgical significance. Asepsis and anti-sepsis.

Six hours

THERAPEUTICS

a. *Medicines*

Their methods of administration; periods of repetitional dosage; cumulative tendencies.

b. *Classification of Drugs Therapeutically*

Choice of agents.

c. *Poisons and their Antidotes*d. *Dosage*

Measures; quantities; effect of repetition.

Six hours

MEDICINE

a. *Diagnosis*

History, physical examination, special examinations of blood, urine, etc. The pulse, temperature, and respiration, normal and pathological. Observation, interpretation, and method of recording symptoms by the nurse.

Two hours

b. *The Duty of the Nurse in the Treatment and Care of the Following Diseases*

Treatment of emergencies. Diseases of the circulatory system. The heart. The blood vessels; arteriosclerosis and its results in angina pectoris, apoplexy, and aneurism. Anaemias, hemorrhagic diatheses.

Three hours

c. *Diseases of the Respiratory System*

The bronchi: bronchitis, bronchial asthma, broncho-pneumonia. The pleurae: pleurisy, empyema. The lungs: pneumonia, haemoptysis.

Three hours

d. *Diseases of the Digestive System*

The mouth: pyorrhoea, stomatitis. The stomach: gastritis, gastric ulcer, cancer. The intestines: constipation, diarrhoea, colitis. Accessory glands: cholecystitis; abscess of the liver; cirrhosis of the liver.

Two hours

e. *Diseases of the Kidney*

One hour

f. *Diseases of the Joints*

One hour

g. *Diseases of Metabolism*

One hour

h. *Infectious Diseases*

Duties of the nurse to patient, family, public, and herself in the following diseases: typhoid fever; typhus fever; cerebro-spinal meningitis; influenza; dysentery; cholera; malaria; yellow fever.

Five hours

i. *The Nurse in Relation to Tuberculosis*

The cause of tuberculosis and its control. Personal protection. The factor of heredity, age, family history, contagion.

The several expressions of the disease: tuberculosis of the bones and joints; tuberculous lymph nodes; tuberculous meningitis; tuberculous peritonitis; pulmonary tuberculosis.

The hygiene of tuberculosis in the hospital, in the hospital tent, in the sanatorium, in the home.

The relations of climate.

Two to three hours

THE NURSING OF INFANTS AND CHILDREN

a. *The Normal Child*

Conditions of growth and development; bathing; clothing; sleep-requirements; excreta; teething.

Habits; breast-feeding; mixed feeding; preparation of foods in laboratory.

Three hours

b. *Stomatitis, Marasmus, Rachitis, Scorbutus, Gastro-intestinal Disorders*

Causes, symptoms, treatment, nursing care.

Three hours

c. *Tuberculosis*

One hour

d. *Tonsillitis, Rheumatism, Cardiac Disorders*

One hour

e. *Bronchitis, Pneumonia, Pleurisy, Empyema*

One hour

f. *Diphtheria, Scarlet Fever, Small Pox, Chicken Pox, Whooping Cough Measles, Mumps*

Four hours

g. *Meningitis, Poliomyelitis, Infantile Neuroses, Chorea*

Two hours

h. *Surgical Conditions in Children*

One hour

SURGERY

a. *The Principles of Sterilization*

Study of sterilizers; their forms and management; methods of use applied to specific results. The sterilization of the person; surgical cleanliness. Care of hands; face; hair; mouth; nose. The sterilization of clothing; surgical suits. Detail of care. Dressing rooms. The sterilization of utensils; instruments; supplies. Aseptic and antiseptic solutions; their preparation and control. The preparation of sterile dressings.

Two hours

b. Surgical Supplies

Surgical dressings; moist and dry. Bandages: their form; variety; uses; preparation. External applications; dusting powders; solutions; unguents. Splints; pads; gloves; syringes; etc. The instrument room or cabinet. Two hours

c. Bandaging

A course of demonstrations and practical exercises in the uses and methods of application of bandages of all forms. Ten hours

d. Surgical Emergencies

Wounds; their causes, results and care. Hemorrhages; points of origin; character; continuance or recurrence; causes; principles of control. Burns, scalds, etc.; their nature; extent; methods of treatment. Fractures, dislocations, and sprains; immediate treatment. Fainting; other causes of unconsciousness. Three hours

e. Principles of Surgical Infection

Septicemia. Pyemia. Erysipelas. Gangrene. Necrosis. Bed-sores and their treatment. Two hours

f. Anesthesia and Anesthetics

General anesthesia; its several degrees; duration and danger; its after-treatment. Nature of anesthetics; varieties; comparative values and dangers. Local anesthesia; agents and methods of production; treatment. Three hours

General Nursing of Surgical Cases

a. Pre-Operative Care

Feeding. Management of bowels and bladder. Special care for special cases. Medication and hypodermics. Preparation of patient; site of operation, etc.

b. Operative Care

The operating room; the operating table; position of patients on operating table for various operations; and precautions to be taken. Coverings of patient. Washing of patient; solutions used. Pulse, etc., during operation. The use of hypodermics; the oxygen apparatus; electrical apparatus, etc.

c. Post-Operative Care

Shock; observation of pulse and temperature. Use of pneumonia jacket. Vomiting. Use of water. Secondary hemorrhage. Care of bladder and bowels. Post-operative infections and evidences of infections. Position of patient and bed. Feeding. Two hours

d. The Care of Special Surgical Conditions

Pain; its importance; significance; location. Evidence and significance of suppuration. Tumors, benign and malignant. Appendicitis. Hernia. Hemorrhoids and rectal conditions. Two hours

e. Study of Defects and Deformities

The mechanics of the normal body. The nursing of orthopedic cases. Three hours

GYNECOLOGY

Gynecological terms and definitions; conditions of the pelvis which bear upon the nursing of pelvic diseases.

The preparation of gynecological patients for examination; for operation.

The general care of gynecological cases. Special modes of treatment at the hands of the nurse. Four hours

APPLIED DIETETICS

a. *The Dietary of Diseases*

Conditions of digestion and metabolism in disease. Influences of age and sex. Relation of food supply to functional inactivity. Relation to tissue loss. Relation to elimination.

b. *Dietaries of Special Forms of Disease*

Diet in continued fevers; in gastro-intestinal disorders; in respiratory disorders. Diet in disorders of nutrition; in renal disorders; in cardiac disorders; in diabetes.

c. *Dietaries of Convalescence*

Milk diets. Light diets. General diets. Four hours

OBSTETRICS

a. *The Anatomy and Physiology of the Female Generative Organs*

b. *The Physiology of Pregnancy; the Accidents of Pregnancy*

c. *The Physiology of Parturition; the Nursing of Labor*

d. *Complications*

Post-partum hemorrhage; puerperal fever; puerperal convulsions; puerperal insanity.

e. *The Care of the New-Born* Seven hours

NERVOUS AND MENTAL DISEASES

a. *Insanity*

Its common forms and usual symptoms. Principles of nursing insane patients.

b. *Epilepsy*

Its manifestations; immediate and general care.

c. *Neurasthenia, Hysteria*

Their recognition and distinctive features. Methods of nursing. Principles and practice of rest cure. General management of nervous cases. Four hours

DISEASES OF THE EYE, EAR, NOSE, AND THROAT

Lectures, illustrated by stereopticon, upon the anatomy and physiology of these organs. The general and local care of diseases, including instruction in applications to the eye, douches and other remedies to the ear, nose, and throat. The recognition and care of foreign bodies in eye, ear, nose, and throat. Instruction in the use of artificial and ordinary leech. The prevention and treatment of ophthalmia neonatorum. Preparation for operations and care after operation, etc. Six hours

PHYSIOLOGIC CHEMISTRY

a. *Water*

Its uses in the human body; quantity and character of supply; its food relations; the water-diet; substitutes for water.

b. *Milk*

The composition of the human milk; the colostrum milk. Comparison with bovine milk. Analysis.

c. *The Urine*

Its normal composition. Analysis. Quantity, physical conditions, collection. Six hours

HOUSEHOLD ECONOMICS

a. *Sanitary Details of Construction*b. *Household Art*c. *Home Laundry*d. *Home Sanitation*

Four hours

SPECIAL TOPICS

Arrangements will be made, from time to time, for formal lectures, upon special topics, to be delivered by available lecturers of large institutional and educational experience, to which the students of the training schools of the Twin Cities will be invited.

STUDENTS

• GRADUATES

Ames, Margaret, Hutchinson
Mark, Mary, St. Peter

Marvin, Mary, Zumbrota
Skonnord, Olga, Minneapolis

THIRD YEAR

Burns, Bessie, Graceville
Madsen, Christina, Minneapolis

Schwarg, Caroline, Dodge Center
Stewart, Lena B., Minneapolis

SECOND YEAR

Cornish, Mary E., Vernon Center
Abrahamson, Mabel, Minneapolis
Angle, Manda, Minneapolis
Cornish, Mary E., Vernon Center
Fidlar, Jennie, Minneapolis

Gorman, Anna, Minneapolis
Manger, Caroline, McIntosh
Oftshun, Olive I., Glenwood
Thompson, Barbara A., Glenwood
Waters, Vera, Beatrice, Neb.

FIRST YEAR

Babcock, Lana, Minneapolis
Greenwalt, Dorothy, Withrow

Lemstrom, Bera, Minneapolis
Lindquist, Signa, Minneapolis

The University of Minnesota

EVENING EXTENSION COURSES

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA
VOL. XV, NO. 14. AUGUST 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college and one for the Summer Session is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota

TABLE OF CONTENTS

The University	3-8
Calendar	4-5
Entrance Examinations	6
Colleges and Schools	7
The Board of Regents	8
The Executive Officers	8
Evening Extension Courses	9-33
Faculty of Instruction	9-10
Admission	11
Fees	12
Credit for Extension Courses	12
Courses of Instruction	14-33
Chemistry	14
Business Courses	14-22
Education	22-24
English	24
Geology	24
German	25
Greek	25
History	26
Latin	26
Mathematics	26
Mechanical Engineering	27
Philosophy and Psychology	27
Rhetoric	28
Romance Languages	28
Scandinavian	29
Sociology	29
Law	29-33

1912							1913														
JULY							JANUARY							JULY							
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12	
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19	
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26	
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..
AUGUST							FEBRUARY							AUGUST							
..	..	..	..	1	2	3	..	..	..	..	..	..	1	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23	
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30	
..	31
SEPTEMBER							MARCH							SEPTEMBER							
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27	
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	30	31
OCTOBER							APRIL							OCTOBER							
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	1	2	3	4	
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11	
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18	
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25	
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER							
..	..	..	..	1	2	..	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8	
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15	
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22	
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29	
..	30
DECEMBER							JUNE							DECEMBER							
1	2	3	4	5	6	7	1	2	3	4	5	6	7	..	1	2	3	4	5	6	
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27	
29	30	31	29	30	28	29	30	31

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
 FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
 ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
 WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
 FRANK FAIRCHILD WESBROOK, M.A., M.D., C. I., Dean of the College of Medicine and Surgery
 ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
 FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
 WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
 GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
 GEORGE F. JAMES, Ph.D., Dean of the College of Education
 HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
 ADA L. COMSTOCK, M.A., Dean of Women

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.
 JOHN F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts, Professor of Mathematics, Head of Department of Mathematics 1115 5th St. S. E.
 JOHN CORRIN HUTCHINSON, B.A., Professor of Greek, Head of Department of Greek 3806 Blaisdell Ave.
 JOHN SINCLAIR CLARK, B.A., Professor of Latin Language and Literature 729 10th Ave. S. E.
 GEORGE BELL FRANKFORTER, Ph.D., Dean of the School of Chemistry, Professor of Chemistry, Head of Department of Chemistry 525 E. River Road
 GEORGE FRANCIS JAMES, Ph.D., Dean of the College of Education, Professor of Education, Head of Department of Education 316 10th Ave. S. E.
 ALBERT ERNEST JENKS, Ph.D., Professor of Anthropology 825 5th St. S. E.
 WILLIAM A. SCHAPER, Ph.D., Professor of Political Science 625 Fulton St. S. E.
 WILLIAM REYNOLDS VANCE, Ph.D., LL.D., Dean of the Law School and Professor of Law 1229 7th St. S. E.
 ALBERT WILLIAM RANKIN, B.A., Professor of Education 916 5th St. S. E.
 *JOHN HENRY GRAY, Ph.D., Professor of Economics and Politics, Head of Department of Economics and Political Science 412 Walnut St. S. E.
 EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics, Acting Head of Department of Economics and Political Science, February, 1912-February, 1913 827 7th St. S. E.
 GISLE BOTHNE, M.A., Professor of Scandinavian Languages and Literatures, Head of Department of Scandinavian Languages 1105 6th St. S. E.
 ANDREW ADIN STOMBERG, M.S., Professor of Scandinavian Languages 531 Walnut St. S. E.
 WILLIAM STEARNS DAVIS, Ph.D., Professor of Ancient History 806 6th St. S. E.
 JAMES PAIGE, M.A., LL.M., Professor of Law 420 Oak Grove St.
 HENRY J. FLETCHER, LL.M., Professor of Law 317 17th Ave. S. E.
 CHARLES MARTIN ANDRIST, M.L., Professor of French 706 Delaware St. S. E.

*Absent on leave, February, 1912-February, 1913.

- FLETCHER HARPER SWIFT, Ph.D., Professor of Education
 HARDIN CRAIG, Ph.D., Professor of English 421 Union St. S. E.
 CARL W. THOMPSON, M.A., Associate Professor of Economics and Director
 of Bureau of Research in Agricultural Economics
 1322 6th St. S. E.
- CEPHAS D. ALLIN, LL.B., M.A., Assistant Professor of Political Science
 112 Church St. S. E.
- OSCAR C. BURKHARD, M.A., Assistant Professor of German
 610 13th Ave. S. E.
- JOHN FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics and
 Political Science 312 State St. S. E.
- JULES T. FRELIN, B.A., Assistant Professor of French
 112 Church St. S. E.
- THOMAS WARNER MITCHELL, Ph.D., Assistant Professor of Business
 Administration 1092 15th Ave. S. E.
- SAMUEL QUIGLEY, M.A., Director of the Extension Division, Assistant
 Professor of Education 916 5th St. S. E.
- FRANK M. RARIG, M.A., Assistant Professor of Rhetoric
 63 Barton Ave. S. E.
- S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construc-
 tion 1517 River Road S. E.
- DAVID FERDINAND SWENSON, B.S., Assistant Professor of Philosophy
 3101 16th Ave. S.
- LOUIS D. H. WELD, Ph.D., Assistant Professor, Extension Work in Eco-
 nomics and Political Science
- HERBERT H. WOODROW, Ph.D., Assistant Professor of Psychology
 806 4th St. S. E.
- JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science
 1120 6th St. S. E.
- HUGH EVANDER WILLIS, M.A., Assistant Professor of Law
 1016 17th Ave. S. E.
- ARTHUR B. BALCOM, B.S., M.A., Instructor, Extension Work in Eco-
 nomics and Political Science
- JAMES DAVIES, Ph.D., Instructor in German 616 12th Ave. S. E.
- AUSTIN S. EDWARDS, Ph.D., Instructor in Psychology
- A. WOLFRED JOHNSTON, M.A., Instructor in Geology 417 Union St. S. E.
- GEORGE NORTON NORTHEROP, M.A., Instructor in English
 2213 Grand Ave.
- RAYMOND V. PHELAN, Ph.D., Instructor, Extension Work in Economics
 612 10th Ave. S. E.
- CHARLES H. PRESTON, B.A., Instructor, Extension Work in Economics
 and Political Science 94 Malcolm Ave. S. E.
- WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Work
 1423 W. 27th St.
- HERMON L. SLOBIN, Ph.D., Instructor in Mathematics 2541 Harriet Ave.
- DON D. LESCOHIER, M.A., Lecturer, Department of Economics and
 Political Science

EXTENSION COURSES

GENERAL INFORMATION

The extension work of the University of Minnesota is organized to include:

A. Evening classes, primarily in Minneapolis and St. Paul.

(1). A considerable part of the freshman and sophomore work in the College of Science, Literature, and the Arts is thus made available, and on request more advanced courses will be organized for students who have completed the first part of the college curriculum and for men and women qualified to profit by specialized study.

(2). Introductory courses from the curriculum of the Law School are offered to young men and women who are interested in this profession or who desire the work as part of a general preparation for business activity.

(3). A considerable number of courses in Economics and Politics in addition to those which have been conducted during recent years by the University.

(4). Afternoon, evening, and Saturday classes in Education as well as in many lines of general study arranged for the special needs of teachers.

B. Correspondence courses, especially in those departments of college study in which work of this kind can be most easily and efficiently organized.

C. Extension lectures, singly or in groups and available not merely near the University but wherever in the State a demand for this kind of instruction may appear.

D. Agricultural extension, including lectures, demonstrations, institutes, and short courses under the direction of the College of Agriculture.

E. Supplementary plans of University co-operation with local educational effort as exemplified in one way by the "University Weeks" first organized in June and July, 1912.

ADMISSION TO COURSES

In general the conditions of admission to extension courses will not be different from those admitting students to the regular courses of the respective schools or colleges of the University.

It is not intended, however, that any regulation should debar from the privileges of these courses any persons who are able to pursue them profitably. Therefore, persons who are sufficiently mature, though they do not comply with the conditions mentioned above, may be admitted to either the evening or the correspondence extension courses, if they

can satisfy the departments in which they wish to study that they are able to carry the work profitably to themselves and without hindrance to the classes.

CREDIT FOR EXTENSION COURSES

Credit for all extension courses (for exception in Law courses, see page 29) regularly and successfully completed will be given to students if they have previously met the requirements for college entrance. Such credits will be recorded upon matriculation in the University.

Approximately one semester's credit will be allowed for each hour of class work per week. Double periods are required in laboratory work.

In certain advanced courses arrangements may be made for a two-hour session once a week, instead of two meetings of an hour and a half each, with two credits instead of three.

Students must indicate at the time of registration whether or not they desire college credit in the courses pursued.

FEEES FOR COURSES

In all departments except the Law the regular fee for classes which meet one evening per week is five dollars a semester; for those which meet two evenings per week, ten dollars.

The requirements relative to the Law courses accompany the announcement of those courses in this bulletin. (See page 33).

All fees are to be paid in advance to the Comptroller of the University. *No fee will be refunded on account of withdrawal from any course, unless application for refund be made within FIVE days after registration.*

PLACES FOR CONDUCTING CLASSES

The classes in Law will be held in the Law Building on the University Campus.

In determining the meeting places for other courses, the convenience of the students enrolled will be consulted as far as practicable.

In Minneapolis, classes may be organized to meet at the University, at the public libraries and high schools, or at other places as desired.

In St. Paul, the Institute of Arts and Sciences will be headquarters for the work, and such additional accommodations as are necessary will be provided.

NUMBER FOR WHOM CLASSES WILL BE ORGANIZED

Classes will not be organized for a smaller enrollment than twelve, and in some courses a larger registration will be necessary.

TIME OF MEETING

Classes may be organized to meet at 7:30 on any evening in the week. The days are already fixed and herein announced for some of the courses.

ENROLLMENT

All who are interested in the formation of classes are requested to address the Director, 319 Folwell Hall, The University of Minnesota, Minneapolis.

COURSES OF INSTRUCTION

CHEMISTRY

- 1 (2).* Advanced General Chemistry Mr. FRANKFORTER
Six credits (two evenings per week); both semesters. Open to all who have completed a satisfactory preparatory course in General Chemistry. Both semesters must be completed before credit is given for the first semester.

Lectures and laboratory work. An introduction to Physical and Technological Chemistry, with an exhaustive study of the chemical elements.

- 2 (16). Industrial Chemistry Mr. FRANKFORTER
Three credits (two evenings per week and laboratory period); first semester. One should have had Organic Chemistry to carry this course successfully.

The course includes the discussion of methods and apparatus used in chemical technology, and the testing of commercial chemical products.

This course may be supplemented by another consecutive course during the remainder of the year.

BUSINESS COURSES

(Department of Economics and Political Science)

The need of special training for a business career can no longer be questioned. Business life has recently become too complex and too intense for anyone to learn it on the principles of apprenticeship or to grow up with the business as many of the great captains of industry did even in the generation just closing.

Business is rapidly becoming a profession, and professional training for business life is now passing to the Universities, just as the preparation of lawyers, physicians, and engineers was passed to the higher institutions of learning in America in the nineteenth century.

But the need of such instruction is not confined to those who can reside at the University and devote their whole time to study. There are large numbers of those who live within easy reach of the University who have been compelled by economic pressure to go into business life without a college course, or who took a general college course without specific reference to their future work, who feel the need of a systematic study of the principles of business along their chosen lines. The Univer-

*The number in parentheses is that of the corresponding course in the regular University bulletins.

sity can be of great service to such men, as has been well demonstrated by the success of the business courses offered in the evening at New York, Philadelphia, Chicago, and other places.

Students looking towards a business career have heretofore been provided for by the regular day classes at the University. Two years ago for the first time the University recognized that it owed quite as distinct a debt to the large numbers residing within reach of its doors, but deprived of the opportunity to take up residence at the University by reason of having to earn their living during the ordinary hours of University instruction.

To meet this growing and imperative need, the University now offers, in the evening courses at the University, work covering the chief subjects required for a proper preparation for a business life, such as Finance, Accounting, Business Organization, Commercial Law, and the like.

This instruction, while not pretending to take the place of business experience, will enable those who take the course to understand and interpret their business experience much more satisfactorily and, therefore, to advance themselves more rapidly because of increased efficiency. It will at the same time raise the moral standards of the business world and thereby conduce to the general welfare. Furthermore, such courses taken by earnest young men already engaged in their life work combines in an ideal way theory and practice. In short, it is an application of the ideal underlying the old method of apprenticeship.

Special Courses by Prominent Business Men

The business courses herein outlined are supplemented by occasional lectures by men of recognized ability and influence in their respective lines of enterprise. Bank and railway officials, business managers, financial editors, and legal and accounting experts are secured for this service.

Dates and subjects of lectures will be announced from time to time. Lectures are open to all members of the evening school and their guests.

GENERAL ECONOMICS

1. Elements of Economics

Mr. BALCOM

Two credits (one evening per week); first semester.

This course aims to ground the student in principles that are basic in all economic discussions. The study naturally centers in value and the laws of valuation under the various applications.

Topics: Utility and valuation; price and the laws of price as applied to competitive and monopolistic conditions; price and the cost of production; the factors of production; the law of diminishing returns; division of labor and its relation to the development of industry; the forces and factors involved in the concentration of industry, including the difference between the agricultural and the mechanical industries; wages, rent,

interest, capitalization, enterprise, and business profits; finally, some attention is given to money, credit, banking, and international trade.

2. Practical Economic Problems

Mr. BALCOM

Two credits (one evening per week); second semester.

The aim of this course is to study economic principles in their application to some of the leading questions of to-day. Must be preceded by Course 1.

Topics: Labor problems, including unionism, trade agreements, compulsory arbitration and the Canadian Industrial Disputes Act; monopoly problems, including legal and natural monopolies, such as patents, copyrights, municipal monopolies, and the railway problem; and capitalistic monopolies, or trusts, in the United States; taxation problems and tax reform in the United States; the problem of crises in their relation to business; finally, problems arising from differences in the agricultural and mechanical industries.

INDUSTRIAL HISTORY

1. Industrial History of the United States

Mr. BALCOM

Two credits (one evening per week); first semester.

The industrial development of the United States since the Revolution, and especially since the Civil War. No preliminary course required.

2. Industrial History of Europe since 1763

Mr. BALCOM

Two credits (one evening per week); second semester.

The industrial development of the European countries since the introduction of modern methods of manufacture and transportation. No preliminary course required.

ECONOMIC GEOGRAPHY AND MATERIALS OF COMMERCE

1. Materials of Commerce

Two credits (one evening per week); first semester. (Not given in 1912-1913.)

A study of the principal wares of commerce with reference to sources, uses, and industrial processes. Text, with lectures, collateral reading, and the use of an extensive collection of illustrative materials.

LABOR PROBLEMS AND REFERENCES

1. Labor Problems

Mr. PHELAN

One evening per week; both semesters.

Modern labor problems; woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work, profit sharing, co-operation, labor unions, strikes, boycotts, conciliation and

arbitration; immigration: causes, effects, remedies. Lectures, text-book, assigned readings, discussions and investigations of local conditions. No credit given unless both semesters are completed.

2. Economic Reforms

Mr. PHELAN

One evening per week; first semester.

Aristocracy versus democracy in economics; competition, socialism, and state regulation plus education as means of achieving economic justice; special attention to socialism as a philosophy of industrial evolution and a program of economic reform, and to the alternative of adequate, reasonable, and efficient public regulation of private economics. Lectures, assigned readings, and discussions.

COURSES IN ACCOUNTING

The courses in Accounting, in combination with those in Business Law and Business Administration, are designed to meet the needs of two classes of students, namely, those who wish to prepare to take the State C. P. A. examinations, and those who aim to continue in their present lines of work but who wish to prepare themselves for managerial positions. To both of these classes a thorough training in Accounting, Business Law, and Business Administration is indispensable.

To the student who wishes to pursue either object we recommend that he arrange his work as follows:

First semester: Principles of Accounting and Law of Contracts.

Second semester: Cost Accounting and Law of Sales and Negotiable Instruments.

Third semester: Accounting Systems, Business Administration, and Law of Partnerships and Corporations.

Fourth semester: Accounting Systems, Advertising, Salesmanship, and Commercial Credit and Law of Real Property, Common Carriers, and Bankruptcy.

Fifth semester: Auditing and Law of Wills, Inheritance, Administration.

Sixth semester: Auditing and Law of Crime and Evidence.

1. Principles of Accounting

Mr. PRESTON

Two credits (one evening per week); first semester.

Experience has proved that the average bookkeeper has not had the opportunity of becoming well grounded in the principles at the basis of the science of Accounting. This fact has rendered it difficult for him to do the work of the advanced courses before first studying the principles. All are therefore urged to commence with this course. Those who have no knowledge of bookkeeping will be given extra assistance for the first few weeks until familiar with elementary principles. This course is not only designed for those who are preparing for accounting positions, but for those who hope to become interested in business as managers or owners.

Topics: The general principles of debits and credits; the distinction between single and double entry, and exercises in changing from one to the other. Interpretation of accounts and balance sheets. The application of the principles of debit and credit to the various books of original entry, and to the development of columnar books. The use of auxiliary ledgers and controlling accounts. The classification of loss and gain or revenue accounts. The classification of accounts peculiar to a manufacturing business. The manufacturing, trading, and administration accounts. Treatment of petty cash, imprest cash, voucher systems, contingent liabilities, proper treatment of merchandise discounts. Depreciation. Text, lectures, and practice work.

2. Cost Accounting

Mr. PRESTON

Two credits (one evening per week); second semester.

A good cost accounting system, which gives an accurate knowledge of the unit cost of production or operation, gives it by processes and elements, gives it in such a form as to permit comparison with pre-determined standards of cost, and gives it concurrently with the act of production, is an indispensable part of the machinery to secure the economical operation of a modern business establishment. Devising and installing cost accounting systems is now and is destined to remain the most lucrative branch of the profession of public accountancy. This course is designed to instruct the student in the principles of cost accounting and illustrate their application.

Topics: The elements of cost—materials, manual labor, machine labor, and indirect expenses; principles of expense classification; kinds of cost accounting—continuous process and contract costs; process costs; methods of determining machine rates; of distributing indirect expenses; unit costs; comparative costs; pre-determined standard costs and their use in connection with the cost accounting system. Methods of compensating workmen so as to stimulate their efficiency and eliminate wastes in operation. The cost ledger and its relation to the general ledger. Illustrative practice work.

3. Accounting Systems and Accounting Problems

Mr. PRESTON

Four credits (two evenings per week); both semesters.

The aim of this course is to apply the principles of account classification to the accounts of a representative of each type of business, showing how its expense and revenue accounts should be classified, its special accounting problems, and the system of accounts and books which will best accomplish the purpose. The type of business to be dealt with will consist of: Financial: the commercial bank, savings bank, and insurance company; mercantile: the department store and lumber yard; manufacturing: the flour mill and brewery; municipal utilities: the gas and electric railway company; public service: the steam railroad and telegraph companies; governmental: accounting systems of municipalities; legal: the accounts and books of executors and receivers. The subject matter will be illustrated by means of the uniform systems of accounts prescribed

by governmental and other commissions, by the published report of corporations and selected C. P. A. problems.

4. Auditing Mr. _____

Four credits (two evenings per week); both semesters. (Not given in 1912-13.)

This course is designed to give the student a knowledge of the general principles and procedure of auditing and acquaint him with the special features connected with the audit of certain classes of business.

5. Business Administration Mr. _____

Two credits (one evening per week); first semester.

This course aims to present the principles of business organization and business management. This course together with the courses in Accounting Principles, Cost Accounting, Business Law, and Corporation Finance, furnish a good preparation for those who aspire to managerial positions.

Topics: The four main divisions of a business—purchasing, producing, selling, and accounting—their sub-divisions and relationship to the source of authority will be thoroughly treated.

COURSES IN FINANCE

Students wishing to do the major portion of their work in Finance are advised to pursue the courses offered in the following sequence: Banking Practice, Money and Credit, Funding Institutions, Investments, Corporation Finance, Speculation and the Money Market. Instruction in foreign banking systems, transportation, and financial statistics and corporation reports may be added if sufficient demand appears.

All courses in Finance should be preceded by the study of Elementary Economics. The desire for breadth of view and general business intelligence should incite the student of finance to the concurrent study of kindred subjects. For this purpose the following titles are recommended in the order named; Practical Economic Problems; Principles of Accounting; Business Law.

The American Institute of Banking

The American Institute of Banking recognizes all evening courses at the University of Minnesota in the several branches of Economics, Finance, Accounting, and Business Law, as fulfilling the requirements of its educational department in like subjects. By an arrangement with the officers of this association, courses in the Evening School may be accredited to members without further study or examination.

By this arrangement, members of the Minneapolis and St. Paul Chapters of the American Institute of Banking may conveniently advance to the degrees and privileges of the educational department by substituting instruction at the University for the home- and group-study courses arranged by the Institute.

1. Banking Practice

Mr. EBERSOLE

Two credits (one evening per week); first semester.

This course is designed for two classes of students: (1) Bank clerks who desire a general view of their business, equal to several years of experience, and (2) prospective business men who wish to utilize banks to their full capacity for service and support. The aim is to explain the various functions of the up-to-date bank and to teach the methods by which its work is accomplished. A careful study will be made of the organization, record, and accounts, mechanism, and methods of large commercial institutions having full complement of banking operations, including city, county, and foreign business. Foreign Exchange will be developed completely. While the instruction comprehends the business and methods of banks in general, the student can readily make necessary deductions to meet the needs of small institutions or of specialized business.

Topics: Among the subjects treated are: bank organization; duties and liabilities of stockholders, directors, and officers; departmental organization and functions; duties of tellers, clerks, and bookkeepers; work of collection and credit departments; bank currency; the reserve; examinations, statements, and reports; organization of clearing houses; comparative methods of commercial and savings banks; the foreign department and international exchange.

2. Money and Credit

Mr. EBERSOLE

Two credits (one evening per week); first semester. (Not given in 1912-13.)

A thorough understanding of the character and functions of money and of the principles of credit is the corner-stone of modern business intelligence. This course in money and credit constitutes an interesting and scientific treatment of the theories of value and prices, of the processes of exchange and of the many forms of media of payment represented by monetary and credit instruments.

3. Investments

Mr. EBERSOLE

Two credits (one evening per week); second semester.

A study of the principles of capital and interest, the processes of investment, and of the nature of capitalistic enterprises and of investment securities. Instruction is by lectures, assigned readings, and class discussion. The history of recent investment projects is briefly reviewed, and the current investment market is closely followed.

Topics: The accumulation of wealth and the nature and functions of capital; the theory of interest; factors which affect capital earnings; depreciation, replacement, and amortization, land rents, the "unearned increment," and real estate values; the organization of modern industry; investment securities and their qualifying attributes; corporation issues: forms, purposes, and legal and economic characteristics; trade and investment statistics; investment mathematics; the securities market; the investment functions of the trust company, the underwriter, the broker, and the bank; the analysis of financial reports and balance sheets; the valuation of industrial projects.

4. Corporation Finance Mr. EBERSOLE

Two credits (one evening per week). (Not given in 1912-13.)

Modern business in all of its major forms is directed through corporate organization. The course in corporation finance is designed to give the student such a knowledge of corporations and their administration as to make clear the general organization of industry and commerce.

5. Commercial Banking Mr. EBERSOLE

Two credits (one evening per week); second semester. (Not given in 1912-13.)

This course treats successively the economic aspect of the several forms of business institutions occupied in the accumulation and investment of capital and in the organization and transfer of credit. Special attention is given to the principles of commercial banking. Federal and state laws and judicial decisions affecting funding enterprises are systematically reviewed, and the nature and extent of public regulation discussed.

6. Speculation and the Money Market Mr. EBERSOLE

Two credits (one evening per week). (Not given in 1912-13.)

This is a lecture course along advanced lines for the benefit of those having considerable knowledge of business and finance. The course is divided into two parts as indicated in the title. The actual operations upon the stock and produce exchanges are used to illustrate the study of speculation, and the course of the markets and the bank rates is closely followed as a basis of deduction in the analysis of cause and effect.

ADVERTISING, SALESMANSHIP, AND COMMERCIAL CREDIT

This series will consist in part of lectures by advertising managers, sales managers, successful salesmen, and by credit managers of Twin City business houses.

1. Advertising and Salesmanship, Part I. Mr. WELD

Two credits (one evening per week); first semester.

The psychology of advertising; methods of catching and holding the attention; of arousing interest; of impressing the memory; of influencing the action of the reader. Kinds of advertising and advertising media and the purposes to which they are adapted. Planning and carrying out an advertising campaign. Measuring results. Text-books: De Weese, *Modern Publicity*, Calkins and Holden, *Modern Advertising*.

2. Advertising and Salesmanship Mr. WELD

Two credits (one evening per week); second semester.

The preparation of the salesman as to personality and knowledge of his wares, methods of approaching the prospective customer, getting his attention, arousing his interest, demonstrating the wares and closing negotiations. Text-book-System Co. "Salesmen and Salesmanship."

3. Commercial Credit

Mr. WELD

Two credits (one evening per week); first semester.

Sources of credit information and their value; credit men's associations and credit bureaus; organization of credit information; the establishment of a line of credit; collection methods and their relation to the credit man's work; credit insurance. Text-book: Lewis, *The Credit Man and His Work*.

INSURANCE

1. General Insurance

Mr. WELD

Two credits (one evening per week); second semester.

The general principles of life, fire and liabilities insurance, and their bearing upon practical business needs.

Text-book (Gephart) and lectures.

TRANSPORTATION

1. American Railway Transportation

Mr. WELD

Two credits (one evening per week); first semester.

A lecture and reading course in the economics of transportation treating questions of railway organization, administration, and rate-making, and presenting an unbiased survey of public interests and government activities in relation to the railway business.

Topics: The present railway system from the standpoint of geographical distribution and ownership and control; the freight, passenger, express, and mail service; railway capitalization; analysis of earnings and expenditures; principles of railway charges; competition and consolidation; distance tariffs; group rates and the basing point system; import and export rates; railway regulation before 1870; granger legislation and the granger decisions; state railway regulation; the interstate commerce act and the work of the Interstate Commerce Commission, the anti-trust act as applied to railroads; the railroad act of 1910; pooling; discrimination and rebates; the taxation of railroads; the questions of government ownership and government regulation; recent judicial decisions affecting the railroad business.

BUSINESS LAW

For description of the course in Business Law, see page 32.

EDUCATION

1 (3). Brief History of Education

Mr. SWIFT

Three credits (two evenings per week); each semester. Ranks as a junior and senior course in the University. Open to teachers, and prospective teachers who have met the college entrance requirements.

The origin and development of schools, more particularly in the modern period, as a preparation for the understanding of the educational systems, theories, and practices of the present.

2 (7). The Theory of Education

Mr. QUIGLEY

Three credits (two evenings per week); Monday and Wednesday; first semester. Open to teachers and prospective teachers who have met the entrance requirements, and to school patrons who are interested in the progress of education, and whose previous consideration of such topics has fitted them for the work.

This is an introductory course in educational theory. It emphasizes the fundamental principles upon which successful practice depends. Actual observation of school work will give point to the discussions. Current educational literature will be reviewed. An effort will be made to develop a basis for judgment in all matters pertaining to the educative process.

3 (9). School Supervision

Mr. RANKIN

Two credits (one evening per week); second semester. Open for credit to high school graduates who are also graduates of Normal Schools, or who have had adequate experience in teaching. Other persons, not desiring credit, may register. Each prospective student must get permission from instructor before registering for course.

A course in fundamental principles of school organization, administration, and supervision. It is designed for teachers, principals, superintendents, members of boards of education, parents, or others who are interested in discussions relating to methods of administration and supervision of public school education.

4 (11). Philosophy of Education

Mr. QUIGLEY

Three credits (two evenings per week); Monday and Wednesday; second semester. Open to all teachers and prospective teachers who have met the college entrance requirements, and to any mature students who have some basis for appreciation of the work.

An endeavor to correlate the various educational ideals drawn from biological and psychological studies, with special consideration of recent social phases of education. An attempt to answer the question, "What does education mean to-day?"

5 (23). Industrial Education

Mr. RANKIN

Four credits (one evening per week); Wednesday; both semesters. Open for credit to high school graduates who are graduates of Normal Schools, or who have had adequate teaching experience, or who have had adequate experience as industrial workers. Other persons, not desiring credit, may register. Each person who wishes to take the course should see the instructor before registering.

The course treats of the necessity for vocational training in the public schools. It aims to show the bearing of the facts of universal education and industrial evolution on the methods and material of a system of public schools.

6 (16). School Sanitation

Mr. RANKIN

Two credits (one evening per week); first semester. Open for credit to teachers, prospective teachers, and school board members. Those desiring University credit must be eligible for enrollment in the University. Others may take course without credit. Each student must see instructor before enrolling.

This course will be conducted by text, by lectures, and by investigation into the problems of school lighting, heating, and ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.

ENGLISH

1 (1). General Survey of English Literature (includes the literature produced in the United States)

Mr. CRAIG

Six credits (two evenings per week); both semesters.

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. Required for a major, minor, and a teacher's certificate.

2 (7a). Shakespeare

Mr. NORTHROP

Two credits (one evening per week); first semester. Open to students who have completed a year of work in college English. Required of all who take their major or obtain a teacher's recommendation in English.

An introductory study of Shakespeare's development as a poet and dramatist, with reading of representative plays.

3 (7b). The Later Plays of Shakespeare

Mr. NORTHROP

Two credits (one evening per week); second semester. Open to students who have completed Course 7a.

Intensive class-room analysis of four plays. Comprehensive collateral reading of other plays.

GEOLOGY AND MINERALOGY

1 (1a). General Geology

Mr. JOHNSTON

Two credits (one evening per week); first semester. Not a first-year college course.

A synoptical treatment of the materials of the earth and of geologic processes; physiographic, structural, and dynamic geology, with a brief introduction to historical geology. Lectures, laboratory work, field excursions, map study, and conferences.

2 (2). Geography and Geology of Minnesota

Mr. JOHNSTON

Two credits (one evening per week); second semester. Open to students who have completed Course 1 (1a).

The physical geography of the State in its relations to geological history and industrial development; the principles and facts of pre-Cambrian geology as exemplified in the State and the extension of these into general application; the present problems of the State in agriculture, drainage, water-power, mining, quarrying, etc.

GERMAN

1 (1a). Beginning

Mr. DAVIES

Six credits (two evenings per week); both semesters. Open to all who enter without German. Juniors and seniors receive only half credit. Both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2 (4). Prose and Poetry

Mr. O. C. BURKHARD

Six credits (two evenings per week); both semesters. Open to all who would enter the University with two years of German. Not open to those who have obtained credit in Course 2 or Course 3. (See regular University Bulletin.) Both semesters must be completed before credit is given for the first semester. This course may be supplemented by Course 5.

Stern's *Aus deutschen Meisterwerken*; Goethe's *Gedichte*, Heine's *Buch der Lieder*. Geography, history, and legend. Review of German grammar throughout the year.

GREEK

1. First Year in Greek

Mr. HUTCHINSON

Six credits (two evenings per week); both semesters. Open to all. Both semesters must be completed before credit is given for the first semester.

Students are advised to take this course in their freshman year, especially such as intend to fit themselves for teaching Latin. Those also who expect to do intensive work in Ancient History or Philosophy, or who expect to study Theology, or who intend to devote themselves to Literature, should take this course in the freshman year.

First semester: The declensions and conjugations and the simpler rules of syntax, together with sentences based on the vocabulary of the Anabasis, and translation into Greek of idiomatic English sentences based upon the same text.

Second semester: The Anabasis itself, an amount equivalent to about a book; Hadley's Greek Grammar; etymology reviewed and syntax studied sufficiently to enable the student to proceed confidently in the translation of the text; translation from English into Greek continued.

HISTORY

1. Medieval and Modern History Mr. DAVIS

Six credits (two evenings per week); both semesters. Open to all. Designed especially for freshmen who offer less than two years of preparatory History for admission. Not credited toward a major or minor.

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.

2 (8). American Political History, 1492-1912 Mr. ANDERSON

Six credits (two evenings per week); both semesters. Open to those who would not present Senior American History for admission to the University, and to teachers. Not recommended to students who expect to take more than two years of college history.

Brief survey of the colonial and the most recent periods, with fuller treatment for the years 1789-1865. Special attention given to political parties, territorial expansion, slavery, and the Civil War.

LATIN

1. Livy: Books I, II, XXI, XXII. Selections Mr. CLARK

Three credits (two evenings per week); first semester. Open to those who have completed four years of Latin in preparatory schools. Course 2 must also be completed before credit is given for this course.

Latin composition and review of the principles of Latin syntax.

2. Plautus and Terrence. Selections Mr. CLARK

Three credits (two evenings per week); second semester. Open to those who have completed Course 1.

The translations of selected plays of Plautus and Terrence, with an outline study of the beginnings of the Roman drama.

MATHEMATICS

1 (4). Logarithms and Trigonometry Mr. SLOBIN

Three credits (two evenings per week); second semester. Open to those who have completed Course 3 (Higher Algebra Part II).

Text, tables, and numerous problems.

2 (7). Analytical Geometry Mr. SLOBIN

Three credits (two evenings per week); first semester. Open to those who have completed Course 2 or 4 (Advanced Algebra and Plane Trigonometry, or Logarithms and Trigonometry).

Rectilinear and polar co-ordinates, producing equations of loci whose law of development is known, constructing and discussing such equations, transformation of co-ordinates, properties of the straight line, the conic sections and higher plane curves by means of their equations.

MECHANICAL ENGINEERING

1 (5 and 6). Machine and Tool Construction Mr. SHIPLEY

Four credits (one evening per week); both semesters. Open to practical machinists and apprentices who are able to do the work with profit to themselves.

A series of lectures on the theory, together with shop practice, giving instruction regarding taps, reamers, cutters, gears, and other special features.

2 (1b). Pattern Making Mr. RICHARDS

Two credits (one meeting per week); both semesters. Open to practical mechanics and apprentices capable of getting something out of the work.

A series of lectures on the theory of pattern making, practically applied in the shop.

3 (2). Mechanical Drawing

Two credits (one evening per week); both semesters. Arranged especially with reference to the other courses offered in the Department of Mechanical Engineering.

The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations, and explanatory notes. Sketching, lettering, tracing, and blue printing. Representation of details of machines and structures, and the interpretation of working drawings.

PHILOSOPHY AND PSYCHOLOGY

1 (15). Mental Retardation Mr. KUHLMANN and Mr. MINER

Three credits; first semester. Two consecutive recitation hours on Saturday morning, 9 to 11 o'clock, and supplementary clinical work and practice training. Open to those who have completed a year of Psychology or who have had an introductory course in Psychology and have taught. A course especially important to teachers.

The nature of backward and exceptional development in children; the measurement of mental development and the detection of defects; the devising of special training for unusual children; the developmental problems of truancy and juvenile delinquency. Especially designed for those contemplating teaching or social work. The clinic in mental development will be at the service of the students, and the observation of backward children forms part of the work.

2 (1b). Elements of Psychology Mr. EDWARDS and Mr. WOODROW

Three credits (two evenings per week); each semester. Open to sophomores, juniors, seniors, and teachers. This course is required for the Teacher's Certificate. The aims and methods of Psychology, the facts

and laws of mental life and the functions of the various mental processes in the adjustment of man and his environment.

3 (2). Logic

Mr. SWENSON

Three credits (two evenings per week); each semester. Open to those who have had some college work and teachers.

The nature of knowledge, the laws of reasoning, and the principles and methods of scientific proof. The aim of this course is to produce accuracy of thought as well as to familiarize the student with the logical grounds of modern science. Text-book, lectures, and reports.

RHETORIC AND PUBLIC SPEAKING

1 (20). A General Course in Public Speaking

Mr. RARIG

Six credits (two evenings per week); both semesters. Open to those who have had Rhetoric 1 or the equivalent.

The fundamentals of effective speaking; study and practice of the principles of breathing, voice-production, enunciation, and action; delivery of extracts from the works of well-known writers and speakers; the principles underlying the making of the speech applied in both oral and written compositions.

2 (2a). Exposition, Description, and Narration

Mr. ———

Six credits (two evenings per week); both semesters. Open to those who have completed the equivalent of Course 1 in College Composition and Rhetoric.

In the first semester, the analysis of specimens of exposition; short themes and fortnightly essays, with emphasis on careful planning and amplification. In the second semester, the same general plan applied to description and narration.

ROMANCE LANGUAGES

1. Beginning French

Mr. FRELIN

Six credits (two evenings per week); both semesters. Open to all, but juniors and seniors receive only half credit. Both semesters must be completed before credit is given for the first semester. Not credited toward a minor in French.

French grammar and reader; modern texts.

2 (3). Advanced French Grammar and Composition

Mr. ANDRIST

Six credits (two evenings per week); both semesters. Open to all who would enter the University with two years of French. Both semesters must be completed before credit is given for the first semester.

French grammar; readings from modern authors, including selections from Coppee, Feuillet, and Daudet.

SCANDINAVIAN

1 (6). Modern Norwegian Literature Mr. BOTHNE

Six credits (two evenings per week); both semesters. Open to advanced students who have completed Courses 1 and 2 (Elementary and Advanced Norwegian) and others having equivalent preparation. Both semesters must be completed before credit is given for the first semester.

History of Norwegian literature from 1814 to the present day.

2 (7). Swedish Literature Mr. STOMBERG

Six credits (two evenings per week); both semesters. Open to advanced students who have completed Courses 3 and 4 (Elementary and Advanced Swedish) and others able to carry the work successfully. Both semesters must be completed before credit is given for the first semester.

History of Swedish literature from 1710 to the present time. History of the literature and study of modern authors, including Selma Lagerlof, Geijerstam, Strindberg.

SOCIOLOGY AND ANTHROPOLOGY

1. Descriptive Sociology Mr. JENKS

Two credits (one evening per week); first semester. Open to advanced students, teachers, and others able to qualify.

Concrete data concerning human associations, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment; the activities and institutions natural and peculiar to the several groups studied. Text-book, lectures, and assigned readings.

2 (14). The American People Mr. JENKS

Two credits (one evening per week); second semester. Open to teachers and students who can pursue the work advantageously. Students should see the instructor before enrolling.

The distribution in the United States of the different peoples of the world found here; the natural genius of the peculiar home development of these peoples, and the modifications of this development in America; the dominant physical, mental, moral, and cultural characteristics of each people, and their relative importance to the nation. Text-book, lectures, assigned readings, and thesis.

EVENING COURSES IN LAW

SCOPE OF COURSE

Beginning with the academic year 1912-13, the Division of University Extension will give evening courses in all of the principal branches of Substantive Law. These courses, given under the immediate direction of the Faculty of the Law School, are designed for the benefit of those

persons who desire legal instruction for the purpose of better qualifying themselves for business careers. They do not lead to a degree, nor are they intended primarily to qualify the student for admission to the bar.

Provision is made, however, whereby students who show special aptitude may receive credit in Extension Courses towards a degree in Law. Any student who has completed with marked success any extension course will be admitted to the regular Law School examination in that subject, and, if successful, will be given full credit. After securing credit for all the subjects taught in the extension course in Law, and thereupon completing at the Law School of the University of Minnesota the various courses in Adjective Law required for a degree, a student will be entitled to graduation, provided that previous to taking these examinations he could have qualified as a regular student in the Law School by having completed two years of academic work in an institution of collegiate rank. It is possible also for a student who successfully completes the extension courses in Law to qualify for passing the bar examination for admission to practice, by taking the regular practice work in the Law School during an additional year.

The brief extension course in Business Law, heretofore given by the Department of Economics and Political Science, will be hereafter conducted under the direction of the Faculty of the Law School. It is specifically described below.

TIME AND PLACE OF INSTRUCTION, AND TEXT-BOOKS

All instruction in Law will be given at the Law Building of the University of Minnesota, Minneapolis. Class exercises will be held on the evening of each week day, excepting Saturday, during the session, beginning at 7:30 and extending not later than 9:30.

For the present, at least, text-books used by students in pursuing the courses will be loaned by the University free of charge, upon payment of a deposit fee not to exceed \$5. This deposit will be repaid upon the students returning in good condition all of the books loaned to him during the year.

REQUIREMENTS FOR ADMISSION

The requirements for admission to the Extension Courses in Law are in general the same as for the day courses in the College of Science, Literature, and the Arts: namely, either (1) special entrance examinations, (2) graduation from an accredited school in Minnesota, or (3) evidence, by certificate, of equivalent scholastic preparation. (See Bulletin of the University of Minnesota, the Colleges of Science, Literature, and the Arts. The bulletin will be mailed, on request, by the Registrar of the University.)

By special arrangement, persons who are at least twenty-one years of age, and who do not comply with the general requirements as above

outlined, may enter the evening courses in Law. In such cases, it will be necessary for applicants to satisfy the Department that they are adequately fitted to carry the proposed work.

COURSES GIVEN IN 1912-13

The complete extension curriculum in Law will extend through three years, with six lecture periods a week each year. During the academic year 1912-13 the courses offered cover only the first and second years' work. The third year's work will be provided in the year 1913-14. The courses given to the first and second-year classes are described in outline below.

First Year

Torts

Mr. PAIGE

Three hours, first semester.

This course treats of the general nature of private wrongs to persons and property. It includes, besides the consideration of specific wrongs, such as assault and battery, defamation, fraud, malicious persecution and conspiracy, trespass, waste, nuisance, negligence, and the like, a study of the general principles of Tort Liability, including the wrongful acts of servants and agents.

Personal Property

Mr. ———

One hour, first semester.

This course treats of the general nature and characteristics of personal property. Kinds of personal property, and interest therein; means of acquiring and losing title thereto.

Contracts

Mr. ———

Two hours throughout the year.

This course deals with the general principles of the Law of Contracts. The student considers fully the rules governing the making of contracts, their operation and discharge, and the legal consequences of a breach of contract. The general purpose of the course is to afford a foundation for the later study of the important kinds of specific contracts, such as those of agency, bailments, partnership, commercial paper and sales, which are considered in separate courses.

Bailments and Carriers

Mr. VANCE

One hour, second semester.

In this course are treated the several classes of bailments, with special consideration of pledges and deposits, and of the rights and liabilities of innkeepers and common carriers.

Real Property

Mr. FLETCHER

Three hours, second semester.

This course covers a general treatment of estates in real property,

the rights incident to ownership of realty, powers, uses and trusts, easements, and the methods of transferring rights in real estate.

Second Year

Equity Mr. WILLIS

Three hours, first semester.

This course is intended to give the student a knowledge of the development of equity jurisprudence, and includes a study of equitable maxims and of equitable titles, rights, and remedies.

Damages Mr. WILLIS

Two hours, second semester.

A study of the principles governing the measure of damages to be given in actions at law with particular reference to Torts, Contracts, and Quasi Contracts.

Agency Mr. WILLIS

Two hours, first semester.

This course, which is of especial importance to the business man, treats of the creation and termination of the relation of principal and agent, and their respective rights and liabilities both with reference to one another and to third persons.

Insurance Mr. WILLIS

One hour, first semester.

A study of the principles that underlie all contracts of insurance, with their special application to the several different kinds of insurance.

Bailments and Carriers Mr. VANCE

One hour, second semester.

(This course is identical with that given to the first-year class as described above.)

Real Property Mr. FLETCHER

Three hours, second semester.

(This course is identical with that given to the first-year classes as described above.)

EXTENSION COURSE IN BUSINESS LAW

This is a brief course in commercial law intended to afford to the business man a general survey of those branches of the law which are especially useful in the conduct of ordinary business affairs. This course will be given by a member of the Faculty of the University Law School. Two lectures will be given each week at evening hours hereafter to be designated. The completion of the entire course will require three years. During the year 1912-13 the subjects taught will cover the work of the first and second years only.

The subjects given are as follows:

First Year

First semester, Contracts and Agency.

Second semester, Sales and Negotiable Instruments.

Second Year

First semester, Partnership and Corporations.

Second semester, Personal Property, Liens, Bailments and Carriers.

The third-year work which will be given in 1913-14 will cover Real Property, Mortgages, Trusts, Insurance, Wills, Administration, and Evidence.

EXAMINATIONS AND CERTIFICATES

Upon completion of each of the courses above described an examination will be held. Students who successfully pass all examinations given during the three years' course will receive a certificate showing that they have completed the University Extension Course in Law, or the Extension Course in Business Law, as the case may be.

FEEES

The tuition fee for the regular Extension Course in Law is \$50 per year, payable one-half at the beginning of the first semester and one-half at the beginning of the second semester. Students taking less than the whole course will be required to pay at the rate of \$5 for each recitation per week for each semester. Students taking the briefer course in Business Law will be required to pay \$10 per year, one-half payable at the beginning of each semester. No other charge of any kind will be made excepting the deposit required for the safe return of text-books loaned, as indicated above.

For further particulars apply to:

Director of the Division of University Extension, University of Minnesota, Minneapolis, Minnesota.

ADDITIONAL COURSES

Many advanced courses not listed in this bulletin will be given upon the request of any responsible individual or group willing to organize a sufficiently large class to insure the success of the undertaking.

AGRICULTURAL EXTENSION

For details relative to Extension Courses offered by the College of Agriculture, address Extension Division, University Farm, St. Paul.

The University of Minnesota

THE COLLEGE OF ENGINEERING

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 16. SEPTEMBER 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college and one for the Summer Session is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota

TABLE OF CONTENTS

Calendar, 1912-13.....	4
University Calendar.....	5
Schools, Colleges and Departments.....	7
Board of Regents.....	8
Executive Officers.....	8
Faculty.....	9-11
Entrance Requirements and Examinations.....	13
Degrees.....	21
Faculty Regulations.....	22
General Information.....	24
Fees and Expenses.....	24
Buildings and Equipment.....	27
Courses of Study.....	36
Departmental Statements.....	43
Students.....	68

1912							1913														
JULY							JANUARY							JULY							
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12	
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19	
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26	
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..
..	
AUGUST							FEBRUARY							AUGUST							
..	1	2	3	1	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23	
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30	
..	31
SEPTEMBER							MARCH							SEPTEMBER							
1	2	3	4	5	6	7	..	..	..	..	..	..	1	..	1	2	3	4	5	6
8	9	10	11	12	13	14	2	3	4	5	6	7	8	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27	
29	30	..	..	..	..	..	23	24	25	26	27	28	29	28	29	30	..	..	..	..
..	30	31
OCTOBER							APRIL							OCTOBER							
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11	
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18	
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25	
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..
..
NOVEMBER							MAY							NOVEMBER							
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8	
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15	
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22	
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29	
..	30
DECEMBER							JUNE							DECEMBER							
1	2	3	4	5	6	7	1	2	3	4	5	6	7	7	1	2	3	4	5	6	
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20	
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27	
29	30	31	29	30	28	29	30	31

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, condition examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

Program of Entrance Examinations 1912-13

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building, unless otherwise specified.

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

Tuesday,	Sept. 10	9 a. m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology
		2 p. m.	American Government, History, Physics, Economics, Commercial Geography
Wednesday,	Sept. 11	9 a. m.	English
		2 p. m.	German, French, Latin, Scandinavian
Thursday,	Sept. 12	9 a. m.	Elementary Algebra
		2 p. m.	Higher Algebra
Friday,	Sept. 13	9 a. m.	Plane Geometry
		2 p. m.	Solid Geometry

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.

Program of Condition Examinations

Tuesday,	Sept. 10	9:00-12:00	Mathematics and Mechanics
		2:00-5:00	Civil Engineering Subjects
Wednesday,	Sept. 11	9:00-12:00	Chemistry and Astronomy
		2:00-5:00	Drawing and Descriptive Geometry
Thursday,	Sept. 12	9:00-12:00	Mechanical Engineering Subjects
		2:00-5:00	Physics and Experimental Engineering
Friday,	Sept. 13	9:00-12:00	Electrical Engineering Subjects; French, German, Spanish, Economics
Saturday,	Sept. 14	2:00-5:00	English
Wednesday,	Jan. 15	2:00-5:00	English, Physics, and Experimental Engineering
Thursday,	Jan. 16	2:00-5:00	Chemistry
Friday,	Jan. 17	2:00-5:00	Mechanical Engineering Subjects Civil Engineering Subjects Electrical Engineering Subjects Drawing Subjects and Astronomy
Saturday,	Jan. 18	9:00-12:00	Mathematics, Mechanics, Steam Turbines, and Stresses

Condition examinations are held in the classrooms of the respective departments.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

TH SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
FRANK FAIRCHILD WESBROOK, M.A., M.D., C. S., Dean of the College of Medicine and Surgery
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. APFLEBY, M.A., Dean of the School of Mines
GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
GEORGE F. JAMES, Ph.D., Dean of the College of Education
HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
ADA L. COMSTOCK, M.A., Dean of Women

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

FACULTY

CYRUS NORTHROP, LL.D., President, Emeritus
GEORGE EDGAR VINCENT, Ph.D., LL.D., President
FRANCIS C. SHENEHON, C.E., Dean

CEPHAS DANIEL ALLIN, M.A., LL.B., Assistant Professor of Political
Science 113 Church St. S. E.
CHARLES M. ANDRIST, M.L., Professor of French
706 Delaware St. S. E.
FREDERICK H. BASS, B.S., Professor of Municipal and Sanitary Engineer
ing 429 Union St. S. E.
CHARLES W. BENTON, M.A., Litt.D., Professor of French
516 9th Ave. S. E.
WILLIAM E. BROOKE, B.C.E., M.A., Professor of Mathematics and Me-
chanics 416 Walnut St. S. E.
OSCAR C. BURKHARD, M.A., Assistant Professor of German
610 13th Ave. S. E.
FRANK H. CONSTANT, C.E., Professor of Structural Engineering
615 6th St. S. E.
ALVIN S. CUTLER, C.E., Assistant Professor of Railway Engineering
717 E. River Road
HANS H. DALAKER, B.A., Assistant Professor of Mathematics
523 Walnut St. S. E.
HENRY T. EDDY, C.E., Ph.D., LL.D., D.Sc., Professor of Mathematics
and Mechanics, Emeritus 916 6th St. S. E.
HENRY A. ERIKSON, B.E.E., Ph.D., Assistant 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.
HENRY J. FLETCHER, LL.M., Professor of Law 317 17th Ave. S. E.
GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry
525 E. River Road
JULES T. FRELIN, B.A., Assistant Professor of French
113 Church St. S. E.
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
1316 7th St. S. E.
ARTHUR EDWIN HAYNES, M.S., M.Ph., Sc.D., Professor, Retired
703 E. River Road

- HANS JUERGENSEN, M.A., Assistant Professor of German
1612 11th Ave. S.
- WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
118 State St. S. E.
- WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive
Geometry 217 Beacon St. S. E.
- ALOIS F. KOVARIK, Ph.D., Assistant Professor of Physics
1105 6th St. S. E.
- FRANCIS P. LEAVENWORTH, M.A., Professor of Astronomy
317 17th Ave. S. E.
- JOHN V. MARTENIS, M.E., Assistant Professor of Mechanical Engineering
217 Harvard St. S. E.
- JOHN G. MOORE, B.A., Professor of German 2810 University Ave. S. E.
- BURT L. NEWKIRK, Ph.D., Assistant Professor of Mathematics and
Mechanics 215 Harvard St. S. E.
- CHARLES W. NICHOLS, M.A., Assistant Professor of Rhetoric
220 Harvard St. S. E.
- EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
914 7th St. S. E.
- EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
827 7th St. S. E.
- WILLIAM T. RYAN, E.E., Assistant Professor of Electrical Engineering
3228 4th St. S. E.
- FREDERICK W. SARDESON, Ph.D., Assistant Professor of Geology
414 Harvard St. S. E.
- WILLIAM A. SCHAPER, M.A., Ph.D., Professor of Political Science
625 Fulton St. S. E.
- FRANCIS C. SHENEHON, C.E., Professor of Civil Engineering Minneapolis
- GEORGE D. SHEPARDSON, M.A., M.E., D.Sc., Professor of Electrical
Engineering 717 E. River Road
- S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construc-
tion 1517 E. River Road
- CHARLES F. SHOOP, B.S., Assistant Professor of Experimental Engineer-
ing 108 Beacon 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
316 12th Ave. S. E.
- JOSEPH M. THOMAS, Ph.D., Professor of Rhetoric 623 14th Ave. S. E.
- JAMES B. WOOLNOUGH, U.S.A., Professor of Military Science
Minneapolis
- ANTHONY ZELENY, M.S., Ph.D., Professor of Physics
613 Fulton St. S. E.
- JOHN ZELENY, B.A., Ph.D., Professor of Physics 712 10th Ave. S. E.
- OTTO S. ZELNER, B.S., Assistant Professor of Surveying
729 Fulton St. S. E.

INSTRUCTORS

- EDWARD P. BURCH, E.E., Lecturer in Electric Railway Engineering
1729 James Ave. S.
- ROBERT W. FRENCH, B.S., Instructor in Drawing 1035 13th Ave. S. E.
- EDWIN H. HEWITT, Lecturer in Architecture 126 Franklin Ave. E.
- WILLIAM F. HOLMAN, Ph.D., Instructor in Mathematics
722 E. 24th St.
- FRANKLIN R. McMILLAN, C.E., Instructor in Experimental Engineering
321 Oak St. S. E.
- WALLACE H. MARTIN, M.E., Instructor in Mechanical Engineering
1030 14th Ave. S. E.
- CARL M. MELOM, M.A., Instructor in French and Spanish
112 Arthur Ave. S. E.
- JOHN I. PARCEL, B.S., Instructor in Structural Engineering
1316 7th St. S. E.
- PETER PETERSON, Instructor in Foundry Practice 3709 Clinton Ave.
- GEORGE C. PRIESTER, B.E., Instructor in Mathematics
1024 15th Ave. S. E.
- LOUIS W. MCKEEHAN, Ph.D., Instructor in Physics Minneapolis
- WARREN T. POWELL, M.A., Instructor in Rhetoric 517 Essex St. S. E.
- EDWARD QUIGLEY, Instructor in Forge Work 2442 15th Ave. S.
- 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.
- FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing and Descriptive
Geometry 414 Oak St. S. E.
- H. M. TURNER, Instructor in Electrical Engineering Minneapolis
- HENRY J. UBRICH, Instructor in Carpentry 602 Buchanan St. N. E.
- RICHARD WISCHKAEMPER, M.A., Instructor in German
504 Beacon St. S. E.

ASSISTANTS

- HARRY W. DIXON, Engineer, Assistant in Power Plant Operation
1800 4th St. S. E.
- PAUL E. KLOPSTEG, B.S., Assistant in Physics 410 17th Ave. S. E.

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, 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.

The four-year course leading to the Bachelor's Degree of Engineering is an excellent preparation for a business career. The course deals with Mathematics, Mechanics, Physics, and includes work in Rhetoric, modern language, and Economics, and contains those elements which will serve well the purpose 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.

ADMISSION

Admission to the College of Engineering for the year 1912-13 may be in accordance with the requirements as announced in the Bulletin of 1911-12, referred to as the old plan, or may be in accordance with the new entrance requirements shown on pages 16 to 20 inclusive.

OLD PLAN OF ADMISSION

Fifteen year-credits of high school work, chosen from the following lists, are required for admission to this College. The first six subjects, amounting to eight year-credits, are required of all students except as noted below. Of the remaining seven year-credits at least two year-credits must be chosen from one of the language groups.

A year-credit is granted on the basis of a recitation period of at least forty minutes, five times per week, for not less than thirty-six weeks. In the case of drawing, shop work, and laboratory practice five recitation periods of at least eighty minutes must be devoted to the work or only a half-credit will be granted.

Two half year-credits are equivalent to one year-credit.

GROUP I

Eight Year-Credits Required:

Elementary Algebra, one credit
Higher Algebra, one-half credit
Plane Geometry, one credit
Solid Geometry, one-half credit
*English, four credits
Chemistry, one credit

GROUP II

Seven Year-Credits Required from This Group, of Which at Least Two Year-Credits Shall be Chosen from One of the Language Groups

Latin—

Grammar, one credit
Caesar, four books, one credit
Cicero, six orations, one credit
Virgil, six books, one credit

Greek—

Grammar, one credit
Anabasis, four books, one credit

*Three credits will satisfy the English requirement when the applicant presents four credits in language. In this case eight credits shall be chosen from Group II.

German—

- Grammar, one credit
- Literature, one to three credits

French—

- Grammar, one credit
- Literature, one to three credits

Spanish—

- Grammar, one credit
- Literature, one credit

Scandinavian Languages—

- Grammar, one credit
- Literature, one credit

History—

- Ancient, to Charlemagne, one credit
- Modern, from Charlemagne, one credit
- English, one-half credit
- Senior American, one-half credit

American Government, one-half credit

Elementary Economics, one-half credit

History of Commerce, one-half credit

Commercial Geography, one-half or one credit

Physics, one credit

Botany, one-half or one credit

Zoology, one-half or one credit

Astronomy, one-half credit

Geology, one-half credit

Physiography, one-half credit

Drawing, one-half or one credit

Shop Work, one-half or one credit

Admission is by certificate or by examination, except for the mathematical requirement as stated on page 15. Whenever admission is by examination, the candidate must pass examinations for the credits from Group I, required for entrance to this College, and in addition enough credits from the list of electives in Group II, to make a total of fifteen year-credits; provided that if the total of entrance conditions does not exceed one year-credit, the applicant shall be admitted conditionally, and be given one year in which to make up the entrance conditions.

Graduates of Minnesota State High Schools; of Advanced Courses of Minnesota Normal Schools; of Minnesota High Schools or Academies not under the supervision of the State High School Board, but which are accredited by the Faculty of the University, will be admitted without examination in the remaining subjects for entrance, provided,

(a) That the school maintain a full four-year course.

(b) That the applicant present to the Registrar the principal's certificate on the blank form provided by the University (see following page), showing that at least fourteen of the required fifteen year subjects

have been passed with credit*. Such deficiency, when not a mathematical subject, is charged against the student as an entrance condition which must be removed before he enters the sophomore class.

Graduates of such schools, whose principal's certificate shows them to be deficient in not more than one and one-half year-credits and who have made such additional preparation in one or more of these subjects as they deem necessary, may take the regular entrance examinations in such subjects to reduce their deficiency to one year-credit or less. But graduates whose principal's certificate shows them to be deficient in more than one and one-half year credits, even though they have made such additional preparation as they deem necessary, must take the regular entrance examinations in all subjects.

Graduates from schools in any other state, accredited to the state university of that state, will be admitted on the same terms as graduates of Minnesota State High Schools.

Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates, which will be accepted in lieu of an examination in the subjects which they represent.

Students bringing records from accredited schools are required to present them on the blank form provided for the purpose by the University. Blank forms may be obtained from the Registrar. No other form of certificate will be accepted. Students who do not bring their certificates on the proper form of blank will not be allowed to register until they have secured the certificate on the required form.

Any Minnesota High School or Academy, not under supervision of the State High School Board, but requiring for graduation a four-year course, exclusive of the common school branches, conforming essentially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and after favorable recommendation, may be accredited by the Faculty in all respects as are the State High Schools, provided,

- (1) That the school be open to inspection at any time by the University.
- (2) That it take such supplementary examinations as may be prescribed from time to time.

ENTRANCE EXAMINATIONS

Every applicant for admission to the freshman class must either

- (a) Present State High School Board certificates for each of the mathematical subjects, or
- (b) Take the entrance examinations in said subjects at the University, provided, however, that students who shall have completed all the required Mathematics during the three years immediately preceding matriculation in this College, shall be admitted without examination in such

*A mark of "passed" is accepted for work done prior to September, 1912.

mathematical subjects as show a standing of at least good (or 80%). This shall apply also to students who shall have completed a full four years' course in Mathematics during the four years immediately preceding their matriculation.

Beginning with September, 1913, the certificate for either Higher Algebra or Solid Geometry must be dated within one year of the time of presentation at the University, and the other must be dated within two years of such time.

Applicants failing to obtain credit in all of the mathematical subjects required will not be accepted.

Students proposing to enter this college should be thoroughly prepared in Mathematics, because the successful prosecution of the work depends largely upon preliminary training in this subject.

TIME AND PLACE OF EXAMINATION

Entrance examinations are held only at the beginning of the college year, Tuesday, September 10th. Applicants should present themselves to the Registrar who will furnish them with application blanks and direct them how to proceed with these examinations and registration. Students prevented from entering at the beginning of the year may be admitted at a subsequent date when circumstances are such as to justify this action. Such students are at a great disadvantage, and all students expecting to enter the University are urged to be present at the beginning of the year. See page 6 for program of examinations.

ENTRANCE CONDITIONS

No applicant who is deficient in more than one year-credit is eligible for admission. Any deficiency becomes an entrance condition and must be made up before the student passes into the sophomore class. But no applicant having an entrance condition in Mathematics will be accepted.

Students are strongly advised to be thoroughly prepared so as to avoid entrance conditions. The work of the freshman year is arduous, requiring the full time and energy of the students to get the greatest benefit from it.

NEW PLAN OF ADMISSION

Admission is either by certificate or by examination. In either case candidates must present:

- (1) Three years of English.
- (2) Three years of Mathematics.
- (3) One year of Chemistry.

4. A minor series chosen from one of the groups B, C, and E. (The required Chemistry may be included in a science series.) To form a language series at least two units of the same language must be offered.

5. Enough additional work to make in all fifteen units of which not more than three may be in Group F, with the provision that not more than one unit will be accepted in each of the subjects, Freehand Drawing, Mechanical Drawing, and Shop Work; not more than two units in Agriculture, and not less than two units in Stenography and Typewriting if that subject be offered.

Students who have not either completed the required Mathematics with a grade of *Pass with Credit* during the three years immediately preceding matriculation, or completed a four years' course in Mathematics with like standing immediately preceding matriculation, and those who do not hold High School Board or College Entrance Examination Board certificates of proper date in the mathematical subjects required, must take entrance examinations in those subjects at the University. The certificate for either Higher Algebra or Solid Geometry must be dated within one year prior to admission to the University, and the other must be dated within two years of such time.

No candidate will be admitted with less than fifteen units of the required grade. The Enrollment Committee 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.

Certificates from the College Entrance Examination Board and from the State High School Board are accepted under either plan of admission as satisfying the scholarship requirement.

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 qualifications to continue the second semester's work.

1. ADMISSION TO THE FRESHMAN CLASS BY EXAMINATION

Entrance examinations are offered at the University during the opening week of the University year. Candidates must pass examinations in all subjects specified above, except such as may be covered by College Entrance Examination Board or State High School Board certificates.

2. ADMISSION TO THE FRESHMAN CLASS BY CERTIFICATE

The following are admitted to the freshman class by certificate:

(a) Graduates of a four-year course of a Minnesota State High School or other accredited school in Minnesota, provided they meet the general requirements stated above, and the following special requirements as to grades.

(1) The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted toward graduation. All records shall be entered on this certificate as *passed*, *passed with credit*, or *passed with honor*.*

To facilitate the operation of this rule, each accredited school is expected to keep its record of standings in these three grades or else show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these grades.

(2) Candidates for admission on certificate must have an average record in the subjects counted for admission of *pass with credit*. For the purpose of this average a *pass* is offset by a *pass with honor*. Candidates are therefore admitted provided they have at least as many semester marks of *pass with honor* as they have semester marks of *pass*.

Candidates entering on certificate shall not be examined for admission on subjects which are lacking or below the required grade, except on presentation to the Enrollment Committee of satisfactory evidence that they have done adequate special work in preparation for the examination. A certificate from the principal of the last school attended, or other person approved by the Enrollment Committee, shall constitute satisfactory evidence; and adequate special preparation shall consist of not less than thirty 60-minute hours under competent instruction on each semester subject presented for examination. (See (c), last paragraph.)

(b) Graduates of the Advanced Latin and Advanced English courses of the Minnesota State Normal Schools.

(c) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state, provided such candidates satisfy all the requirements as to major and minor series, subjects, and grades demanded of the graduates of Minnesota High Schools. (See 2 (a) above.)

In case the records of any candidate from another state cannot be translated into the grades used in this state, the Enrollment Committee shall order examinations in English and also in three other subjects chosen from three different admission groups. The results of such examinations shall be final.

The examinations authorized under 2 (a) and 2 (c) shall be held at the same time and according to the same schedule as the regular entrance examinations mentioned under 1.

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.

*In per cent, these three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, *passed*=65-75, *passed with credit*=75-90, *passed with honor*=90-100.

(2) In schools having 75 as a passing mark, *passed*=75-80, *passed with credit*=80-90, *passed with honor*=90-100.

Group A: English

English, 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: Foreign Languages

Latin—

Grammar, one unit
 Caesar, 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

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 three units may be offered from the following list of vocational subjects.

Business Subjects—

Business Law, one-half unit

Advanced Bookkeeping, one unit

Business Arithmetic, one-half unit

Elementary Bookkeeping, one unit

Manual Subjects—

Freehand Drawing, one unit

Mechanical Drawing, one unit

Stenography and Typewriting, two units

Shop Work, one unit

Modeling and Wood Carving, one unit

Agriculture—

One to two 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.

MANUAL TRAINING

Credit in Shop Work and Drawing will be given for work in manual training courses, or for practical experience; provided the applicant can give evidence of proficiency, and ability 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.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

A description of subjects accepted for admission to the University will be found in the Bulletin of General Information which will be sent to any address upon application to the Registrar, The University of Minnesota, Minneapolis.

ADVANCED STANDING

The University may accept records from other colleges for credit to advanced standing. Such records are acceptable as far as they are equivalent to the work done in this University and satisfactory to the department concerned, but are subject to subsequent maintenance of standing. Certificates from other institutions must be on the official blanks of such institution and should show:

1. The subject studied and the ground covered.
2. The time spent upon each subject.
3. In case of laboratory subjects a concise statement of work done.
4. The result. It is sufficient to state that the subject was creditably completed.

Students desiring advanced standing must present their applications and certificates to the Enrollment Committee for the approval of the departments concerned in the credit to be given.

UNCLASSIFIED STUDENTS

Unclassified students are permitted 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 present preparation sufficient to admit them to the freshman class. Persons of mature years who shall give satisfactory evidence of ability to do with credit the work applied for, may be admitted by vote of the Faculty.

REGISTRATION

Students having matriculated in previous years are required to indicate registration on proper blank not later than September 3d. Fees must be paid in full on or before September 10th.

For the second semester, registration must be indicated on or before January 21st and fees must be paid on or before January 28th.

A penalty fee of one dollar must be paid by all students who register or pay fees after the prescribed time. After the day previous to that on which classes begin the penalty for delay increases at the rate of twenty-five cents per day. The Registrar will send proper blanks to all students who were in college the previous year, on or before August 20th. Students who fail to receive blanks at that date should call for them.

The registration of new students consists of three parts and should be carried out in the following order.

1st. Present credentials on proper blank to the Registrar. This should be done prior to August 1st.

2d. Pass such entrance examinations as may be required.

3d. Present registration blank, matriculation and address cards at the Registrar's office at the appointed time, and secure statement of fees.

4th. Pay the Cashier the amount indicated within the time set in the calendar.

No one is recognized as a student of the College or admitted to classes, until his class cards, countersigned by the Registrar, have been received by the instructors; this applies to both semesters.

DEGREES

Students completing a course of study to the satisfaction of the Faculty of the College are entitled to receive a degree.

Five-year courses of study leading to the degree of Bachelor of Science in Engineering and Architecture and to the degrees of Civil, Mechanical, Electrical, and Architectural Engineer and Architect are offered. The degree of Bachelor of Science in Engineering, or Architecture is 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.

Any person may undergo, at suitable times, 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 must be spent at the University before such degree shall be granted; and provided the examination in every case be held before a committee of the Faculty appointed for that purpose.

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 original research made by the student himself and be creditable from a literary as well as from a technical point of view.

Theses are to be written in a clear hand, or typewritten. The subject of the thesis is required to be reported to the head of the department in which the student is a candidate for a degree, and the work of preparation must be formally begun early in the year. During the second semester the student is expected to devote at least ten hours a week to the preparation of his thesis.

The subject of the thesis and 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 the thesis, because, more than any other work the undergraduate does, this certifies to his ability to undertake the difficult and responsible duties involved in the direction of engineering and industrial interests.

The thesis must be completed and put into the hands of the Faculty not later than the Friday before Commencement week.

The original drawings, tracings, negatives, etc., are to be placed in the college files. Clear prints therefrom are to accompany the manuscript. The thesis shall be upon a good quality of paper, $8\frac{1}{2}$ by 11 inches, with a margin $1\frac{1}{2}$ inches at the left for binding and a margin of about $1\frac{1}{4}$ inches on the other sides; it shall be bound in black cloth and leather and deposited in the college library.

FACULTY REGULATIONS

Registration for Work.—Students will not receive credit for work done in classes for which they have not been registered.

Examination for Credit.—Students who make up work out of class and wish to take examinations to gain credit in their University course, shall apply to the Faculty for permission to take the examinations.

Reports.—At the end of each semester each student shall receive a mark in each subject for which he is registered. The several marks shall be as follows: A, pass with honor; B, pass with credit; P, pass; C, conditioned; F, failed.

Subjects to be Repeated.—Any student in the College of Engineering whose average for the year is below passing grade may be required on re-entering the University to pursue again all the subjects of the year in which he has not passed with credit.

Conditions and Failures.—Students who receive a condition or failure in the work of either semester so as to make it impossible for them to continue the same line of work in the following semester, will not be allowed to elect an advanced subject in place of the one omitted, but may be required to devote their full time to the remaining subjects of the course. However, those students who attain an average grade of B in the remaining subjects pursued may elect an advanced subject in the place of the one omitted.

No student will be allowed to omit any freshman work in order to make up entrance conditions.

No student with an entrance condition will be allowed to register for any sophomore subject, nor will any student with a freshman condition or failure be allowed to register for a junior subject, nor will any student with a sophomore condition or failure be allowed to register for any senior subject.

A condition not made up before the subject is offered again becomes a failure subject to rules governing failures.

Students conditioned in the work of the first semester are given an opportunity to remove their conditions after the Easter recess and at the beginning of the first semester of the following year. Students conditioned in the work of the second semester are given an opportunity to remove their conditions at the beginning or end of the first semester of the following year at the date regularly set in the program for such examinations. No such subject which requires as a prerequisite work in which a student is conditioned, may be taken until the condition is removed. If a student fails to remove a condition at the first examination, he will not be allowed to try the following examination, but shall be required to take the work over in class. Failures must be taken over again in class.

Dropped from Rolls.—Any student receiving conditions or failures in more than fifty per cent of his work in the first semester shall be dropped from the rolls, and will not be allowed to re-enter the University until the opening of the following year.

GENERAL INFORMATION

FEEES

The annual incidental fee for students in this College, resident or non-resident, is fifty dollars (\$50.00). It includes all charges for matriculation and laboratory or shop work courses. One-half the incidental fee is payable at the opening of each semester.

In addition to the first semester incidental fee, a deposit fee of five dollars (\$5.00) is required to cover the following items:

Change of registration	\$2.50
Examination for removal of condition, at set time	1.00 per subject
Rental of post-office box, University post-office	.50 per year
Locker rental	.50 to 1.00 "
Penalties for late registration or late payment of fees.	

A penalty fee of one dollar must be paid by all students who register or pay fees after the prescribed time. (See calendar page 5.) 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 the year. This fee is to be deposited with the University cashier at the beginning of each year when the student registers. 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.

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

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, about	15.00

LIVING EXPENSES

Several years ago a number of young men kept careful account of their expenses for the University year. The result was that the expenses of the young men ranged from \$217.00 to \$397.00. The same students earned sums varying from \$237.00 to \$272.00. These figures do not include fees, and as the cost of living has increased decidedly, probably 25 per cent should be added to make them safe.

Board ranges from \$3.00 per week to as high as the student can afford to pay. In private families board ranges from \$4.00 to \$5.00. Furnished rooms vary in price from \$8.00 to \$20 per month.

STUDENT ORGANIZATIONS

The Engineers' Society meets once in two weeks to listen to addresses by prominent engineers and to discuss various engineering topics. *The Minnesota Engineer* is published quarterly by this society. It is devoted to the publication of articles upon engineering subjects by students, professors, and others.

SCHOLARSHIPS

It is the policy of the University to establish scholarships in the different departments, where extra help is needed, under regulations somewhat as follows:

1. The appointments are made by the Executive Committee of the Board of Regents, upon the recommendation of the department in which the appointment is desired after approval by the Faculty.
2. Recipients of scholarships may be either graduates or undergraduate students.
3. The scholarships are not intended as gifts or benefactions from the State to the recipients, but as provisions under which services may be rendered the University.
4. It is understood that these services are of a nature which shall assist the holder of a scholarship to attain the mastery of some line of work in the department to which he is appointed.

THE MINNEAPOLIS STEEL AND MACHINERY COMPANY
SCHOLARSHIP

Beginning with the College year 1912-13, the Minneapolis Steel and Machinery Company has created a scholarship of \$500 to be expended upon work in the laboratories of the College by a graduate student. The subject upon which work will be carried on is to be determined by agreement between the Company and the College of Engineering.

THE BRIGGS PRIZE IN FOUNDRY PRACTICE

For the encouragement of students in foundry practice, Mr. O. P. Briggs, Commissioner of the National Foundrymen's Association, Detroit, Mich., offers \$75 annually, in two prizes, which are to be accompanied by gold medals. The competition is open to sophomores in the College of Engineering, and the prize will be awarded for the best essays relative to the above subject. 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 1st.

THE GEORGE C. ANDREWS PRIZE

Mr. George C. Andrews, M.E. '87, has offered an annual prize to the senior mechanical engineers for the best essay on any subject connected with heating and ventilation. The first prize in this contest will consist of \$50.00 in cash accompanied by a suitable medal; a second prize will also be given which will consist of \$25.00 in cash accompanied by a medal. The winner of the first prize will be offered a position with the George C. Andrews Heating Company.

BUILDINGS AND EQUIPMENT

The College of Engineering and the Mechanic Arts has full advantage of the resources of the University as a whole. In addition to the University library, laboratories, lecture rooms, and gymnasium, in which the students of this College have full privilege, four buildings are devoted to the work of the College. The Departments of Civil Engineering, Architecture, Mathematics, and Drawing occupy the beautiful new Main Engineering Building completed in September, 1912. The Mechanical Engineering Department has an entire building devoted to its special work, and the Electrical Department, together with the University Light and Power Plant, occupies a third building. The new Experimental Building was completed and first occupied in September, 1911. This beautiful and useful building was erected at a cost approximating \$125,000, and ranks as one of the most adequate buildings of its kind in the country. It will be devoted to the work of the Department of Experimental Engineering, which forms a part of all courses in this College.

The main Engineering Building supersedes the old Mechanic Arts Building, so far as the Departments of Civil Engineering, Architecture, Mathematics, and Drawing are concerned. Architecturally it is a fine specimen of the Italian Renaissance, and forms one of the group of new buildings of the Cass Gilbert plans of the Greater Campus. In addition to many spacious, light, and well-ventilated recitation, lecture, and drafting rooms, it contains an auditorium with a seating capacity of four hundred persons, a central engineering library, special welfare rooms for the comfort and convenience of students and for the Engineering Society. A shower bath room is provided for students who exert themselves in work or athletics. The administration offices will be in this building.

For information concerning the method of work and equipment of the College, the following condensed statements are offered.

LIBRARIES AND READING ROOMS

The new central engineering library will in a measure supersede the older scheme of departmental libraries. The new central library will be open from eight o'clock in the morning until ten o'clock at night, and will be under the care of a competent librarian. The library occupies a whole wing, 40x70 feet in ground plan, of the new Main Engineering Building. A basement will eventually be given over to book stacks with a capacity of 40,000 volumes. The main floor of the library is planned in accordance with the alcove system with a capacity of 10,000 books. It is lighted from side windows and from overhead as well. On the level of the second floor a balcony extends on all four sides of the room. Book space on the balcony is provided against the four outer walls. A reading ledge circles the balcony, and overlooks the main reading room.

The library will be supplied with technical books relating to all branches of engineering and to architecture. The reading room will be well supplied with the technical periodical literature of interest to students and engineers. All graduates in engineering of the University, and all engineers of the State of Minnesota or elsewhere are invited to make free use of the library facilities. It is intended as an asset of the profession of engineering and architecture, as well as an instrument of the students and Faculty.

Departmental libraries will be continued on a small scale, containing only such volumes as are urgently needed close at hand as reference books.

In addition to the above are the libraries of the University, the city of Minneapolis, the city of St. Paul, and others, containing many works of value to the engineering profession. Standard works bearing on special subjects are purchased as they appear and the more important scientific and technical periodicals are secured and placed in the reading rooms maintained in connection with the several departments of the college.

Journal clubs are organized, in most of the departments, for the discussion of current technical literature, relating to the best modern practice. The students are kept in touch with the developments along engineering lines and are taught how to use the technical press.

In addition to the foregoing, the College has many periodicals donated by the societies publishing them, and others loaned by members of the Faculty, who place their periodicals and professional libraries at the disposition of the students.

THE UNIVERSITY LIGHT AND POWER PLANT

The light and power plant was designed for the purpose of instruction and also for furnishing electric light and power to the various buildings, shops, and laboratories of the University. The plant is characterized by the variety of its equipment, as well as by its value in developing power economically.

The boiler plant contains a 130-h.p. Cahall (B. & W. type) water tube boiler designed to carry a working pressure of 250 pounds; a 60x16 foot multitubular boiler which carries 175 pounds pressure; a Sorge-Cochrane purifier of 300-h.p. capacity; and a large Sturtevant fan and direct-connected engine, to be used for overloads and for experiments with mechanical drafts.

In addition to this apparatus a three-stage Foster super-heater has recently been installed. This is arranged to superheat simultaneously 3,500 pounds of steam at 175 pounds pressure to 80 degrees of superheat, an equal quantity of high pressure cylinder exhaust at 20 pounds pressure to 60 degrees, and 4,500 pounds turbine steam at 175 pounds pressure to 250 degrees of superheat. The piping from super-heater to the various engines has been designed to permit of great flexibility which affords a

wide scope for experimental work, as well as allowing different methods in their operation best suited to the conditions.

In the engine room there is an Allfree automatic expansion 75-h.p. engine, connected by belting to a jack shaft equipped with roller bearings. There is also a 150-h.p. cross-compound Corliss engine especially designed for the Mechanical Engineering Department. This engine is provided with a Wheeler surface-condenser, and is arranged so that it may be run simple or compound, condensing or non-condensing, as desired. It thus constitutes a valuable part of the equipment for experimental work.

The engine room also contains a 150-h.p. DeLaval steam turbine direct connected to 100 kw. electric generator. This steam turbine is equipped with a double set of nozzles and is connected with a jet condenser, so that it may be run condensing or non-condensing as desired.

A 100-h.p. gas producer located in an annex to the boiler room has recently been installed and furnishes gas for the operation of a 65-h.p. Munzell two-cylinder gas engine direct connected to a 35-kw. generator.

The University electric light and power circuits are maintained at 114 and 228 volts, the principal supply being direct current from the University plant, supplemented by alternating current from transformers connected with the circuits of the Minneapolis General Electric Company. Equality of pressure on the two sides of the system is maintained independently or jointly by the various supply units, including: a twin Sprague 125-125-volt 100-kilowatt turbo-generator, a Westinghouse 250-volt 40-kilowatt belt-driven generator with auxiliary slip rings and balancing coils, a pair of Electric Machinery 125-volt 40-kilowatt belt-driven generators, a 250-volt 30-kilowatt Electric Machinery generator directly connected to a gas engine and having a motor-generator balancing set, a double 320-ampere hour chloride storage battery with end cells and motor-driven double booster set, and two 30-kilowatt 2300 230-115-volt transformers. Two switchboards of six and seven panels respectively provide for convenient control of the various supply and distributing circuits.

CIVIL ENGINEERING

Municipal and Sanitary Engineering

For this work is provided the usual equipment for giving instruction in classroom, laboratory, and field, including a collection of drawings, photographs, and models. The Engineering Department of the State Board of Health furnishes records of existing practice in Minnesota, thus providing a means of comparing progress in Minnesota and elsewhere; facilities are also offered for the prosecution of experimental work in sanitary lines under the direction of this board. Arrangements have been made with the Engineering Department of the State Highway Commission for co-operative work.

The special course in Municipal Engineering now offered has been replaced by a sequence in optional subjects in the new five-year course.

Railway Engineering

The aim of this work is to give the student a thorough working knowledge of railroad practice, especial emphasis being laid upon the execution of practical problems, both in the field and drafting room. The department is fully equipped with the instruments necessary for carrying on an extended railroad survey.

Structural Engineering

This is assisted by a collection of drawings of representative structures; photographs of prominent bridges, buildings, and roofs, in this country and abroad; a well-selected library of the best books and specifications upon structural engineering; slide rules and calculating instruments for rapid and accurate computations; and such other instruments as will facilitate the work of design.

Laboratories.—Students in Civil Engineering have access to the laboratories and shops of the several departments in which their work lies. The new Experimental Engineering Building offers excellent facilities for experimental work with cement and its products. In this connection there is a large Olsen testing machine of two hundred thousand pounds capacity, with automatic and autographic attachments, extension head for columns ten feet long, and transverse arms for twenty-foot beams. Additional space and equipment are provided for experimental and research work.

Library.—The Civil Engineering library has been merged in the general library of the College and does not exist as a separate departmental library.

Inspection Tours.—The professional work in Civil Engineering is illustrated in a practical manner by frequent class visits to the many engineering works and plants in the vicinity of Minneapolis and St. Paul.

MECHANICAL ENGINEERING

The plan of instruction in this course is intended to give the student a thorough training in mathematics and the physical sciences, and in the fundamental principles of engineering.

The work is planned to make him familiar with the various applications of these principles, and with the practical details of machine construction and design.

In the machine shops a three-ton crane, with a clear span of twelve feet, runs the entire length of the shop, thus giving ample space for erecting. This crane also serves some of the larger machine tools.

The foundry has been the subject of especial study and possesses many features of interest and value. In accordance with the best modern practice for light work the floor is of concrete, and the gangways, leading from the cupola and extending lengthwise of the room, are of heavy iron plates set in cement.

A light traveling crane is also provided for the foundry. This has a span of eighteen feet, and runs the entire length of the room.

The lighting, heating, and ventilation of the building have received careful consideration. In the machine and pattern shops sixty per cent of the wall space above the benches is glass. In the foundry and forge shop less light is allowed, since an abundant supply of overhead light is obtained from windows placed in the lantern ventilator which extends over the roof. Pipe coils are employed in heating the building and these are placed partly on the side walls under the windows and partly overhead. Electric power is used for driving the machinery. The group system has been selected as the best adapted to the conditions, and a number of small motors are placed in the several departments; 220-volt continuous current motors are employed in connection with a three-wire system of distribution, which is also used in the lighting circuit.

The machine shop contains representatives of the ordinary machine tools, gauges, and small tools usually found in a well-equipped modern plant.

The shop for pattern making and general wood work contains benches with vises and tools, lathes and lathe tools, an improved universal sawing machine, band saws, planer, jointer and other power tools, and all hand tools used in carpentry and pattern making.

The forge shop is equipped with stationary and portable forges, a blower and exhaust fan arranged on the down-draft system, a one-hundred-pound drop hammer, and the necessary small tools used in blacksmithing.

The foundry contains a thirty-inch Whiting cupola, and two brass furnaces, which embody some novel features. There are two core ovens; one for ordinary work $3\frac{1}{2} \times 3\frac{1}{2} \times 5$ feet, and one $3\frac{1}{2} \times 7 \times 6$ feet for special cores which may be required. The feature of these core ovens is that the gases and products of combustion are caused to traverse suitable conduits under a plate floor and do not come into direct contact with the cores. The usual moulding tools, ladles, crucibles, and all of the tools and materials needed in moulding and casting iron, brass, or white metal are provided.

The shop work is intended, not so much to give the student skill in the manual operations of the respective crafts, as a knowledge of the methods and processes of practical construction.

The new engineering power plant is admirably equipped with apparatus which constitutes a valuable part of the equipment.

The departmental library contains such books as are needed close at hand. The general library of the College contains a collection of historic and recent works, the best standard books being purchased as soon as issued. There are a number of complete files of the transactions of engineering societies and of the leading technical publications. The library is amply supplied with both general mechanical and railway press.

Railway Mechanical Engineering.—Courses have been arranged for students wishing to specialize in this subject. The various courses may be elected separately, subject to the requirements for previous preparation, to fill out the electives or options in the post senior year of any department.

Students planning to elect these courses are encouraged to work, under special arrangements, in railway shops during the summer vacations. This has proved its value as preparatory to the special work of the senior year. In every possible way the methods of the department are intended to place the students in touch with the best railway work, keeping always in sight the limitations which railway experience has found financially and practically to exist.

The location of the University is particularly favorable, being between the cities of St. Paul and Minneapolis in proximity to the shops, yards, and headquarters of the extensive railway systems of the Northwest, which offer exceptional facilities for the prosecution of this work.

Visits of Inspection.—During the year numerous visits are made to the manufacturing plants of St. Paul and Minneapolis, which have proved to be of great value in supplementing the classroom work.

ELECTRICAL ENGINEERING

The Electrical Engineering Department and the University Electric Light and Power Plant are housed in a brick building of slow-burning mill construction. The part of the building devoted exclusively to the work of electrical instruction is 80 feet long by 60 feet wide with two stories and basement. In the basement are electro-chemical laboratory, research rooms, shop, battery room, toilet and stock rooms. On the first floor are the dynamo laboratory, instrument rooms, and offices. On the second floor are laboratories for photometry, photography, meter and lamp testing; and rooms for recitations, drafting, library and office.

The laboratory equipment includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant potential and constant current, direct current generators and motors, single phase and polyphase alternators, commutating, induction, and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, and brakes afford convenient and ample means for taking up the energy of dynamos and motors. To facilitate testing, there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines. Power is obtainable from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of the Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 115-230 volts. An excellent assortment of instruments of well-known American and foreign makers is available for laboratory use. A well-equipped standardizing laboratory furnished with certified standards for current, electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a variety of arc and incandescent

lamps and meters with necessary standards and other accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes. Alternators, rotary converters, transformers, lamps, condensers, oscillographs, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers, and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation. There is a variety of apparatus for special investigations. An electric car contributed by the Minneapolis Street Railway Company will be installed over a suitable testing pit and will provide facilities for investigating and demonstrating certain traction problems. This car is the beginning of an electric railway museum.

The departmental library consists of such reference books as are needed close at hand. The engineering library of the College contains a large collection of books pertaining to all branches of engineering, including an excellent collection of electrical and allied works, a full set of United States Patent Office Gazettes and a partial set of the Specifications. New books and trade publications are being added continually. Files of twenty-two journals are nearly completed and others are being collected and bound. These, with the files in the general library of the University, offer excellent facilities for research work. Free access is given to the private libraries and collections of the professors.

The reading room of the General Engineering Library receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests. A journal club meets for the discussion of current literature in mechanical and electrical engineering, keeping the students in touch with current progress and best modern practice, and teaching them the value of the technical press.

The department museum contains a valuable and growing collection of historical electrical machines, instruments, lamps, wiring, and other devices showing important steps in the development of modern practice. The collection of samples furnished by various manufacturers and dealers is a great help in exhibiting best modern practice and in teaching young engineers to appreciate the merits of different products. Samples from repair shops and elsewhere are of special value in illustrating the treatment received by apparatus in commercial use and the necessity of careful design and construction.

The course of instruction aims to give the students a knowledge of phenomena and principles and the various applications of electricity, the methods and instruments used in measuring and transforming it, and practice in the design and operation of electrical apparatus. Practice and theory are taken together as far as possible. During the senior and post-senior years, students have daily work with electrical instruments and apparatus, and with commercial problems. Occasional inspection tours among the extensive and varied electrical interests in Minneapolis and St. Paul furnish excellent illustration.

The plants of the Minneapolis General Electric Company, the St.

Paul Gas Light Company, and the Twin City Rapid Transit Company, with transmission lines at 13,200, 25,000, and 50,000 volts, offer instructive illustrations of early and recent practice in transmission and distribution, while the plants of the Northwestern Telephone Exchange Company and of the Tri-State Telephone Company are available for observation of telephonic practice.

The University Electric Light and Power Plant, which is in the same building, affords opportunity to observe commercial conditions at close range.

All students in Electrical Engineering are strongly advised to spend their vacations in factories, repair shops, electric light and railway stations, etc., in order to obtain commercial experience, and to appreciate better the relation existing between technical training and practical work.

It is the aim to train the students to be independent and efficient workers, and to adopt the methods of professional engineers. Students are required to verify the formulas used in various calculations, and are encouraged to derive their own formulas for simplifying work in special cases. At the same time they are expected to use logarithms, slide rules, tables, curves, charts, and all legitimate means for obtaining accurate results with the least amount of drudgery.

The regular instructing force is supplemented by competent non-resident lecturers.

In the more advanced laboratory work students are encouraged to determine for themselves as independent workers the best methods and conditions for accurate results. While the laboratory work is classified, the students are treated individually and are advanced as rapidly as their attainments warrant.

In fitting up the laboratory, care is taken to secure representative types of apparatus of commercial style, in order to acquaint the students with actual practice. In putting up new lines and in setting up apparatus, the students are required to work in accordance with standard practice. Each student is given a certain amount of practice in the construction of electrical apparatus.

The electrical engineers have drawing and machine design in common with the mechanical engineers for the first four years. During the post-senior year direct and alternating current generators and motors, transformers, switch-boards, transmission lines, and electric light plants are designed. Complete working drawings and specifications must accompany some of the special problems elaborated. A large number of blue-prints, drawings, and specifications in the department library in addition to those in other departments are available.

EXPERIMENTAL ENGINEERING

The new Experimental Building was completed in September, 1911. It is of reinforced concrete, brick, stone, and steel construction, and has over 32,000 square feet of floor space. It is among the most modern and up-to-date engineering laboratories in the United States.

The main laboratory room is approximately 57 feet wide and 227 feet long, well-lighted both from the sides and overhead, and traversed for its full length by a traveling crane of ten tons capacity. Along the west side of the room a balcony extends the full length of the building with drafting and computing rooms and a museum opening from it. Located on the main floor, in addition to the large laboratory room, is a lecture room, an instrument room, a mechanician's shop, and the departmental offices.

In the well-lighted basement are rooms for cement and concrete testing, for experiments on road materials, and for special tests.

The equipment in part is as follows: three Universal testing machines of 50,000, 100,000 and 200,000 pounds capacity; several transverse and torsion testing machines for determining the strength, elasticity, ductility, and other characteristics of the various materials used in engineering work; apparatus for tests of concrete, cement, and road materials; several forms of absorption and transmission dynamometers for determining the power generated by engines or other motors, or absorbed by shafting or machinery; coal and gas calorimeters for determining the heat values of fuels; apparatus for the analysis of flue gases; machines for determining the lubricating qualities of oils, and the relative values of metals used for journals and bearings.

A 150 horse power Stirling boiler, designed for a maximum pressure of 250 pounds, and operated by induced draft furnished by a No. 6 Sirocco fan, is equipped with a Cochrane feed-water heater and purifier, Blake Pot Valve feed pump and the necessary gauges, calorimeters, tanks, scales, and pyrometers. It forms a thoroughly up-to-date experimental plant. Special attention has been given to the design of the steam and hydraulic piping, the high pressure steam piping being extra heavy with Van Stone joints used throughout. The laboratory also contains various types of steam engines equipped with condensers, indicators, brakes, scales, and thermometers to determine the efficiency in the use of steam under various conditions, and for valve setting and indicator work; several gas and gasoline engines; pulsometers, injectors, steam and power pumps; several types of impulse wheels, hydraulic rams; hydraulic tank, weirs, nozzles, meters; steam driven air compressor, air tools, drills and apparatus; refrigerating machinery, with arctic room.

Some commercial testing is done in connection with the regular work of instruction. This brings the student into actual contact with the engineering world and affords him valuable experience and data for his future work.

COURSES OF STUDY

CIVIL, MECHANICAL, AND ELECTRICAL ENGINEERING AND ARCHITECTURE*

FRESHMAN YEAR

First Semester

Mathematics 1, Algebra and Trigonometry, five credits, Messrs. Holman and Priester
Rhetoric 15, Rhetoric and Composition, four credits, Messrs. Nichols and Powell
Drawing 1, Freehand, two credits, Mr. Kirchner and Assistants
Drawing 3, Descriptive Geometry, two credits, Mr. Kirchner
Mechanical Engineering 1, Carpentry and Pattern Making, three credits, Messrs. Shipley,
Richards, and Ubrich
French 1 or 3, three credits, Mr. Benton and Assistants
or
German 1 or 4, three credits, Mr. Moore and Assistants
or
Spanish 11, three credits, Mr. Melom
Military, Drill 1, three credits, Mr. Woolnough

Second Semester

Mathematics 2, Trigonometry and Analytical Geometry, five credits, Messrs. Holman
and Priester
Rhetoric 15, Rhetoric and Composition, four credits, Messrs. Nichols and Powell
Drawing 2, Mechanical, two credits, Mr. French
Drawing 4, Descriptive Geometry, two credits, Mr. Kirchner
Mechanical Engineering 1, 2, Pattern Making and Blacksmithing, three credits, Messrs.
Shipley, Richards, and Quigley
French 1 or 3, three credits, Mr. Benton and Assistants
or
German 1 or 4, three credits, Mr. Moore and Assistants
or
Spanish 11, three credits, Mr. Melom
Military Drill 1, three credits, Mr. Woolnough

CIVIL ENGINEERING

SOPHOMORE YEAR

First Semester

Mathematics 3, Analytical Geometry, four credits, Messrs. Dalaker, Holman, and Priester
Physics 5, Mechanics of Solids and Fluids, four credits, Mr. Zeleny and Assistants
Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
Drawing 5, Drafting, three credits, Messrs. Kirchner and French
Geology 1, three credits, Mr. Sardeson
French 2 or 5, three credits, Mr. Benton and Assistants
or
German 3 or 7, three credits, Mr. Moore and Assistants
or
Spanish 12, three credits, Mr. Melom
Military Drill 1, three credits, Mr. Woolnough

*The work in Architecture in the freshman year is the same as the work for freshmen of the Engineering courses, except that Shop Work, Mechanical Engineering 1, is replaced by Architecture 1, which is rendering in pencil, ink, and color. This subject gives three credits, the same as the Shop Work.

Second Semester

Mathematics 4, Calculus, four credits, Messrs. Dalaker, Holman, and Priestner
 Physics 6, Heat, Magnetism, and Electrostatics, four credits, Mr. Zeleny and Assistants
 Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
 Drawing 6, Drafting, three credits, Messrs. Kirchner and French
 Civil Engineering 1, Surveying, three credits, Mr. Cutler and Assistants
 French 2 or 5, three credits, Mr. Benton and Assistants
 or
 German 3 or 7, three credits, Mr. Moore and Assistants
 or
 Spanish 12, three credits, Mr. Melom
 Military Drill 1, three credits, Mr. Woolnough

JUNIOR YEAR

First Semester

Mathematics and Mechanics 5, Calculus and Mechanics, three credits, Messrs. Newkirk and Dalaker
 Physics 7, Electrokinetics, four credits, Mr. Zeleny and Assistants
 Chemistry 4, Quantitative Analysis, three credits, Mr. Sidener
 Civil Engineering 2, Surveying, three credits, Mr. Cutler
 Economics 1, Elements of Economics, three credits, Messrs. Robinson, Mitchell, and Ebersole
 Drawing 7, Elements of Architecture, three credits, Mr. Kirchner

Second Semester

Mathematics and Mechanics 6, Analytical Mechanics, three credits, Messrs. Newkirk and Dalaker
 Physics 8, Sound and Light, four credits, Mr. Zeleny and Assistants
 Civil Engineering 3, Surveying, three credits, Mr. Cutler
 Astronomy 1, Elements of Astronomy, three credits, Mr. Leavenworth
 Economics 7a, Economics of Transportation, three credits, Mr. Weld
 Civil Engineering 14, Highways and Pavements, three credits, Mr. Bass
 Civil Engineering 4, Summer Camp. Four to six weeks, at close of junior year. Required. Messrs. Cutler and Zelter.

SENIOR YEAR

First Semester

Mathematics and Mechanics 7, Strength and Resistance of Materials, four credits, Messrs. Brooke and Newkirk
 Civil Engineering 20, Stresses, three credits, Messrs. Constant and Parcel
 Civil Engineering 6, Railway Engineering, two credits, Mr. Cutler
 Civil Engineering 21, Elementary Structural Design, three credits, Mr. Constant
 Political Science 16, American Government, two credits, Messrs. Schaper and Young
 Experimental Engineering 1, Materials Testing, two credits, Messrs. Kavanaugh, Shoop, and McMillan
 Elective, as approved, three credits

Second Semester

Mathematics and Mechanics 8, Hydraulics, four credits, Messrs. Brooke and Newkirk
 Civil Engineering 22, Stresses, three credits, Mr. Parcel
 Civil Engineering 7, Railway Engineering, three credits, Mr. Cutler
 Political Science 6, Engineering Law, two credits, Mr. Young
 Experimental Engineering 3, Hydraulic Laboratory, three credits, Messrs. Kavanaugh, Shoop, and McMillan
 Civil Engineering 10, Hydraulic Engineering, three credits, Mr. Bass

POST SENIOR

First Semester

Civil Engineering 23, Structural Design, five credits, Messrs. Constant and Parcel
 Civil Engineering 26, Masonry, five credits, Mr. Parcel
 Electrical Engineering 4, Electric Power, three credits, Mr. Ryan
 Experimental Engineering 8, Laboratory, three credits, Messrs. Kavanaugh, Shoop, and McMillan
 or
 Civil Engineering 8, Railway Engineering, three credits, Mr. Cutler
 or
 Civil Engineering 11, Hydraulic Engineering, four credits, Mr. Bass
 Thesis, three credits

Second Semester

Civil Engineering 12, Sanitary Engineering, two credits, Mr. Bass
 Civil Engineering, Thesis, five credits
 Electives, to be approved
 Civil Engineering 24, Structural Design, five credits, Messrs. Constant and Parcel
 Civil Engineering 25, Swing Bridges, four credits, Mr. Constant
 Civil Engineering 27, Reinforced Concrete, three credits, Mr. Constant
 Civil Engineering 9, Railway Engineering, three credits, Mr. Cutler
 Economics 7b, Railway Administration, three credits, Mr. Weld
 Civil Engineering 13, Municipal Engineering, five credits, Mr. Bass
 Chemistry 14, Water Analysis, three credits, Mr. Frankforter
 Pathology and Bacteriology 1, Bacteriology, five credits, Mr. Westbrook and Assistants
 Civil Engineering 15, Rivers, Harbors, and Canals, two credits, Mr. Shenehon
 Civil Engineering 5, Goedesy, three credits, Mr. Zelner
Required: Nineteen or twenty credits to consist of the prescribed courses, a selected group and approved electives.

MECHANICAL ENGINEERING

For freshman year, see page 36.

SOPHOMORE YEAR

First Semester

Mathematics and Mechanics 3, Analytical Geometry, four credits, Messrs. Dalaker, Holman, and Priester
 Physics 5, Mechanics of Solids and Fluids, four credits, Mr. J. Zeleny and Assistants
 Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
 Drawing 5, Drafting, three credits, Messrs. Kirchner and Rowley
 French 2 or 5, three credits, Mr. Benton and Assistants
 or
 German 3 or 7, three credits, Mr. Moore and Assistants
 or
 Spanish 12, three credits, Mr. Melom
 Mechanical Engineering 3, 4, Foundry Practice; or Machine and Bench Work, three credits, Messrs. Shipley, Martin, and Peterson
 Military Drill 1, three credits, Mr. Woolnough

Second Semester

Mathematics and Mechanics 4, Calculus, four credits, Messrs. Dalaker, Holman, and Priester
 Physics 6, Heat, Magnetism, and Electrostatics, four credits, Mr. J. Zeleny and Assistants

Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
 Drawing 6, Drafting, three credits, Messrs. Kirchner and Rowley
 French 2 or 5, three credits, Mr. Benton and Assistants
 or
 German 3 or 7, three credits, Mr. Moore and Assistants
 or
 Spanish 12, three credits, Mr. Melom
 Mechanical Engineering 3, 4, Foundry Practice; or Machine and Bench Work, three credits
 Messrs. Shipley, Martin, and Peterson
 Military Drill 1, three credits, Mr. Woolnough

JUNIOR YEAR

First Semester

Mathematics and Mechanics 5, Calculus and Mechanics, three credits, Messrs. Newkirk and Dalaker
 Physics 7, Electrokinetics, four credits, Mr. J. Zeleny and Assistants
 Chemistry 4, Quantitative Analysis, three credits, Mr. Sidener
 Economics 1, Elements, three credits, Messrs. Robinson, Mitchell, and Ebersole
 Mechanical Engineering 11, Mechanism, three credits, Mr. Martenis
 Mechanical Engineering 5, Tool Construction, four credits, Mr. Shipley

Second Semester

Mathematics and Mechanics 6, Analytical Mechanics, three credits, Messrs. Newkirk and Dalaker
 Physics 8, Sound and Light, four credits, Mr. J. Zeleny and Assistants
 Chemistry 19, Gas and Coal, three credits, Mr. Harding
 Economics 7a, Economics of Transportation, three credits, Mr. Weld
 Mechanical Engineering 12, Kinematics, three credits, Mr. Martenis
 Mechanical Engineering 6, Machine Construction, four credits, Mr. Shipley

SENIOR YEAR

First Semester

Mathematics and Mechanics 7, Strength and Resistance of Materials, four credits, Messrs. Brooke and Newkirk
 Experimental Engineering 1, Materials Testing, two credits, Messrs. Kavanaugh, Shoop, and McMillan
 Political Science 16, American Government, two credits, Messrs. Schaper and Young
 Civil Engineering 20, Stresses, three credits, Messrs. Constant and Parcel
 Mechanical Engineering 13, Machine Design, five credits, Messrs. Flather and Martenis
 Mechanical Engineering 19, Steam Boilers, one credit, Mr. Martin
 Electrical Engineering 5, Electric Power, three credits, Mr. Ryan

Second Semester

Mathematics and Mechanics 8, Hydraulics and Pumping Machinery, four credits, Messrs. Brooke and Newkirk
 Experimental Engineering 4, Laboratory, three credits, Messrs. Kavanaugh, Shoop, and McMillan
 Political Science 6, Engineering Law, two credits, Mr. Young
 Mechanical Engineering 20, Steam Engine, three credits, Mr. Flather
 Mechanical Engineering 14, Machine Design, three credits, Messrs. Flather and Martenis
 Mechanical Engineering 21, Gas Engines, two credits, Mr. Martin
 Electrical Engineering 5, Electric Power, three credits, Mr. Ryan

POST SENIOR YEAR

First Semester

Mathematics and Mechanics 9, Thermodynamics, three credits, Mr. Brooke
 Experimental Engineering 6, Laboratory, three credits, Mr. Kavanaugh

Mechanical Engineering 22a, Measurement of Power, two credits, Mr. Flather
 Mechanical Engineering 15, Machine Design, four credits, Messrs. Flather and Martin
 or
 Mechanical Engineering 25, Railway Design, four credits, Messrs. Flather and Martenis
 Mechanical Engineering 23, Heating and Ventilation, three credits, Mr. Martenis
 or
 Mechanical Engineering 24, Railway Technology, two credits, Messrs. Martenis and Martin
 Mechanical Engineering, Elective, two credits
 or
 Electrical Engineering, Practice, two credits
 Elective, three credits

Second Semester

{ Mathematics and Mechanics 10, 11, Turbines, four credits, Mr. Brooke
 { Mechanical Engineering 28, Specifications, one credit, Mr. Flather
 or
 { Economics 7b, Railway Administration, three credits, Mr. Weld
 { Mechanical Engineering 26, Locomotive Construction, two credits, Mr. Flather
 Mechanical Engineering 16, Machine Design, four credits, Messrs. Flather and Martin
 or
 Mechanical Engineering 25, Railway Design, four credits, Messrs. Flather and Martenis
 Mechanical Engineering 22b, Measurement of Power, two credits, Mr. Flather
 or
 Mechanical Engineering 27, Locomotive Testing, two credits, Mr. Flather
 Experimental Engineering 9, Gas Engine, three credits, Mr. Kavanaugh
 Mechanical Engineering, thesis, three credits
 Elective, two or three credits

COURSE IN ELECTRICAL ENGINEERING

For freshman year, see page 36.

SOPHOMORE YEAR

First Semester

Mathematics and Mechanics 3, Analytical Geometry, four credits, Messrs. Dalaker, Holman, and Priester
 Physics 5, Mechanics of Solids and Fluids, four credits, Mr. J. Zeleny and Assistants
 Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
 Drawing 5, Drafting, three credits, Messrs. Kirchner and Rowley
 French 2 or 5, three credits, Mr. Benton and Assistants
 or
 German 3 or 7, three credits, Mr. Moore and Assistants
 or
 Spanish 12, three credits, Mr. Melom
 Mechanical Engineering 3, 4, Foundry Practice; or Machine and Bench Work, three credits, Messrs. Shipley, Martin, and Peterson
 Military Drill 1, three credits, Mr. Woolnough

Second Semester

Mathematics and Mechanics 4, Calculus, four credits, Messrs. Dalaker, Holman, and Priester
 Physics 6, Heat, Magnetism, and Electrostatics, four credits, Mr. J. Zeleny and Assistants
 Chemistry 3, Qualitative Analysis, three credits, Messrs. Nicholson and Bliss
 Drawing 6, Drafting, three credits, Messrs. Kirchner and Rowley

French 2 or 5, three credits, Mr. Benton and Assistants
 or
 German 3 or 7, three credits, Mr. Moore and Assistants
 or
 Spanish 12, three credits, Mr. Melom
 Mechanical Engineering 3, 4, Foundry Practice; or Machine and Bench Work, three credits,
 Mr. Shipley
 Military Drill 1, three credits, Mr. Woolnough

JUNIOR YEAR

First Semester

Mathematics and Mechanics 5, Calculus and Mechanics, three credits, Messrs. Newkirk
 and Dalaker
 Physics 7, Electrokinetics, four credits, Mr. J. Zeleny and Assistants
 Mechanical Engineering 11, Mechanism, three credits, Mr. Martenis
 Economics 1, Elements, three credits, Messrs. Robinson, Mitchell, and Ebersole
 Chemistry 4, Quantitative Analysis, three credits, Mr. Sidener
 Mechanical Engineering 5, Tool Construction, four credits, Mr. Shipley

Second Semester

Mathematics and Mechanics 6, Analytical Mechanics, three credits, Messrs. Newkirk
 and Dalaker
 Physics 8, Sound and Light, four credits, Mr. J. Zeleny and Assistants
 Physics 9, Advanced Electrical Measurements, one credit, Mr. A. Zeleny
 Mechanical Engineering 12, Kinematics, three credits, Mr. Martenis
 Economics 7a, Economics of Transportation, three credits, Mr. Weld
 Electrical Engineering 1, Applied Electricity, three credits, Mr. Shepardson
 Mechanical Engineering 6, Machine Construction, four credits, Mr. Shipley

SENIOR YEAR

First Semester

Mathematics and Mechanics 7, Strength and Resistance of Materials, four credits, Messrs.
 Brooke and Newkirk
 Political Science 16, American Government, two credits, Messrs. Schaper and Young
 Electrical Engineering 2, Electrical Machinery, three credits, Mr. Springer
 Electrical Engineering 17, Laboratory, three credits, Mr. Springer
 Experimental Engineering 1, Materials Testing, two credits, Messrs. Kavanaugh, Shoop,
 and McMillan
 Mechanical Engineering 13, Machine Design, five credits, Messrs. Flather and Martenis
 Mechanical Engineering 19, Steam Boilers, one credit, Mr. Martenis

Second Semester

Mathematics and Mechanics 8, Hydraulics and Pumping Machinery, four credits, Messrs.
 Brooke and Newkirk
 Political Science 6, Engineering Law, two credits, Mr. Young
 Civil Engineering 20, Stresses, three credits, Messrs. Constant and Parcel
 Mechanical Engineering 20, Steam Engine, three credits, Mr. Flather
 Electrical Engineering 2, Electrical Machinery, three credits, Mr. Springer
 Electrical Engineering 17, Laboratory, three credits, Mr. Springer
 Experimental Engineering 2, Steam Laboratory, two credits, Messrs. Kavanaugh, Shoop,
 and McMillan

POST SENIOR YEAR

First Semester

Electrical Engineering 6, Alternating Currents, two credits, Mr. Shepardson
 Mathematics and Mechanics 9, Thermodynamics, three credits, Mr. Brooke

Electrical Engineering 7, 8 or 9, Practice, two credits, Messrs. Shepardson and Ryan
Electrical Engineering 18, Laboratory, three credits, Mr. Springer
Electrical Engineering 14, Design, three credits, Mr. Ryan
Experimental Engineering 7, Laboratory, two credits, Mr. Kavanaugh
Electrical Engineering, thesis, two credits, Mr. Shepardson
Elective, three credits

Second Semester

Electrical Engineering 6, Alternating Currents, three credits, Mr. Shepardson
Electrical Engineering 8, 10, 11 or 12, Practice, three credits, Messrs. Shepardson, Springer,
and Ryan
Electrical Engineering 18, Laboratory, three credits, Mr. Springer
Electrical Engineering 15, Design, three credits, Mr. Ryan
Electrical Engineering 12, Telephony, two credits, Mr. Shepardson
or
Mathematics and Mechanics 10, Water Turbines, two credits, Mr. Brooke
Electrical Engineering, Thesis, three credits, Mr. Shepardson
Elective, three credits

Students desiring to specialize in Electro-Chemistry will be allowed to make certain substitutions in the senior and post senior years by approval of the Faculty.

DEPARTMENTAL STATEMENTS

ARCHITECTURE

WILLIAM H. KIRCHNER, B.S., Professor, Head of Department of Drawing
and Descriptive Geometry 209 Main Engineering Building
EDWIN H. HEWITT, Lecturer in Architecture

1. Drawing and Rendering Mr. KIRCHNER and ASSISTANTS
Six credits (six hours per week); first and second semesters. Re-
quired of all freshmen.
Drawing in outline; drawing from small casts; tracing and sketching; water colors.
2. Architectural Drawing Mr. KIRCHNER and ASSISTANTS
Two credits (four hours per week); second semester. Required of
all freshmen.
Drawing and rendering of plans, elevations, sections, and details; measured drawings.

ASTRONOMY

FRANCIS P. LEAVENWORTH, M.A., Professor, Head of the Department of
Astronomy Observatory or 123 Polwell Hall

1. General Astronomy Mr. LEAVENWORTH
Three credits (three hours per week); second semester. Required of
juniors, C. E. Course. Preparation: Course Mathematics 4.
A study of the general principles of Astronomy, illustrated by lantern slides and
telescopic observations. Lectures, recitations, problems in practical astronomy.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor, Head of Department
of Chemistry 114 Chemistry Building
CHARLES F. SIDENER, B.S., Professor of Chemistry 203 Chemistry Building
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry 209 Chemistry Building
EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry 104 Chemistry Building
FRANK W. BLISS, M.S., Instructor in Chemistry 205 Chemistry Building
EARL PETTIJOHN, B.S. in Chemistry, Instructor in Chemistry 216 Chemistry Building
WOLDEMAR M. STERNBERG, B.S. in Chemistry, Instructor in Chemistry 205 Chemistry Building

3. Qualitative Analysis Messrs. NICHOLSON and BLISS
Six credits (six hours per week); first and second semesters. Required of all sophomores.

The course includes general reactions of the metals and their qualitative separation; reaction and identification of acids, followed by practical problems in qualitative analysis. Lectures and laboratory work.

4. Quantitative Analysis Messrs. SIDENER, PETTIJOHN, and STERNBERG
Three credits (one lecture or recitation and four hours laboratory per week); first semester. Required of all juniors. Preparation: Course 3.

Includes a general discussion of quantitative methods with laboratory work in gravimetric and volumetric analysis.

14. Water Analysis Mr. FRANKFORTER
Three credits; second semester. Optional, post senior year C. E. Course.

Sanitary chemical analysis of water. Samples collected by the students tested for nitrogen in its several conditions, chlorine, color, turbidity, hardness.

19. Gas and Fuel Analysis Mr. HARDING
Three credits; second semester. Junior M. E. Course.

Lectures and laboratory work. This course comprises methods of sampling and analyzing the most important commercial gases, liquid fuels, and coals; and methods for determining their calorific value for purposes of control work and for learning their heat efficiencies.

CIVIL ENGINEERING

FRANCIS C. SHENEHON, C.E., Professor, Head of Department of Civil Engineering 133 Main Engineering Building

FRANK H. CONSTANT, C.E., Professor of Structural Engineering 228 Main Engineering Building

FREDERICK H. BASS, B.S., Professor of Municipal and Sanitary Engineering 123 Main Engineering Building

ALVIN S. CUTLER, C.E., Assistant Professor of Railway Engineering 202 Main Engineering Building

OTTO S. ZELNER, B.S., Assistant Professor of Surveying 216 Main Engineering Building

JOHN I. PARCEL, B.S., Instructor in Structural Engineering 223 Main Engineering Building

1. Surveying Messrs. CUTLER and ZELNER
Three credits (six hours per week); second semester. Required of sophomores, C. E. Course.

Recitations, lectures, and illustrative problems relating to chaining, field problems employing chain; methods of keeping field notes; determination of area—D. M. D. and rectangular co-ordinate method. Methods of laying out and dividing land, including the public land surveys of the United States. The care, proper use, and adjustment of all instruments used are treated in field exercises. Chain, compass, and transit surveys are made and circuits of level-lines run by each party. All surveys made in the field are platted and areas computed. Solution of problems and usual office reduction of all field notes.

- 1a. Surveying Mr. ZELNER
 One credit (one to two hours per week). Elective. Open to students in Mechanical and Electrical Engineering Courses.
 A short course in the use, care, and adjustment of surveying instruments.
2. Surveying Mr. CUTLER
 Three credits (six hours); first semester. Junior C. E. Course.
 Preparation: Course 1.
 A complete topographical survey is made and platted. The survey consists of a triangulation, followed by stadia and sketching.
3. Surveying Messrs. CUTLER and ZELNER
 Three credits (six hours); second semester. Required of juniors, C. E. Course.
 Elements of hydrographic, mining, municipal, and railroad surveying. Use of current meters; barometers, plane table. Determination of meridian by solar observation. Methods of computing and staking railroad curves. This course is preparatory to the more advanced work carried on in the summer camp.
4. Summer Camp Messrs. CUTLER and ZELNER
 Four to six weeks. Required of Juniors, C. E. Course.
 Continuation of Course 3, including extended railroad surveys, topographic, triangulation, and hydrographic.
5. Geodesy Mr. ZELNER
 Three credits (three to six hours per week); second semester. Post senior C. E. Course. Elective.
 Methods of conducting a geodetic survey, lectures and assigned readings.
6. Railway Engineering Mr. CUTLER
 Two credits (four hours per week); first semester. Senior C. E. Course.
 A further study of the mathematics of curves and earthwork, including the spiral and vertical curves, and methods of computing earthwork and haul. Completion of maps and profiles of summer camp work.
7. Railway Engineering Mr. CUTLER
 Three credits (six hours per week); second semester. Senior C. E. Course. Optional.
 Recitations and drawing room work relating to the design and construction of railroad buildings and structures, such as wooden trestles, coaling stations, water stations, engine houses, etc. The object is to make the student familiar with all the principal structures which come under the supervision of the maintenance-of-way department of a modern railroad.
8. Railway Engineering Mr. CUTLER
 Three credits (three hours per week); first semester. Post senior C. E. Course. Optional.
 Recitations and lectures covering the following subjects: Economics of railroad location with a critical study of train resistance, influence of grade, curvature, distance, rise and fall, signaling, yard and stations, valuation of railroad property.

9. Railway Engineering Mr. CUTLER
 Three credits (three hours per week); second semester. Post senior
 C. E. Course. Elective.

HYDRAULIC AND MUNICIPAL ENGINEERING

10. Hydraulic Engineering Mr. BASS
 Three credits; second semester. Senior C. E. Course.

A study of rainfall, evaporation, percolation, and run-off. A review of the application of hydraulics to municipal water supply, water power, drainage, and irrigation. Structures common to all of the above, including reservoirs, dams, and controlling works. Lectures, recitations, and problems.

11. Hydraulic Engineering Mr. BASS

Four credits; first semester. Post senior C. E. Course. Optional.
 A continuation of Course 10. Municipal water supply; sources of water supply; purification and distribution. Water power: economics, principles governing design of plant.

12. Sanitary Engineering Mr. BASS

Two credits; second semester. Post senior C. E. Course.
 Principles of public health. The function of the engineer in the prevention of disease.

13. Municipal Engineering Mr. BASS

Five credits; second semester. Post senior C. E. Course.
 A continuation of Courses 11 and 12 in municipal water supply and sewerage. Adaptation of various structures to the solution of problems of hydraulics and public hygiene. Maintenance and operation by municipal governments. House drainage, refuse disposal, heating and ventilating of public buildings.

14. Highways and Pavements Mr. BASS

Three credits (four to five hours per week); second semester. Required of juniors, C. E. Course.

Lectures, recitations, and field work relating to the economics, location, construction, and maintenance of public highways and pavements.

15. Rivers, Harbors, and Canals Mr. SHENEHON

Two credits; second semester. Post senior C. E. Course.
 A series of lectures dealing with the principal engineering phases of water transportation.

STRUCTURAL ENGINEERING

20. Stresses in Framed Structures Mr. PARCEL

Three credits (five hours per week); first or second semester. Open to senior students pursuing the course in Mechanics of Materials.

Stresses in simple structures by graphic and algebraic methods. Mill building specifications and proportioning of parts. Design of roof trusses, simple beams, girders and roof truss bents. Recitations, problems, and plates. Ketchum's *Steel Mill Buildings*. Handbooks of Steel Manufacturers.

21. Elementary Structural Design Mr. CONSTANT
Three credits (six hours per week); first semester. Senior. Preparation: Course Mathematics 6.
Lectures upon the elements of design. Design of simple trusses.
22. Stresses in Framed Structures Mr. PARCEL
Three credits (five hours per week); second semester.
Continuation of Course 20, with special reference to stresses in bridge trusses under moving loads. Recitations, problems, and plates. Johnson, Bryan, and Turneaure's *Modern Framed Structures*, Part II.
23. Structural Design Messrs. CONSTANT and PARCEL
Five credits (ten hours per week); first semester. Post senior.
Open to students who have completed Courses 20 and 22.
Theory and design of steel structures, including mill buildings, railway and highway bridges, standpipes and towers, and other problems of structural interest. Lectures, problems, and design.
24. Structural Design Messrs. CONSTANT and PARCEL
Five credits (ten hours per week); second semester. Post senior.
Continuation of Course 23. With special reference to the design of steel railway bridges and the theory and design of steel arch bridges. Lectures, problems, and design.
25. Swing Bridges Mr. CONSTANT
Four credits (eight hours per week); second semester. Post senior
C. E. Course. Optional.
Theory and design of swing and bascule bridges, with special attention to the design of the operating machinery. Moving structures. Lectures, problems, and design.
26. Masonry Construction Mr. CONSTANT
Five credits (eight hours per week); first semester. Post senior.
Preparation: Course 20.
Foundations, design, and use of cribs, cofferdams, and pneumatic caissons, pressure of earth, design of retaining walls, piers, abutments, dams, and chimneys. Properties of stones, brick, cement, and concrete. Recitations and lectures, two hours per week; drawing room work, six hours per week.
27. Reinforced Concrete Mr. CONSTANT
Three credits (six hours per week); second semester. Post senior.
Preparation: Course 26.
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. Turneaure and Maurer's *Principles of Reinforced Concrete*.

DRAWING AND DESCRIPTIVE GEOMETRY

- WILLIAM H. KIRCHNER, B.S., Professor, Head of Department of Drawing
and Descriptive Geometry 209 Main Engineering Building
FRANK B. ROWLEY, B.S., M.E., Instructor 209 Main Engineering Building
ROBERT W. FRENCH, B.S., Instructor 209 Main Engineering Building

1. Freehand Mr. FRENCH
 Two credits (four hours per week); first semester. Required of all freshmen, in conjunction with Course 3.
 Sketching and lettering. Exercises in reading and making drawings. From objects, drawings, dictation, and memory.
2. Mechanical Mr. FRENCH
 Two credits (four hours per week); second semester. Required of all freshmen. Preparation: Courses 1, 3. Continuation of Course 1.
 The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations, and explanatory notes.
 Sketching, lettering, tracing, and blue printing. Representation of details of machines and structures, and the interpretation of working drawings.
3. Descriptive Geometry Mr. KIRCHNER
 Two credits (three hours per week); first semester. Required of all freshmen. Open to students pursuing Course 1.
 Introductory course in Descriptive Geometry. Systems of representation, methods, loci, and constructive geometry. Recitations and drawing room exercises.
4. Descriptive Geometry Mr. KIRCHNER
 Two credits (two hours per week); second semester. Required of all freshmen. Preparation: Courses 1, 3. Continuation of Course 3.
 Central projection and special cases; principles and applications. Representation of lines, planes and solids, and of their relations; tangencies, intersections and developments. Recitations, lectures, and the solution of problems.
- 5, 6. Drafting Messrs. KIRCHNER, ROWLEY, and FRENCH
 Six credits (six hours per week); first and second semesters. Required of all sophomores. Preparation: Courses 2, 4.
 Graphics, machine drafting, structural drafting, and topography. Instruction in drafting room methods.
 (a) Civil engineering course
 (b) Mechanical and electrical engineering courses.
7. Elements of Architecture Mr. KIRCHNER
 Three credits; first semester. Required of juniors, C. E. Course.
 Preparation: Course 5.
 The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.
21. Technical Drawing Messrs. KIRCHNER and FRENCH
 Six credits (six hours per week); first and second semesters. Required of freshmen, Analytical Chemistry Course.
 Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings and translations.

FOR GRADUATES

30. Descriptive Geometry and Applications
 31. Projective Geometry
 32. Perspective

ECONOMICS AND POLITICAL SCIENCE

- *JOHN H. GRAY, Ph.D., Professor, Head of Department of Economics and Political Science Mechanic Arts Building
 EDWARD V. ROBINSON, Ph.D., Professor, Acting Head of Department, February 1, 1912 to February 1, 1913 Mechanic Arts Building
 WILLIAM A. SCHAPER, M.A., Ph.D., Professor Mechanic Arts Building
 THOMAS WARNER MITCHELL, Ph.D., Assistant Professor Mechanic Arts Building
 JEREMIAH S. YOUNG, Ph.D., Assistant Professor Mechanic Arts Building
 J. FRANKLIN EBERSOLE, M.A., Assistant Professor Mechanic Arts Building
 LOUIS D. H. WELD, Ph.D., Assistant Professor Mechanic Arts Building

ECONOMICS

1. Elements of Economics Messrs. ROBINSON, MITCHELL, and EBERSOLE

Three credits (three hours per week); first semester.

A thorough course in the elements of economic theory, with special reference to present-day economic and social problems. Marshall, Wright, and Field's *Outline* and a text-book, supplemented by lectures and problems, with a weekly quiz.

- 7a. Economics of Transportation Mr. WELD
 Three credits (three hours per week); second semester. Required of juniors. Preparation: Course 1.

A general course on the history and theory of transportation and communication, with special reference to the United States. Early routes and methods of migration and commerce. Causes determining the location of railways. Effect of steam and electricity in the consolidation of industries and of nations. Signal systems, the post, telegraph, and telephone. Parcels post and express service. Economic functions and relations of highways, interurban electric lines, steam railways, inland waterways, and ocean transportation. The organization of the ocean commerce. Lectures, assigned readings, and discussions.

- 7b. Railway Administration Mr. WELD
 Three credits (three hours per week); second semester. Required, post senior year, Railway M. E. Course. Preparation: Course 7a.

The organization of a railway corporation, duties of officers, functions of departments, railroad finances, accounting and statistics, problems connected with different classes of service, terminals, betterments, physical valuation, etc.

Lectures, assigned readings and special topics.

POLITICAL SCIENCE

16. American Government Mr. YOUNG
 Two credits (two hours per week); first semester. Required of all seniors.

*Absent on leave from February 1, 1912 to February 1, 1913,

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 6.

6. Engineering Law

Mr. YOUNG

Two credits (two hours per week); second semester. Required of all seniors. Preparation: Course 16.

A course in the elements of law especially designed for engineering students. It includes a study of the system of federal and state courts, the jury system, the law of contracts, corporations, partnerships and limited partnerships, administrative law, the rights and duties of citizenship, and some leading features of the law of real and personal property and the law of riparian rights.

ELECTRICAL ENGINEERING

GEORGE D. SHEPARDSON, M.A., M.E., Professor, Head of Department of
Electrical Engineering 30 Electrical Engineering Building

FRANK W. SPRINGER, E.E., Professor

15 Electrical Engineering Building

WILLIAM T. RYAN, E.E., Assistant Professor

14 Electrical Engineering Building

H. M. TURNER, Instructor

Electrical Engineering Building

EDWARD P. BURCH, E.E., Lecturer

1. Applied Electricity

Mr. SHEPARDSON

Three credits (three hours per week); second semester. Required of juniors, E. E. Course. Preparation: Course Physics 7.

Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

2. Electrical Machinery

Mr. SPRINGER

Six credits (six hours per week); first and second semesters. Preparation: Courses Physics 1, 5, 6, and Mathematics 6, 5.

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.

4. Electric Power

Mr. RYAN

Three credits (four hours per week); first or second semester. Required of post seniors, C. E. Course, and of seniors, School of Mines. Preparation: Courses Physics 5, 6.

Elements of theory and practice of electrical measurements, wiring, dynamos, motors, and electric lighting. Thirty-six lectures and recitations and thirty-six hours laboratory. Text-book: Norris, *Introduction to the Study of Electrical Engineering*.

5. Electric Power

Mr. RYAN

Six credits (four hours per week); first and second semesters. Required of seniors, M. E. and Chemical Courses. Preparation: Courses Physics 5, 6.

An elementary study of the electrical problems involved in the generation, distribution, measurement, and utilization of power. Lectures, recitations, and laboratory work, supplemented by numerous practical problems. Text-book: Thomaelen, *Electrical Engineering*.

6. Alternating Currents Mr. SHEPARDSON
Four to six credits (two or three hours per week); first and second semesters. Post senior year. Preparation: Courses 1, 2.
Phenomena, measurement and use of alternating currents; theory of line, transformer generator, and motor; types of apparatus. Text-book: Steinmetz, *Alternating Current Phenomena*.
7. Electrical Engineering Practice: Batteries Mr. RYAN
One credit (one hour per week); first semester. Post senior year. Preparation: Course 2.
General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Text-book: Lyden, *Storage Battery Engineering*.
8. Electrical Engineering Practice: Lighting Mr. SHEPARDSON
One credit (one hour per week); first or second semester. Post senior year. Preparation: Course 2.
Comparison of different sources of light; photometry; physics of the arc; history, design, and regulation of arc lamps; adaptation to constant current, constant potential and A. C. circuits; carbons; history, manufacture, and economy of incandescent lamps; distribution of light.
9. Electrical Engineering Practice: Central Stations Mr. RYAN
One or two credits (one or two hours per week); second semester. Post senior year. Preparation: Courses 2, 6.
Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas, and water power; location, design, and erection of station buildings; boilers, engines, dynamos, storage batteries, switchboard and lines; operation and regulation; maintenance of plant; emergencies; examination of stations in Minneapolis and St. Paul.
10. Electrical Engineering Practice: Railways Mr. BURCH
One credit (one hour per week); first or second semester. Post senior year. Preparation: Course 2 or 4.
History and development; different systems of distribution; location and calculation of feeders; line and track construction; choice of motors, trucks, generators, and engines; operation and repairs.
11. Electrical Engineering Practice: Transmission Mr. RYAN
One credit (one hour per week); second semester. Post senior year. Preparation: Courses 1, 2, 5.
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.
12. Electrical Engineering Practice: Telegraph and Telephone Mr. SHEPARDSON
One or two credits (one or two hours per week); second semester. Post senior year. Preparation: Courses 1, 5.
Various systems and instruments used in local and long distance telegraphy and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm, and district messenger systems.

13. Electrochemistry Mr. SHEPARDSON
 One or two credits (one or two hours per week); first or second semester. Post senior year.
 Theoretical and experimental study of electrolytic and electrothermal processes.
14. Electrical Design Mr. RYAN
 Three credits (six hours per week); first semester. Post senior year. Preparation: Courses Physics 1, 2, Elect. Eng. 1, 2, and Mech. Eng. 13.
 The design of direct current generators and motors, and alternating current transformers; complete working drawings and specifications to accompany each design. Textbook: Ryan, *Design of Electrical Machinery*.
15. Electrical Design Mr. RYAN
 Three credits (six hours per week); second semester. Post senior year. Preparation: Courses 6, 14.
 The design of alternating current generators and motors, and switchboards.
16. Electrical Design Mr. RYAN
 Two credits (four hours per week); second semester. Post senior year. Preparation: Courses 8, 14.
 Designs, specifications, and estimates for an electric light or power plant.
17. Electrical Laboratory Mr. SPRINGER
 Six credits (six hours per week); first and second semesters. Senior year. Preparation: Courses 1, 2, and Physics 5, 6.
 Tracing circuits and locating faults; electrical engineering measurements; calibration of instruments; operation and characteristic curves of generators and motors. Lectures and practice.
18. Electrical Laboratory Mr. SPRINGER
 Six credits (six hours per week); first and second semesters. Post senior year.
 Experimental study of alternating currents; regulation and efficiency tests of alternators, transformers, motors, and rotaries; photometric tests of incandescent and arc lamps. Lectures and practice.
19. Electrical Laboratory Messrs. SHEPARDSON and SPRINGER
 One or two credits (two or four hours per week); first or second semester. Post senior year.
 Efficiency tests and special problems.
20. Electrical Engineering Measurements Mr. SPRINGER
 Application of measurements to electrical engineering practice. Lectures and laboratory.
21. Power Plant Operation Messrs. RYAN, MARTENIS, and DIXON
 One or two credits (equivalent to two or four hours per week); first or second semester. Post senior year, elective.
 Practice in operation and care of gas producer, gas engine, boilers, engines, turbine, dynamos, battery, switchboards, and auxiliary apparatus of the University lighting plant.

22. Journal Reading Mr. SHEPARDSON
Two credits; first and second semesters. Post senior year.
Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of the American Institute of Electrical Engineers.
23. Precise Electrical Engineering Measurements Mr. SPRINGER
Preparation: Course 19.
Lectures and laboratory work. Precise measurements of resistance, voltage, current, self-induction, and capacity; standardization of measuring instruments. Open to limited number subject to approval.
24. Illuminating Engineering Mr. SHEPARDSON
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.
25. Telephone Engineering Mr. SHEPARDSON
Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus; lines and line phenomena, including induction, transposition, loading coils, etc.
26. Alternating Current Phenomena Mr. SHEPARDSON
Lectures and laboratory work. Study of wave forms, transient phenomena; oscillographic investigations; tests of apparatus.
Candidates for the degree of Electrical Engineer are required to take Courses 1, 2, 6, 14, 15, 17, 18; also 68 hours classroom work selected from Courses 7 to 13.

Note.—Electives may be chosen from any courses given in the Academic or Engineering Colleges for which the student has sufficient preparation. Attention is called to the following as desirable for electrical engineers.

Botany.—Timber and timber diseases.

Chemistry.—Quantitative analysis, gas and coal analysis, electro-chemical analysis.

Civil Engineering.—Short course in surveying for seniors; masonry and construction, structural details; hydraulic engineering; sanitary engineering; railway economics.

Drawing.—Advanced work in theoretical and practical graphics.

Electrical Engineering.—Any courses not taken as required work (except 3, 4, and 5).

Experimental Laboratory.

Geology.—Mineralogy.

Language.—English, French, German, Spanish.

Mathematics.—Theory of turbines, hydraulic motors and wind engines; circular hyperbolic and elliptic functions; wave theories of light, heat, and electricity; directional calculus, vector analysis, differential equations, least squares.

Mechanical Engineering.—Measurement of power, air compressors and motors, shop work, heating and ventilation, machine design, railway technology, gas engines and producers.

Military Science.

Physics.—Advanced work on special problems.

Political Science and Economics.—Money and banking, corporation finance, public finance, accounting, industrial problems.

EXPERIMENTAL ENGINEERING

WILLIAM H. KAVANAUGH, M.E., Professor, Head of Department of
Experimental Engineering

103 Experimental Engineering Building

SPANISH

11. Beginning Messrs. FRELIN and MELOM
Six credits (three hours per week); first and second semesters.
12. Intermediate Mr. MELOM
Six credits (three hours per week); first and second semesters. Open
to those who have completed Course 11.

GEOLOGY AND MINERALOGY

WILLIAM H. EMMONS, M.A., Professor, Head of Department of Geology
and Mineralogy 108 Pillsbury Hall
FREDERIC W. SARDESON, Ph.D., Assistant Professor of Paleontology
103 Pillsbury Hall

1. Geology Mr. SARDESON
Three credits (three hours per week); first semester. Required of
sophomores, C. E. Course
A condensed course in physical and historical geology for Civil Engineers. Geo-
dynamics, structural geology, physiography, stratigraphic and historical geology are treated
successively. Excursions to typical localities will supplement work done in the classroom.
Lectures and reference reading.

GERMAN

JOHN G. MOORE, B.A., Professor, Head of Department of German
210 Folwell Hall
HANS JUERGENSEN, M.A., Assistant Professor 215 Folwell Hall
OSCAR BURKHARD, M.A., Assistant Professor 214 Folwell Hall
RICHARD WISCHKAEMPER, M.A., Instructor 216 Folwell Hall

1. Beginning Messrs. JUERGENSEN, BURKHARD, and WISCHKAEMPER
Six credits (three hours per week); first and second semesters. Open
to all.
Pronunciation, grammar, conversation, and composition; selected reading in easy
prose and verse.
- 3b. Scientific Intermediate Messrs. JUERGENSEN, BURKHARD,
and WISCHKAEMPER
Six credits (three hours per week); first and second semesters. Prepara-
tion: Course 1.
This course is arranged to meet the peculiar needs of engineering students. Text:
Dippold's *Science Reader*.
4. Prose and Poetry Messrs. MOORE, JUERGENSEN, BURKHARD,
and WISCHKAEMPER
Six credits (three hours per week); first and second semesters. Open
to all who enter the University with two years of German.
Selections of prose and poetry, geography, history, and legend. Review of German
grammar throughout the year.

7. Advanced Scientific Reading Messrs. JUERGENSEN and BURKHARD
Six credits (three hours per week); first and second semesters. Open to all who have taken Course 3 or 4.

Reading of scientific monographs and periodicals.

8. Seminar in Scientific Reading Mr. JUERGENSEN
Two credits (two hours per week). Open to graduate students, and by permission of the department, to undergraduates who have completed Course 7.

1912-13. The literature of evolution (Haeckel, Reinke, etc.).

MATHEMATICS AND MECHANICS

WILLIAM E. BROOKE, B.C.E., M.A., Profesor, Head of Department of
Mathematics and Mechanics 114 Main Engineering Building

BURT L. NEWKIRK, Ph.D., Assistant Professor
108 Main Engineering Building

HANS H. DALAKER, M.A., Assistant Professor
105 Main Engineering Building

WILLIAM F. HOLMAN, Ph.D., Instructor
108 Main Engineering Building

GEORGE C. PRIESTER, B.S., Instructor 105 Main Engineering Building

The ability to understand and apply mathematical processes readily is regarded as essential to the engineer. The aim of these courses is to cultivate this ability so far as possible. To this end special emphasis is laid upon two things: elucidation of principles and drill upon their applications, as furnishing the only sure basis for a thorough technical and professional training. Courses 1 to 8 inclusive must be taken in the order indicated, and in order to enter upon the work of any year the student must have attained a passing mark on all the required courses in preceding years.

1. Higher Algebra and Analytical Trigonometry

Messrs. HOLMAN and PRIESTER

Five credits (five hours per week); first semester. Required of all freshmen.

Theory of exponents, series, undetermined coefficients, determinants, theory of equations, graphs, logarithms, trigonometric transformations.

2. Plane and Spherical Trigonometry and Analytical Geometry to Conic Sections

Messrs. HOLMAN and PRIESTER

Five credits (five hours per week); second semester. Required of all freshmen.

Properties of plane triangles and their solution by logarithmic tables and the slide rule; general properties and solution of spherical triangles; introduction to analytical geometry, transformation of co-ordinates, the right line and circle.

3. Analytical Geometry of Two and Three Dimensions

Messrs. DALAKER, HOLMAN, and PRIESTER

Four credits (four hours per week); first semester. Required of all sophomores.

Conic sections and other loci; the point, line, plane, and quadric.

4. Differential and Integral Calculus

Messrs. DALAKER, HOLMAN, and PRIESTER

Four credits (four hours per week); second semester. Required of all sophomores.

Differentiation and integration, expansion in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing.

5. Calculus and Mechanics

Messrs. NEWKIRK and DALAKER

Three credits (three hours per week); first semester. Required of all juniors.

Integration; rectification, quadrature, curvature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.

6. Analytical Mechanics

Messrs. NEWKIRK and DALAKER

Three credits (three hours per week); second semester. Required of all juniors.

Before registration for this course the student must pass the required Physics of sophomore year in addition to the required Mathematics, Courses 1 to 5 inclusive. Statics and dynamics, rectilinear, circular and harmonic motion, and curvilinear motion in general, dynamics of rigid bodies, impact, work and energy.

7. Strength and Resistance of Materials Messrs. BROOKE and NEWKIRK

Four credits (four times per week); first semester. Preparation: Course 6. Required of all seniors.

Mechanical and elastic properties of materials of construction; beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, plates; theory of internal stress.

8. Hydraulics and Pumping Machinery

Messrs. BROOKE and NEWKIRK

Four credits (four times per week); second semester. Preparation: Course 6. Required of all seniors.

Laws of equilibrium, pressure and flow of liquids; theory of the action of pumps.

9. Thermodynamics of Steam and Gas Engines

Mr. BROOKE

Three credits (three times per week); first semester. Preparation: Course 8. Required of all candidates for degrees in Mechanical and Electrical Engineering.

The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including use of steam tables, entropy diagrams, etc.

10. Water Turbines

Mr. BROOKE

Two credits (two times per week); second semester. Required of all candidates for degrees in Mechanical and Electrical Engineering except those who elect either Railway Engineering or Telephony.

Theory of the operation, construction, and regulation of turbine wheels.

11. Steam Turbines

Mr. BROOKE

Two credits (two times per week); second semester. Open to all who have had Course 9 and are pursuing Course 10.

Various types of turbines, velocity, impulse, and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.

FOR GRADUATES

Courses in the following related subjects in Mathematics, Mathematical Physics, and Theoretical Mechanics are open to those who have had sufficient preparation, but they are primarily intended for graduates.

13. Vector Analysis

14. Advanced Calculus

15. Differential Equations

16. Partial Differential Equations of Mathematical Physics

17. Theory of Functions

18. Application of Elliptic Functions

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.M.E., Professor, Head of Department of Mechanical Engineering 12 Mechanical Engineering Building

JOHN V. MARTENIS, M.E., Assistant Professor of Mechanical Engineering 21 Mechanical Engineering Building

S. CARL SHIPLEY, B.S., M.E., Assistant Professor of Machine Construction, and Superintendent of Shops

18 Mechanical Engineering Building

WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Making

28 Mechanical Engineering Building

WALLACE A. MARTIN, M.E., Instructor in Mechanical Engineering

Mechanical Engineering Building

PETER PETERSON, Instructor in Foundry Practice

Mechanical Engineering Building

EDWARD QUIGLEY, Instructor in Forge Work

Mechanical Engineering Building

HENRY UBRICH, Instructor in Carpentry

Mechanical Engineering Building

SHOP WORK

1a. Carpentry

Messrs. RICHARDS and UBRICH

Two credits (six hours per week, twelve weeks); first and second semesters. Required of all freshmen in Engineering Courses.

Wood working, use of tools; lathe and bench work. Lectures and practice.

1b. Pattern Making

Mr. RICHARDS

Two credits (six hours per week, twelve weeks); first and second semesters. Required of all freshmen in Engineering Courses.

Patterns for molding, core boxes, flasks. Lectures and practice.

2. Blacksmithing Messrs. SHIPLEY and QUIGLEY
 Two credits (six hours per week, twelve weeks); first and second semesters. Required of all freshmen in Engineering Courses.
 Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.
3. Foundry Practice Mr. PETERSON
 Three credits (six hours per week); first and second semesters. Required of all M. E. and E. E. sophomores.
 Molding, casting, mixing metals, brass work, and core making. Shop practice, recitations, and lectures.
4. Machine and Bench Work Mr. SHIPLEY
 Three credits (six hours per week); first and second semesters. Required of all M. E. and E. E. sophomores.
 Chipping, filing, machine work. Lectures and practice.
5. Tool Construction Mr. SHIPLEY
 Four credits (eight hours per week); first semester. Required of juniors, M. E. Course. Preparation: Course 4.
 Tools, taps, reamers, cutters, and other special work. Lectures and practice.
6. Machine Construction Mr. SHIPLEY
 Four credits (eight hours per week); second semester. Required of juniors, M. E. Course. Preparation: Course 5.
 Gear cutting, finishing, machine construction. Lectures and practice.
7. Carpentry, Joinery, and Wood Carving Mr. RICHARDS
 Four credits (eight hours per week); first or second semester. Open to all students.
 A course in wood working designed with special reference to the needs of teachers of manual training.
8. Machine Construction Mr. SHIPLEY
 Four credits (eight hours per week); first or second semester. Elective. Open to seniors.
 Construction of patterns and machine work for special apparatus or machinery designed by the students.
9. Shop Economics Mr. FLATHER
 Two credits (two hours per week); second semester. Senior elective.
 Shop and factory organization and management; cost systems.
10. Power Plant Operation Messrs. MARTENIS, RYAN, and DIXON
 One credit (equivalent to two hours per week); first or second semester. Elective, post senior year.
 Operation and maintenance of boilers, engines, gas producers, gas engines, steam turbines, and accessory apparatus. Smoke prevention.

MACHINE DESIGN

11. Elements of Mechanism Mr. MARTENIS
 Three credits (three hours per week, lectures and recitations); first semester. Required of juniors, M. E. and E. E. Courses. Preparation: Course Mathematics 4.

The transmission of motion without consideration of the strength of parts. Levers, gearing, linkwork, belts, screws, epicyclic trains, parallel motions, quick-return movements.

12. Kinematics and Elementary Machine Design Mr. MARTENIS

Three credits (six hours per week); second semester. Required of juniors, M. E. and E. E. Courses. Preparation: Course Mathematics 4.

Graphical diagrams of the paths, speeds, and accelerations of important mechanisms; centroids, analysis of mechanisms; construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.

13. Machine Design Messrs. FLATHER and MARTENIS

Five credits (ten hours per week); first semester. Required of seniors, M. E. and E. E. Courses. Open only to students pursuing Course Mathematics 7.

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.

14. Machine Design Messrs. FLATHER and MARTENIS

Three credits (six hours per week); second semester. Required of seniors, M. E. Course. Open only to those pursuing Course 20.

Application of graphical methods to the design of valve-gears and link motions. Zeuner diagrams, indicator cards. Lectures and drawing-room practice.

15. Machine Design Messrs. FLATHER and MARTIN

Four credits (eight hours per week); first semester. Required, post senior year, M. E. Course. Preparation: Courses 14, 19.

Steam engines. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determinations of details.

Gas engine. An alternative course in gas engine design is offered those who have completed Course 21.

16. Machine Design Messrs. FLATHER and MARTIN

Four credits (eight hours per week); second semester. Required post senior year, M. E. Course. Preparation: Course 13.

Original designing, including machinery for changing size and form. Boiler design, cranes, pumping, and transmission machinery, and engineering appliances. Lectures, problems, and drawing-room practice.

17. Tool Design Mr. FLATHER

Two to four credits (four or eight hours per week); first or second semester. Post senior year, elective. Preparation: Courses 6, 13.

Design of tool for manufacturing interchangeable parts; jigs and milling fixtures.

18. Power Plant Design Mr. FLATHER

Two or four credits (four or eight hours per week); first or second semester. Elective. Preparation: Courses 19, 20.

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; water powers and power distribution, dynamos and motors pumps, shafting, piping and accessory plant.

STEAM ENGINEERING AND PRIME MOVERS

19. Steam Boilers

Mr. MARTENIS

One credit (one hour per week); first semester. Senior year. Open only to students pursuing Course Mathematics 7.

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.

20. Steam Engine

Mr. FLATHER

Three credits (three hours per week); second semester. Senior year. Preparation: Course Mathematics 7.

Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions, and other reversing gear automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

21. Gas Engines and Producers

Mr. MARTIN

Two credits (two hours per week); second semester. Senior year.

Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.

A study of the power-gas producer, including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

22. Measurement of Power

Mr. FLATHER

(a) Two credits (two hours per week); first semester. Post senior.

Preparation: Course Mathematics 8.

A study of the methods employed in measuring power. Dynamometers. Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors, power required to drive machine tools and shafting. Recitations and lectures.

(b) Two credits (two hours per week); second semester. Elective, post-senior year. Preparation: Course Mathematics 8.

Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. Heating and Ventilation

Mr. MARTENIS

Three credits (six hours per week); first semester. Elective. Post senior year.

Principles of heating and ventilation. Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum, and fan systems. Lectures, recitations, and design.

Seminar

Open to seniors and post seniors once a week.

RAILWAY MECHANICAL ENGINEERING

The following courses are available to students desiring to prepare themselves for special work in railway engineering.

24. Railway Technology Mr. MARTENIS
Two credits (four hours per week); first semester. Post senior year,
Railway M. E. Course.

The object of this course is to familiarize the student with the practical details of construction of locomotives, and consists in part of a systematic course of visits to the various railroad shops in the vicinity; lectures and recitations.

25. Railway Design Messrs. FLATHER and MARTENIS
Eight credits (eight hours per week); first and second semester.
Post senior year. Preparation: Course 24.

(a) Of link and valve motions. Continuation of Course 14, with special applications of the Stephenson and Walschaert gears.

(b) Of locomotives and car details.

(c) Of the locomotive boiler.

(d) Of assembled parts.

26. Locomotive Construction Mr. FLATHER
Two credits (two hours per week); second semester. Post senior
year. Preparation: Course 24.

Lectures, reading, and recitations on design and construction of locomotives, supplementing Course 25. This treats,

(a) Of parts not involving the boiler and the use of steam; but including the carriage as frames, springs, and equalizing arrangements, running gear, brakes, trucks, lubrication.

(b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks, riveted joints, bracing and staying. Lagging, smoke prevention.

(c) Of the locomotive engine. Details, heat insulation, cylinder proportion for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.

27. Locomotive Road Testing Mr. FLATHER
Two credits; second semester. Post senior year.

28. Specifications Mr. FLATHER
One credit (one hour per week); second semester. Post senior year,
M. E. Course.

A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations, and practice in writing specifications.

FOR GRADUATES

Advanced courses offered in:

Engineering Design.

Experimental Investigation.

Railway Engineering.

MILITARY SCIENCE AND TACTICS

JAMES B. WOOLNOUGH, U.S.A., Head of Department of Military
Science and Tactics Armory

W. F. RHINOW, Assistant Commandant Armory

BERT A. ROSE, Instructor of Cadet Band Armory

1. Military Drill

Mr. WOOLNOUGH

Three hours per week; first and second semesters.

A minimum of 84 hours drill per year is required by the War Department of all men in the freshman and sophomore classes. Regulations of the War Department also require theoretical and practical instruction in Drill Regulations, Manual of Guard Duty, Firing Regulations, and Field Service Regulations.

An encampment of cadets (except incoming freshmen) is held at the beginning of each year. Cadets attending encampment are excused from two-thirds of the drill during the first semester. During the encampment instruction is given in Field Service Regulations and Range Shooting. The University, including the College of Agriculture, forms a regiment of twelve companies with a band. A platoon of artillery exists on the Main University Campus. At the School of Agriculture (from October to April) six companies, with a band, have been formed.

Military Drill may be taken by others than freshmen and sophomores. To encourage this, as it is considered beneficial, not only to the individual but to the State, a year's drill is allowed to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year. Bandsmen who register for Drill beyond the required amount must register for the entire year and be subject to the same regulations as the other cadets.

No student in the College of Engineering who has completed two years' Drill is permitted to register for additional Drill without the written authority of the Students' Work Committee.

No student in the College of Engineering who has completed two years' Drill is permitted to register for Military Science without the written authority of the Students' Work Committee.

2. Military Science

Mr. WOOLNOUGH

Two hours per week; second semester. Optional. Open to students who have completed the two years' Drill.

Theoretical instruction in the four subjects mentioned above which are required by the War Department. This work taken in connection with a year's Drill, will give four credits for the semester.

The uniform worn at Drill consists of trousers, blouse and cap, modeled after the West Point cadet uniform and costs in Minneapolis \$15 and \$16.

As a rule officers are selected from those who have completed two years' Drill, lieutenants from the junior class and captains and field officers from the senior and post senior classes. Officers and non-commissioned officers are selected after practical and theoretical examinations, due consideration being given to recommendations of superior officers, and to faithful attendance at Drill.

On the graduation of each class the Commandant reports to the Adjutant General of the Army the names of graduates who have shown special aptitude for the military service, and furnishes a copy thereof to the Adjutant General of the State of Minnesota.

Usually a field manoeuvre is held each year with the St. Thomas cadets, and, during the encampment, one with the Minnesota National Guard.

Military instruction is intended to be so conducted as to develop a soldierly bearing, and to foster a spirit of fine courtesy, high honor, and easy obedience to rightful authority. The endeavor is made to impress upon the student that the instruction not only benefits the nation but is of value to him individually, in building up his physique, in teaching him self-reliance and developing manly qualities.

PATHOLOGY AND BACTERIOLOGY

ROBERT H. MULLIN, B.A., M.B., Associate Professor of Pathology and Bacteriology
Institute of Public Health
WINFORD P. LARSON, M.D., Demonstrator in Pathology and Bacteriology
Institute of Public Health
GUSTAV A. MAGNUSSON, M.D., Demonstrator in Pathology and Bacteriology
Institute of Public Health

General Bacteriology Messrs. MULLIN, LARSON, and MAGNUSSON
Five credits; second semester. Post senior C. E. Course. Optional.
Lectures and demonstrations. The general scope of Bacteriology, the history of its development, and the biological and chemical problems involved in the life history of bacteria are dealt with.

The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media are studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants, and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, is thoroughly carried out. Testing of various germicides, chemical and physical, and the use of bacteriological methods in the examination of drinking water form an important part of the work. Bacteria activities concerned in sewage purification, etc., receive attention.

PHYSICS

JOHN ZELENY, B.S., B.A., Ph.D., Professor, Head of Department of Physics 15 Physics Building
ANTHONY ZELENY, M.S., Ph.D., Professor 20 Physics Building
HENRY S. ERIKSON, E.E., Ph.D., Assistant Professor 18 Physics Building
ALOIS F. KOVARIK, Ph.D., Assistant Professor 18 Physics Building
LOUIS W. MCKEEHAN, Ph.D., Instructor 19 Physics Building
RUFUS C. SHELLNBARGER, M.A., Instructor 19 Physics Building
JAMES C. SANDERSON, Ph.D., Instructor 32 Physics Building
PAUL E. KLOPSTEG, B.S., Assistant

5. Mechanics of Solids and Fluids

Messrs. KOVARIK and SHELLNBARGER

Four credits (four hours per week); first semester. Open to those who have completed Courses Mathematics 1, 2. Required of all sophomores.

A thorough drill in the elementary principles of mechanics, numerous simple problems to illustrate the principles, laboratory work in the last half of the semester only. The first part of a general course, continued in Courses 6, 7, and 8.

6. Heat, Magnetism, and Electrostatics

Messrs. KOVARIK and SHELLNBARGER

Four credits (one lecture, two recitations and two hours laboratory); second semester. Open to those who have completed Course 5. Required of all sophomores.

The fundamental principles, mainly from the experimental side; the measurement of the most important quantities involved; lectures to illustrate the various phenomena studied.

7. Electrokinetics

Messrs. J. ZELNY, ERIKSON, SHELLNBARGER,
and MCKEEHAN

Four credits (one lecture, two recitations and two hours laboratory); first semester. Open to those who have completed Course 6. Required of all juniors.

Phenomena accompanying the passage of electricity through solids, liquids, and gases; the various laws which govern such discharges; the basic principles of electrical engineering; a brief study is made of ionization, the X rays, radioactivity, electric waves and wireless telegraphy; measurements of the various electrical quantities.

8. Sound and Light

Messrs. J. ZELNY, ERIKSON, SHELLNBARGER,
and MCKEEHAN

Four credits (one lecture, two recitations and two hours laboratory); second semester. Open to those who have completed Course 5. Required of all juniors.

Wave motion and the various phenomena of sound and light; lectures illustrated with experiments showing the various effects studied; laboratory work to aid the student to a better insight into some of the relations.

9. Advanced Electrical Measurements

Messrs. A. ZELNY and KLOPSTEG

One credit (two hours laboratory work); second semester. Open to those who have completed Course 7. Required of juniors, E. E. Course.

Devoted mainly to the study and measurements of capacity, inductance, and magnetic induction.

RHETORIC AND PUBLIC SPEAKING

JOSEPH M. THOMAS, Ph.D., Professor, Head of Department of Rhetoric
and Public Speaking 310 Folwell Hall

CHARLES W. NICHOLS, M.A., Assistant Professor 410 Folwell Hall

WARREN T. POWELL, M.A., Instructor 410 Folwell Hall

STUDENTS

FOUR-YEAR COURSE SENIOR CLASS—18

Civil Engineers—5

Adams, John W., St. Paul
Curtis, Thomas H., Fairmont
Flygare, August L., Winthrop
Hosfield, Raleigh W., Faribault
West, Robert W., Minneapolis

Electrical Engineers—7

Anderson, Arthur R., Willmar
Bill, Earl M., Minneapolis
Dorrance, Albert P., St. Paul
Meyer, Carl F., Minneapolis
Purves, Leland E., Eyota
Streich, Harry C., Winona
Young, Charles N., St. Paul

Mechanical Engineers—5

Boyce, Leonard F., Minneapolis
Brown, William P., Minneapolis
Johnson, Frank, Minneapolis
Markoe, James C., St. Paul
Thompson, Herbert L., Hokah

Science and Technology—1

Johnson, Paul A., Minneapolis

FIVE-YEAR COURSE SENIOR CLASS—55

Civil Engineers—25

Anderson, Harvey B., Hopkins
Bailey, William H., Minneapolis
Bingen, William J., Minneapolis
Bradley, Byron H., Minneapolis
Buhl, Thomas J., Graceville
Cummings, Elmer F., Beaver Creek
Dimond, Grover W., Minneapolis
Giertsen, Marcus O., Minneapolis
Haberle, Edward L., Minneapolis
Jorgens, Robert D., Minneapolis
Kapphahn, Raymond J., Brandon
King, Forest V., Redwood Falls
Kriz, Joseph J., Hopkins
Pagenhart, Clarence C., Rochester
Pease, Raymond A., Kelso, N. Dak.
Peterson, Barney J., Alvarado
Rolfe, West A., Ada
Ryan, Loiel J., Little Falls
South, Willard A., Blue Earth
Souther, M. Edwin, Minneapolis
Swenson, Hjalmer S., Willmar
Torgerson, Irving E., Lanesboro
Wangaard, Oscar H., Minneapolis
Welin, Arthur, Argyle
Wolff, Henry E., St. Paul

Electrical Engineers—19

Avis, Samuel L., Ely
Benham, Claude F., St. Paul
Bisek, Peter P., New Prague
Brewster, William E., Minneapolis
Daum, H. Arno, Albert Lea
Hedenstrom, Ernest A., St. Paul
Herrmann, Raymond, Henderson
Hillman, C. Kirk, St. Paul
Hoorn, Fred W., Red Wing
Hovden, Conrad D., Perley
Knapp, Lester H., Big Lake
Mathes, Robert C., Minneapolis
Merriell, Elmer W., Minneapolis
Nelson, George A., Anoka
Pardee, Charles A., Minneapolis
Ringstrom, Ivan G., Minneapolis
Swenson, Theodore M., St. Paul
Thuras, Albert, Minneapolis
Towle, Neal C., Minneapolis

Mechanical Engineers—11

Chapin, Harold S., St. Paul	Donaldson, Frank A., St. Paul
Clark, William G., Stillwater	Hirleman, Clark W., Minneapolis
Crane, Eugene C., Minneapolis	Mikesh, Martin A., Minneapolis
Crawford, Allen S., Rochester	Morton, Harold S., Minneapolis
Dinsmoor, Arthur T., Minneapolis	Rand, Lars, Minneapolis
	Ruemmele, A. Emil, Hudson, Wis.

JUNIOR CLASS—66

Civil Engineers—22

Bergquist, John E., Winthrop	Montgomery, Abertis, Osakis
Burnett, Harold, Duluth	Morse, George A., Minneapolis
Chilton, Edward G., Prazee	Nelson, Mauritz O., Minneapolis
Curtis, Benjamin J., Fairmont	Nordstrom, Carl T., Minneapolis
Hewett, Maurice W., Minneapolis	Peterson, Ralph W., Olivia
Koepke, Walter E., Minneapolis	Quiggle, Arthur W., Pelican Rapids
Kruse, Helmer, Nymore	Ringsred, Gerhard, Duluth
Larson, Albin F., Fairmont	Siverts, John S., Morris
Lovering, Harry D., St. Paul	Thurston, Harold H., Anoka
Matchett, Henry J., St. Paul	Webster, Donald W., Rushford
Milne, Rufus H., Crookston	Wilk, Benjamin, Eveleth

Electrical Engineers—31

Baird, Lyman S., Austin	Layden, Arthur, Delta, Col.
Bennett, Eugene F., Preston	McCartney, Floyd A., Long Prairie
Chapman, Wendell P., Garden City	Mahoney, William L., Minneapolis
Dewars, Allen, Minneapolis	Malgren, Carl A., Minneapolis
Dow, Clarence A., Minneapolis	Miller, Hollis D., Minneapolis
Downs, Charles E., Hastings	Okada, Shigetomo, Kobe, Japan
Eastman, Alden C., Minneapolis	Peterson, Andrew M., St. Paul
Edelstein, Jacob E., North Branch	Ramm, Theodore, Winona
Everett, William R., Waseca	Rickel, Cyrus K., Minneapolis
Goetzenberger, Ralph L., Minneapolis	Schroeder, Carl W., Minneapolis
Haines, Allen K., St. Louis, Mo.	Stinchfield, Fred, Minneapolis
Hayden, Junior, Glenco	Thayer, Paul W., Minneapolis
Irwin, Vincent H., Heron Lake	Wadsworth, Winthrop M., Minneapolis
Johnson, George O., Lyle	Wentz, Walter W., Elmore
Lagaard, Alex., Minneapolis	Wilcox, Hugh B., Bricelyn
	Wilcox, Leslie W., Hancock

Mechanical Engineers—13

Buenger, Albert, St. Paul	Hubbell, Arthur C., St. Paul
Critchett, Edward F., Minneapolis	Kopper, Edward, Jr., St. Paul
Durham, Donald B., Minneapolis	Orr, George M., Hastings
Edgerton, George W., Minneapolis	Ovestrud, Melvin, Spring Grove
Goebel, Rudolph C., Minneapolis	Robertson, Soren M., Minneapolis
Hartman, Leon R., Minneapolis	Sansen, Bert R., St. Paul
	Wines, Fred, Minneapolis

SOPHOMORE CLASS—96

Civil Engineers—38

Anderson, George T., Chisholm	Cleveland, Bliss S., Glenwood, Wis.
Brenchley, Walter C., Minneapolis	Croswell, Thomas L., Spokane, Wis.
Butler, George E., St. Paul	Dimond, Harvey G., Minneapolis

Doolittle, William K., Minneapolis
 Ekberg, Carl E., Minneapolis
 Geib, George A., St. Paul
 Granfield, Thomas H., Pittsfield, Mass.
 Handschu, Charles K., Mora
 Howell, Clarence E., St. Paul
 Hustad, John C., Minneapolis
 Johnson, Alexander B., Maynard
 Johnson, Edgar W., Minneapolis
 Jones, Idris V., Minneapolis
 Jones, Ivor V., Minneapolis
 Jorgensen, Peter H., Hopkins
 Knight, Ralph J., Minneapolis
 Lagaard, Maurice B., Minneapolis
 Larson, Louis J., Windom
 Mariette, Percy A., Minneapolis
 Mitchell, Lester M., Minneapolis
 Ott, Leonard E., Preston
 Ott, Willis H., Albert Lea
 Peterson, Arthur C., Windom
 Pratt, Benjamin A., Minneapolis
 Price, John R., Jr., Fulda
 Quarve, Lloyd, Britton, S. Dak.
 Rankin, Renville S., Minneapolis
 Schouler, Weston S., Pittsfield, Mass.
 Sears, Dow I., St. Paul
 Smith, Cedric B., Minneapolis
 Snyder, Robert G., Fulda
 Van Praag, Sol, Minneapolis
 Weatherill, Cedric S., Preston
 Weigel, Howard N., Minneapolis
 West, John C., St. James
 Williams, Charles A., Minneapolis

Electrical Engineers—40

Adler, Eugene H., Minneapolis
 Anderson, Arthur H., Alexandria
 Anderson, Joseph W., Hallock
 Burt, Fred R., Chokio
 Daum, Leo A., Albert Lea
 DeBooy, Justus C., Elk River
 Dunham, Roy O., Lakeville
 Elliott, Douglass, Minneapolis
 Fallon, Eugene L., Hutchinson
 Fastenau, Karl, Minneapolis
 Garvey, Walter S., Excelsior
 Gunnarson, Carl A., Minneapolis
 Hartney, James L., Maynard
 Heys, George A., Barnesville
 Houghtaling, Elting, Fairmont
 Jackson, Otto E., Stockholm, Wis.
 *Janda, Louis E., Mankato
 Johnson, Carl J., Hoffman
 Johnson, Elmer W., Staples
 Jones, George R., Blue Earth
 Jones, Robert ap, Wabasha
 Kerns, Clinton B., Montrose
 Loeffler, Stanley, Luverne
 Mayer, Harris, Minneapolis
 Meyer, Herbert, Minneapolis
 Mitchell, Harry J., Graceville
 Oakes, Harold, Worthington
 Olaison, Clifford E., Minneapolis
 Peterson, Albert L., Erskine
 Plank, Howard G., Minneapolis
 Pomeroy, Emery F., Minneapolis
 Preston, Earl R., Minneapolis
 Putz, John H., St. Paul
 Quigley, Thomas Q., Bird Island
 Reinhardt, Earl L., St. Paul
 Robertson, Burton J., Lyle
 Russell, Carl A., Minneapolis
 Sipes, Charles H., Luverne
 Tallmadge, Everett S., St. Paul
 Wuest, Karl F., Anoka

Mechanical Engineers—18

Campbell, Lorn, St. Paul
 Churchill, Warren R., Hammond, Wis.
 Colvin, James A., Sandstone
 Dorr, William R., St. Paul
 Engberg, Adar W., Cambridge
 Fullerton, Kenneth M., St. Paul
 Gammell, J. Henry, Madison
 Giltinan, David M., Minneapolis
 Haines, Albert C., Minneapolis
 Hammond, Laurence D., Minneapolis
 Harris, Harold R., St. Paul
 Heilig, Merlin F., Milaca
 Kaercher, C. Basil, Ortonville
 Miller, George A., Minneapolis
 Rockwell, Harvard S., Duluth
 Rockwood, Fletcher, Minneapolis
 Snow, Clarence J., Le Sueur
 Vetleson, Ingvál B., Dalton

FRESHMAN CLASS—121

Civil Engineers—48

Aasland, Christopher, Minneapolis
 Aichele, Frederick, St. Paul
 Armstrong, George, Minneapolis
 Banister, Percival R., St. Paul
 Bear, Glenn, Minneapolis
 Blomquist, Mauritz, Winthrop

*Deceased.

Bradt, Fred H., Minneapolis
 Christianson, Hilmar B., Minneapolis
 Cuddy, William A., Minneapolis
 Doherty, Robert S., St. Paul
 Dorsey, John G., Minneapolis
 Fanner, Earl H., Minneapolis
 Fillmore, Harold A., Minneapolis
 Fitzgerald, J. Edward, St. Paul
 Hammond, Arthur G., St. Paul
 Haynes, Stanley H., Minneapolis
 Head, Neil C., St. Paul
 Helmick, Dan S., Minneapolis
 Hodnett, Oscar M., St. Paul
 Holtze, Harry S., Sioux City, Ia.
 Hulett, Glen C., Luverne
 Johnson, John A., Mankato
 Johnson, Phil L., Minneapolis
 Lambert, Leslie, Minneapolis
 Larson, C. Adolph, Lanesboro
 Leonard, Thomas K., Mellette, S. D.
 Lokensgard, Melvin O., Sawyer, N. D.

McKay, Earl D., Delhi
 Moore, Jerome T., St. Paul
 Neumann, S. G., Minneapolis
 Olbrich, Fred G., Minneapolis
 Olson, Gardner M., Cokato
 O'Neill, William C., St. Paul
 Patten, Norman, Minneapolis
 Perry, Hugh C., Minneapolis
 Peterson, William W., Mora
 Rhodes, Calhoun T., Minneapolis
 Rounds, Fred G., St. Paul
 Rufsvold, Olav M., St. Paul
 Scott, Elmer C., Minneapolis
 Skurdalsvold, Peter, Minneapolis
 Swenson, Oscar E., Minneapolis
 Taft, Charles E., Minneapolis
 Webber, Wayne H., Austin
 Weinke, Ernest H., St. Paul
 Wild, Carl D., Cedar Falls, Ia.
 Withee, Warren, St. Paul
 Woehler, Charles G., Minneapolis

Electrical Engineers—40

Aaby, Alvin G., Hayfield
 Abbott, Amos H., St. Paul
 Anderson, George N., Monticello
 Atkins, Charles P., St. Paul
 Bredeson, Collen, Minneapolis
 Carlson, Richard P., Minneapolis
 Clarke, Samuel E. B., Minneapolis
 Eggers, Henry C. T., Minneapolis
 Ellefson, Selmer, Canby
 Ellsworth, Luther, Cannon Falls
 Erickson, Edwin L., Aitkin
 Freeman, Edward W., Minneapolis
 Gilbert, Charles S., White Bear
 Hammarsten, Conrad, Cokato
 Hanna, Cardwell M., Duluth
 Hillgren, Harvey A., Minneapolis
 Hjermstad, Harry M., Red Wing
 Holmberg, John, Minneapolis
 Hult, George A., Minneapolis
 Jessup, W. R., Minneapolis

Knutson, George, Minneapolis
 Lawrence, Scott, Montevideo
 Lilly, Clarence, Onida, S. D.
 Lutz, Richard E., Mantorville
 McKey, Forest P., Albert Lea
 Martin, Wayne P., St. Louis Park
 Nortner, Sylvester E., Minneapolis
 Peterson, Carl M., Minneapolis
 Picha, Benjamin, New Prague
 Skagerberg, Rutchter, Cloquet
 Swanson, Earl R., Hager City, Wis.
 Tallmadge, Hiram, Minneapolis
 Thompson, Harry T., Blair, Wis.
 Turner, Roy H., Minneapolis
 Wandel, George H., Pine City
 Ware, Tom T., Ft. Scott, Kansas
 Welch, William H., St. Paul
 Wells, Zelora B., Mankato
 Wilcox, Halsey H., Montevideo
 Winkes, Frank, Wheaton

Mechanical Engineers—33

Baker, Clarence, Morton
 Boyles, Ralph R., St. Paul
 Brown, Homer L., Minneapolis
 Caesar, John, Jr., Stillwater
 Crosly, Milton E., Minneapolis
 Dresser, Harry S., Minneapolis
 Eldredge, Asa A., St. Paul
 Eldredge, Eugene, St. Paul
 Foque, Edwin N., Medford, Mass.
 Gerlach, Arthur C., West Bend, Wis.
 Gerten, Frank L., Gladstone
 Hagen, Ralph, Minneapolis
 Jaqua, John R., Minneapolis

Larson, Alvin H., Henderson
 Lindgren, Leonard W., St. Paul
 Lofstrom, Martin E., Cambridge
 Mason, Arthur P., Minneapolis
 Miller, William C., St. Paul
 Mixer, Walter R., St. Paul
 Moody, Chester, Minneapolis
 Nelson, Rockwood, Minneapolis
 Passer, Clarence W., Waseca
 Pearson, Albin S., Hudson, Wis.
 Roberts, Earl H., Minneapolis
 Rollmann, Edwin, Minneapolis
 Rush, James H., Minneapolis

Serum, Mark M., Jackson
 Skon, Herman W., St. Paul
 Smart, George A., St. Cloud

Stone, Charles W., Minneapolis
 Thayer, Raymond C., Minneapolis
 Waldron, Ralph E., Minneapolis
 Wolff, William S., St. Paul

IRREGULAR—21

<i>Arch.</i>	Allbee, S. Pierce, New Richmond, Wis.	<i>Arch.</i>	Haslund, Roy H., Minneapolis
<i>Civil</i>	Bolmgren, Ernest W., Minneapolis	<i>Civil</i>	Knox, Charles R., Fairmont
<i>Civil</i>	Brinsmaid, Charles C., Minneapolis	<i>Civil</i>	Kratka, Frank H., Jr., Thief River Falls
<i>Elect.</i>	Brooks, Robert L., Minneapolis	<i>Arch.</i>	Lamoreaux, Leigh C., Minneapolis
<i>Civil</i>	Clark, Percy M., Minneapolis	<i>Elect.</i>	Lanzen, William J., Minneapolis
<i>Arch.</i>	Cobb, DeWitt I., Minneapolis	<i>Elect.</i>	Mertz, Karl J., Hastings
<i>Civil</i>	Estabrook, Joseph B., Minneapolis	<i>Civil</i>	Miller, Wilbur A., Long Prairie
<i>Civil</i>	Foster, Leslie W., Minneapolis	<i>Mech.</i>	Moore Clinton K., Minneapolis
<i>Civil</i>	Godette, William M., St. Paul	<i>Civil</i>	Onstad, Olaf., Minneapolis
	<i>Elect.</i> White, Charles W., Minneapolis	<i>Elect.</i>	Strong, George E., St. Paul
		<i>Arch.</i>	Turner, Howard A., Minneapolis

The University of Minnesota

CORRESPONDENCE COURSES

1912-1913



BULLETIN OF THE UNIVERSITY OF MINNESOTA

VOL. XV, NO. 20. OCTOBER 1912

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college and one for the Summer Session is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota

TABLE OF CONTENTS

The University	7
Calendar	4
Colleges and Schools	7
The Board of Regents	8
The Executive Officers	8
Correspondence-Study Courses	
Faculty of Instruction	9
General Information	11
Courses of Instruction	
Economics and Political Science	15
Business Law	17
Accounting	18
Education and Psychology	18
German	20
Greek	21
History	22
Latin	23
Literature and Rhetoric	24
Mathematics	25
Philosophy	26
Science	26
Romance Languages	28
Scandinavian Languages	29

1912							1913																				
JULY							JANUARY							JULY													
Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa							
..	1	2	3	4	5	6	..	..	..	1	2	3	4	..	..	1	2	3	4	5		
7	8	9	10	11	12	13	5	6	7	8	9	10	11	6	7	8	9	10	11	12							
14	15	16	17	18	19	20	12	13	14	15	16	17	18	13	14	15	16	17	18	19							
21	22	23	24	25	26	27	19	20	21	22	23	24	25	20	21	22	23	24	25	26							
28	29	30	31	..	..	..	26	27	28	29	30	31	..	27	28	29	30	31	..	..					
..							
AUGUST							FEBRUARY							AUGUST													
..	..	..	..	1	2	3	..	..	..	..	..	1	..	..	..	..	..	..	1	2
4	5	6	7	8	9	10	2	3	4	5	6	7	8	3	4	5	6	7	8	9							
11	12	13	14	15	16	17	9	10	11	12	13	14	15	10	11	12	13	14	15	16							
18	19	20	21	22	23	24	16	17	18	19	20	21	22	17	18	19	20	21	22	23							
25	26	27	28	29	30	31	23	24	25	26	27	28	..	24	25	26	27	28	29	30							
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..	..	..	
SEPTEMBER							MARCH							SEPTEMBER													
1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	..	1	2	3	4	5	6			
8	9	10	11	12	13	14	4	5	6	7	8	9	10	11	12	13	7	8	9	10	11	12	13	
15	16	17	18	19	20	21	9	10	11	12	13	14	15	14	15	16	17	18	19	20	14	15	16	17	18	19	20
22	23	24	25	26	27	28	16	17	18	19	20	21	22	21	22	23	24	25	26	27	21	22	23	24	25	26	27
29	30	23	24	25	26	27	28	29	28	29	30	28	29	30
..	30	31
OCTOBER							APRIL							OCTOBER													
..	..	1	2	3	4	5	..	..	1	2	3	4	5	..	..	..	1	2	3	4		
6	7	8	9	10	11	12	6	7	8	9	10	11	12	5	6	7	8	9	10	11							
13	14	15	16	17	18	19	13	14	15	16	17	18	19	12	13	14	15	16	17	18							
20	21	22	23	24	25	26	20	21	22	23	24	25	26	19	20	21	22	23	24	25							
27	28	29	30	31	..	..	27	28	29	30	..	..	..	26	27	28	29	30	31	..		
..							
NOVEMBER							MAY							NOVEMBER													
..	..	..	..	..	1	2	..	..	..	..	1	2	3	..	..	..	..	..	..	1
3	4	5	6	7	8	9	4	5	6	7	8	9	10	2	3	4	5	6	7	8							
10	11	12	13	14	15	16	11	12	13	14	15	16	17	9	10	11	12	13	14	15							
17	18	19	20	21	22	23	18	19	20	21	22	23	24	16	17	18	19	20	21	22							
24	25	26	27	28	29	30	25	26	27	28	29	30	31	23	24	25	26	27	28	29							
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..	
DECEMBER							JUNE							DECEMBER													
1	2	3	4	5	6	7	1	2	3	4	5	6	7	..	1	2	3	4	5	6							
8	9	10	11	12	13	14	8	9	10	11	12	13	14	7	8	9	10	11	12	13							
15	16	17	18	19	20	21	15	16	17	18	19	20	21	14	15	16	17	18	19	20							
22	23	24	25	26	27	28	22	23	24	25	26	27	28	21	22	23	24	25	26	27							
29	30	31	..	..	..	..	29	30	..	..	..	..	..	28	29	30	31	..	..	..				

UNIVERSITY CALENDAR

1912-1913

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

1912

September	3	Tuesday	Registration closes except for new students
September	3-10	Week	Fees payable except for new students
September	10-16	Week	Entrance examinations, registration of new students, and payment of fees
September	11-17	Week	Military encampment of cadets
September	18	Wednesday	First semester begins
November	27	Wednesday	Thanksgiving recess begins 6:00 p. m.
December	2	Monday	Thanksgiving recess ends 8:00 a. m.
December	20	Friday	Christmas vacation begins 6:00 p. m.

1913

January	7	Tuesday	Christmas vacation ends 8:00 a. m.
January	21	Tuesday	Registration for second semester closes
January	27	Monday	Final examinations begin
January	28	Tuesday	Payment of fees for second semester closes
February	5	Wednesday	Second semester begins
February	12	Wednesday	Lincoln's Birthday: a holiday
February	13	Thursday	First semester class reports due
February	22	Saturday	Washington's Birthday: a holiday
March	19	Wednesday	Easter recess begins 6:00 p. m.
March	27	Thursday	Easter recess ends 8:00 a. m.
May	30	Friday	Decoration Day: a holiday
June	2	Monday	Final examinations begin
June	7	Saturday	Second semester closes
June	8	Sunday	Baccalaureate service
June	9	Monday	Senior class day exercises
June	11	Wednesday	Alumni Day
June	12	Thursday	Forty-first Annual Commencement
June	13	Friday	Summer vacation begins

The University year for 1913-14 will begin Tuesday, September 9.

THE UNIVERSITY

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges, and departments:

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 SCHOOL OF AGRICULTURE, including—

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

TEACHERS' SUMMER TRAINING SCHOOL

THE SCHOOL OF TRACTION ENGINEERING

THE SCHOOL OF AGRICULTURE, CROOKSTON

THE SCHOOL OF AGRICULTURE, MORRIS

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE SUB-STATION AT DULUTH

THE SUB-STATION AT WASECA

THE SUB-STATION AT ZUMBRA HEIGHTS

AGRICULTURAL EXTENSION

BUREAU OF RESEARCH IN AGRICULTURAL ECONOMICS

THE LAW SCHOOL

THE COLLEGE OF MEDICINE AND SURGERY, 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 GEOLOGICAL AND NATURAL HISTORY SURVEY

THE BOARD OF REGENTS

The Hon. JOHN LIND, Minneapolis, President of the Board	-	-	1914
GEORGE EDGAR VINCENT, Ph.D., LL.D., Minneapolis	-	-	<i>Ex-Officio</i>
The President of the University			
The Hon. ADOLPH O. EBERHART, Mankato	-	-	<i>Ex-Officio</i>
The Governor of the State			
The Hon. C. G. SCHULTZ, St. Paul	-	-	<i>Ex-Officio</i>
The State Superintendent of Public Instruction			
The Hon. W. J. MAYO, Rochester	-	-	1913
The Hon. MILTON M. WILLIAMS, Little Falls	-	-	1913
The Hon. HENRY B. HOVLAND, Duluth	-	-	1914
The Hon. A. E. RICE, Willmar	-	-	1915
The Hon. CHARLES L. SOMMERS, St. Paul	-	-	1915
The Hon. B. F. NELSON, Minneapolis	-	-	1916
The Hon. PIERCE BUTLER, St. Paul	-	-	1916
The Hon. CHARLES A. SMITH, Minneapolis	-	-	1916

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 F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature, and the Arts
 FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and Mechanic Arts
 ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture
 WILLIAM R. VANCE, Ph.D., LL.B., Dean of the Law School
 FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery
 ALFRED OWRE, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry
 FREDERICK J. WULLING, Ph.D., LL.M., Dean of the College of Pharmacy
 WILLIAM R. APPLEBY, M.A., Dean of the School of Mines
 GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry
 GEORGE F. JAMES, Ph.D., Dean of the College of Education
 HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School
 MARGARET SWEENEY, Ph.D., Dean of Women

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.
 SAMUEL QUIGLEY, M.A., Director of the Extension Division, Assistant
 Professor of Education 525 11th Ave. S. E.
 FRANK MALOY ANDERSON, M.A., Professor of History
 1629 University Ave. S. E.
 CHARLES MARTIN ANDRIST, M.L., Professor of French
 706 Delaware St. S. E.
 CHARLES W. BENTON, Litt.D., Professor, Head of Department of Ro-
 mance Languages 516 9th Ave. S. E.
 GISLE BOTHNE, M.A., Professor, Head of Department of Scandinavian
 Languages and Literatures 1105 6th St. S. E.
 WILLIAM E. BROOKE, B.C.E., M.A., Professor of Mathematics and
 Mechanics 416 Walnut St. S. E.
 OSCAR C. BURKHARD, M.A., Assistant Professor of German
 719 E. River Road
 JOHN SINCLAIR CLARK, B.A., Professor of Latin Language and Literature
 729 10th Ave. S. E.
 FREDERIC EDWARD CLEMENTS, Ph.D., Professor of Botany, Head of
 Department of Botany 800 4th St. S. E.
 WILLIAM STEARNS DAVIS, Ph.D., Professor of Ancient History
 806 6th St. S. E.
 JOHN FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics and
 Political Science 312 State St. S. E.
 JULES T. FRELIN, B.A., Assistant Professor of French
 112 Church St. S. E.
 JOHN EVENSON GRANRUD, Ph.D., Professor of Latin
 605 Delaware St. S. E.
 JOHN CORRIN HUTCHINSON, B.A., Professor of Greek, Head of Depart-
 ment of Greek 3806 Blaisdell Ave.
 WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive
 Geometry 217 Beacon St. S. E.
 EDWARD M. LEHNERTS, M.A., Assistant Professor of Geography
 800 4th St. S. E.
 JAMES BURT MINER, Ph.D., Assistant Professor of Psychology
 428 Walnut St. S. E.
 THOMAS WARNER MITCHELL, Ph.D., Assistant Professor of Business
 Administration 1092 15th Ave. S. E.
 JOHN G. MOORE, B.A., Professor, Head of Department of German
 2810 University Ave. S. E.

- WALLACE NOTESTEIN, Ph.D., Assistant Professor of History
112 Church St. S. E.
- JOSEPH BROWN PIKE, M.A., Professor of Latin, Head of Department of
Latin 1025 6th St. S. E.
- ALBERT WILLIAM RANKIN, B.A., Professor of Education
916 5th St. S. E.
- CHARLES ALBERT SAVAGE, Ph.D., Professor of Greek
618 12th Ave. S. E.
- ANDREW A. STOMBERG, M.S., Professor of Scandinavian Languages and
Literatures 531 Walnut St. S. E.
- FLETCHER HARPER SWIFT, Ph.D., Professor of Education
215 Walnut St. S. E.
- LOUIS D. H. WELD, Ph.D., Assistant Professor, Extension Work in
Economics and Political Science 1011 8th St. S. E.
- NORMAN WILDE, Ph.D., Professor of Philosophy and Psychology, Head
of Department of Philosophy and Psychology 901 6th St. S. E.
- ALFRED B. BALCOM, B.S., M.A., Instructor, Extension Work in Eco-
nomics and Political Science 424 Harvard St. S. E.
- ARTHUR C. BURKHARD, M.A., Assistant in German 410 17th Ave. S. E.
- JAMES DAVIES, Ph.D., Instructor in German 616 12th Ave. S. E.
- RENE M. DELAMARE, B.L., Instructor in French 501 8th Ave. S. E.
- J. THEODORE GEISSENDOERFER, Ph.D., Instructor in German
223 Harvard St. S. E.
- ALFRED E. KOENIG, M.A., Instructor in German 977 14th Ave. S. E.
- HYME LOSSE, B.A., Assistant in French 613 4th St. N.
- CARL M. MELOM, M.A., Instructor in Spanish and French
112 Arthur Ave. S. E.
- LEON METZINGER, Ph.B., Instructor in German 979 14th Ave. S. E.
- GEORGE NORTON NORTHROP, M.A., Instructor in English
2213 Grand Ave.
- LUTHER WOOD PARKER, M.A., Instructor in French
1005 University Ave. S. E.
- RAYMOND V. PHELAN, Ph.D., Instructor, Extension Work in Economics
612 10th Ave. S. E.
- RUTH SHEPARD PHELPS, M.A., Instructor in Italian
East Sanford Hall
- CHARLES H. PRESTON, B.A., Instructor, Extension Work in Economics
and Political Science 94 Malcolm Ave. S. E.
- THEOPHILUS H. SCHROEDEL, B.A., Instructor in German
977 14th Ave. S. E.
- HERMON L. SLOBIN, Ph.D., Instructor in Mathematics
1514 Brook Ave. S. E.
- HELEN A. WHITNEY, M.A., Instructor in Rhetoric 1221 5th St. S. E.
- RICHARD WISCHKAEMPER, M.A., Instructor in German
504 Beacon St. S. E.

CORRESPONDENCE-STUDY COURSES

GENERAL INFORMATION

The developments of the last few years have clearly demonstrated the effectiveness of, and the necessity for, university teaching by correspondence. The foremost American universities have recently recognized this opportunity for specific service by extending their work beyond the lecture room and the campus, in order to reach students who are unable to comply with the traditional limitations of university and college study.

In thus extending its functions, the University offers a plan of practical instruction whereby collegiate training is made available in every section of the State and to those who of necessity must devote a part of their time to other duties. Although such instruction can not compensate for the lack of a complete cultural or professional course, taken in residence, it makes available to persons unable to attend the University, an opportunity to study along lines best adapted to their respective needs and interests.

By a careful economy of time, it is possible to contribute largely to the requirements for a B.A. degree, by combining work in residence at the University Summer Session, with correspondence study under the University Extension Division.

SCOPE OF THE WORK

The subjects offered cover a wide range and give sufficient material for the needs of numbers of men and women intent on further study. Mathematics and certain lines of natural science, language and literature, history, politics, economics, and the elements of philosophical and other social sciences, afford a considerable breadth of selection.

CORRESPONDENCE STUDENTS

Correspondence teaching is of significance to several kinds of students: to the teacher, whom experience has taught the need for further study for individual satisfaction and professional efficiency; to the college graduate, who desires to take up some study which he did not pursue in his resident work; to the man or woman, who left school early and who now feels the value of broader training to make either life more interesting or work more productive, and to the young high school graduate

who desires to begin his college course. When correspondence teaching is fully developed, it can offer something to every one in the community, whatever his age, training, occupation, or interests. Even at the present stage, it meets the needs of very considerable numbers and many different classes.

CONDITIONS OF ADMISSION

For reasons already suggested, the courses selected fit rather closely the needs and attainments of men and women who have already finished the public high school. Maturity and experience in life and affairs, however, will be accepted as sufficient preparation for some studies even though the applicant has never completed a high school course. All of the work announced can be satisfactorily completed by correspondence, but in every case resident study at the University, either in the summer or during the academic year, will serve as a valuable introduction to new branches, or a more effective rounding up of subjects previously pursued.

All men and women who seem qualified to pursue successfully the courses offered will be admitted to registration without formal examination, but the University reserves the right in each case of advising a change in the election of courses as well as requiring preliminary work before enrollment is accepted.

CREDIT FOR WORK

To students who can not meet the regular University entrance requirements, no credit is given beyond a statement of efficiency when courses are successfully completed. University credits are reserved for those who have already met the usual requirements of college entrance and who have done satisfactory work in the branches chosen. Credit toward the professional state teacher's certificate will be allowed only to such students as are now admitted to examination by the committee acting for the State Department of Public Instruction. Reports of successful work under correspondence teaching of this University will be duly credited on teacher's certificates. University credits allowed in this connection will be recorded separately until the student matriculates at the University, when they will be recorded permanently as University credits.

INSTRUCTORS

The correspondence teaching is done by instructors from the various faculties in the University, who are in continuous charge of similar courses and who are familiar with the needs of non-resident students. The courses outlined are not mere duplicates of university work, but have been outlined and will be administered in such a way as to take advantage of the broader experience of the mature non-resident student and to make this experience serve as far as possible instead of the more intensive reading of the college student.

THE UNIT COURSE

The courses are arranged in series of twenty-four or more lessons. The unit is twenty-four lessons, taken to represent the equivalent of three recitations or lectures each week during one half-year. Forty lessons usually represent five recitations weekly for a half-year, and the same proportion between hours and credits will be ordinarily observed in courses of either more or less than twenty-four lessons.

ASSIGNMENTS

Lesson assignments will be sent out to correspondence students, not singly, but in groups varying with the nature and length of the course. From two to five lessons may be sent at one time, on which reports are to be returned, normally, in from two to three weeks, as may be directed. A unit course of twenty-four lessons sent out in groups of three, each to be returned within three weeks, will require, therefore, six months for completion, but a time allowance of one year is given for each course, not counting such interruptions as may occur from the absence of the instructor from the University during vacations or the presence of the student at the University during the summer or other terms.

EXAMINATIONS

All students who desire credit in any course will submit to an examination, either at the University or, by arrangement, in their home town under the supervision of an accredited representative of the University.

FEES

The fee which has been tentatively fixed for correspondence courses of twenty-four lessons each is ten dollars, payable in advance. Wherever the greater length of a course or the greater expense of its conduct, owing to its special nature, makes a larger fee necessary, the statement will be made in the proper connection in the printed description. After registration no fees are returned in whole or in part.

LOAN OF BOOKS

Books are loaned to correspondence students, in so far as such practice is consistent with the regular use of the library. The period of loan is one month. The student is expected to pay the express both ways. No other expense is attached to this if the books are returned in good condition.

CLASS WORK

The work here offered is primarily for individual students. When a group of some size is pursuing a particular course, however, in any

community, the University offers to send an instructor at a nominal charge of five dollars for each visit, in order to direct personally either in the beginning of the term or occasionally at intervals the studies of the group.

HOW TO ENROLL

1. Apply to the Director of the Extension Division for the courses that you wish to pursue.
2. You will receive a registration blank, if the course is available, and also a statement of the fee due.
3. Fill out the registration blank completely and return it together with the fee and statement to Director of Extension Division, University of Minnesota, Minneapolis.
4. The fee will be turned over to the Comptroller and his receipt, together with the first lessons, will be sent to you.
5. Your permanent record will be opened in the office of Extension Division.

HOW TO SEND MONEY

By post office or express money order, personal check, or draft. **MAKE ALL CHECKS AND ORDERS PAYABLE TO THE UNIVERSITY OF MINNESOTA.** Always address the Director of the Extension Division at the University of Minnesota, Minneapolis.

AGRICULTURAL EXTENSION

Agricultural extension including lectures, demonstrations, institutes, and short courses will be carried on as usual under the direction of the Extension Division of the College of Agriculture. Address all inquiries regarding such work to the Extension Division, University Farm, St. Paul, Minnesota.

UNIVERSITY WEEKS

Supplementary plans of University co-operation with local educational effort as exemplified in one way by the "University Weeks," first organized in June, 1912, will again be considered by the University and correspondence is invited on that subject.

INQUIRIES

Address all inquiries except those relating to distinctly agricultural extension work to Director of Extension Division, 319 Folwell Hall, University of Minnesota, Minneapolis.

From this office you will receive application blanks for lectures and correspondence courses, and answers to all kinds of inquiries relative to courses, lectures, and plans for other extension features.

COURSES OF INSTRUCTION

ECONOMICS AND POLITICAL SCIENCE

1. Elements of Economics Mr. BALCOM

Twenty-four lessons (three university credits).

This course aims to ground the student in principles that are basic in all economic discussions. The study naturally centers in value and the laws of valuation under the various applications.

Topics: Utility and valuation; price and the laws of price as applied to competitive and monopolistic conditions; price and the cost of production; the factors of production; the law of diminishing returns; division of labor and its relation to the development of industry; the forces and factors involved in the concentration of industry, including the difference between the agricultural and the mechanical industries; wages, rent, interest, capitalization, enterprise, and business profits; finally, some attention is given to money, credit, banking, and international trade.

2. Labor Problems, Part I Mr. PHELAN

Twenty-four lessons (three university credits).

Modern labor problems; woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work. Lectures, text-books, assigned readings.

Labor Problems, Part II Mr. PHELAN

Twenty-four lessons (three university credits).

Profit sharing, cooperation, labor unions, strikes, boycotts, conciliation and arbitration; immigration: causes, effects, remedies. Lectures, text-books, assigned readings.

Both courses must be completed before credit is given for either.

3. Economic Reforms Mr. PHELAN

Twenty-four lessons (three university credits).

Aristocracy versus democracy in economics; competition, socialism, and state regulation plus education as means of achieving economic justice; special attention to socialism as a philosophy of industrial evolution and a program of economic reform, and to the alternative of adequate, reasonable, and efficient public regulation of private economics. Lectures and assigned readings.

4. Currency and Credit Mr. EBERSOLE

Twenty-four lessons (three university credits).

The subject matter of this course constitutes the necessary basis of a thorough understanding of the principles of currency, banking, and finance. It comprehends a careful study of theories of money and credit,

the origin and evolution of banking, the banking and currency systems of the chief commercial countries, and the operations of the domestic and foreign exchanges. Current questions of banking practice, currency, and financial legislation, and the seasonal phase of the American money market will be separately treated. Prescribed text-books and the library facilities of students are utilized as far as practicable, and are supplemented by official publications, detailed explanations, and illustrations.

Topics: The nature and functions of money, the medium of exchange and the standard of value; the theory of value and prices; metallic money, government paper money, and bank currency; forms and characteristics of credit currency, the limits of its use, its regulation and safety; a comparative examination of the chief banking systems of the world; banking machinery and methods; the foreign exchanges; the money market and the bank rates; the theory and history of bimetallism.

5. Banking Practice

Mr. EBERSOLE

Twenty-four lessons (three university credits).

This course is designed to explain the various functions of the up-to-date bank, and to teach the methods by which its work is accomplished. Financial theory forms no part of the course, but a knowledge of the theoretical principles of money and banking or the simultaneous study of Course 2 will prove a decided advantage to the student.

This work will include a careful study of organization, records, and accounts, mechanism, and methods of large commercial institutions having a full complement of banking operations, including city, country, and foreign business. While the instruction comprehends the business and methods of banks in general, the student can readily make necessary deductions to meet the needs of small institutions or of specialized business.

Special instruction will be given on the operation of recent currency legislation, the work of the U. S. Monetary Commission and the technical operations of the money market.

Topics: Among the subjects treated are: bank organization; duties and liabilities of stockholders, directors, and officers; departmental organization and functions; duties of tellers, clerks, and book-keepers; work of collection and credit departments; bank currency; the reserve; examination, statements, and reports; organization of clearing houses; comparative methods of commercial and savings banks; the foreign department and international exchange; law of commercial paper, bank investment, and the investment of trust funds.

6. Railway Transportation

Mr. WELD

Twenty-four lessons (three university credits).

This course constitutes a comprehensive study of the economic aspects of transportation. It deals with the financial and administrative organization of the railway business and with the relations between

the railroads and other branches of industry. Considerable attention is given to state and federal supervision, including the work of the State Railway Commissions, the Interstate Commerce Commission, and decisions of the U. S. Supreme Court.

Topics: Transportation in the United States prior to 1830; the origin and development of steam locomotion; early ventures in railway control; the organization of the present system, including the freight, passenger, mail, and express service; railway statistics; the practice of freight classification and rate making; railway legislation: the Granger laws and decisions, the Interstate Commerce Act and its expansion, prevailing state regulations, the Anti-Trust Act in its relation to railways, foreign railway laws and systems; current railway problems: competition and consolidation, discrimination and rebates, state and federal regulation, and public ownership.

BUSINESS LAW

7. Contracts and Agency

Twenty-four lessons (three university credits).

The general rules of contracts being fundamental to all work in business law, this course should precede the others.

Contracts.—Formation of contracts, offer and acceptance, consideration, capacity of parties, minors, married women, misrepresentation, fraud, legality of object, the operation of contracts, interpretation of contracts, methods of discharging contracts.

Agency.—Methods of forming the relation of agency, who may act as agent, who may act as principal, liabilities of principal to third parties, liabilities of agents, termination of agency.

8. Sale and Negotiable Instruments

Twenty-four lessons (three university credits).

Sales of personal property; definition of a sale, when the title passes to the buyer; rights of the seller (a) to set the contract aside on the ground of fraud; (b) the sellers' lien for the purchase money; (c) right of stoppage in transit; rights of the purchaser, (a) to demand goods of a certain quality; (b) warranty of the purchaser's title.

Sales of real property: (a) the formation of the contract to sell real property; (b) the conveyance; (c) recording, rights and obligations of the seller of realty to the purchaser; rights and obligations of the purchaser towards the seller.

Negotiable instruments, nature and characteristics: (a) definition; (b) the uniform negotiable instrument law, essentials, non-essentials, negotiations, indorsement and delivery, holder in due course and his rights, notice of dishonor, protest, checks.

9. Partnerships, Joint Stock Companies, and Corporations

Twenty-four lessons (three university credits).

Formation of partnerships; articles of co-partnership; methods of terminating partnerships; rights and obligations of partners; (a) toward co-partners, (b) toward the firm's creditors. Special partners, limited partnerships.

Joint stock companies: how distinguished from ordinary partnerships; how like ordinary partnerships; statutory requirements.

Corporations: formation of corporations of various classes, membership in corporations, methods of transferring interest, rights of stockholders (a) to dividends, (b) to inspect and control corporate affairs; liabilities of stockholders (a) on stock subscriptions, (b) to pay assessments. Duties of officers and directors. Discussions of trusts and holding companies. Doctrine of ultra vires.

ACCOUNTING

10. Principles of accounting

Twenty-four lessons (three university credits).

The meaning of debit and credit. Applications of the principles to the journal, cash book, sales book, and purchase book. Exercises in posting to the ledger. Interpretation of accounts, losses, gains, assets, liabilities, and balance sheets. Columnar books of original entry. Practical work in making up a set of books.

11. Manufacturing and Cost Accounting

Twenty-four lessons (three university credits). Accounting (a) is required as the basis for the work.

An explanation of the adaptation of the principles of accounting to manufacturing industries. The trading account, the manufacturing account, columnar manufacturing books, ledger systems, classification of capital and revenue accounts, discussion of depreciation, good-will, etc.

Cost accounts: the need for a cost system in every plant, the material ledger, cost records, methods of distribution of "over-head" expense; the machine rate method, the percentage method; the cost ledger, methods of rate for labor, time rate, piece rate, etc.

EDUCATION AND PSYCHOLOGY

1. Introductory Psychology

Mr. MINER

Forty lessons (three university credits). One-half credit toward Psychology on the State Professional Teacher's Certificate.

The purpose of this course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology.

2. Educational Psychology

Mr. MINER

Twenty-four lessons (three university credits). One-half credit toward Psychology on the State Professional Teacher's Certificate.

The study of mental development in its relation to heredity and training, with an investigation of the facts and theories of childhood and adolescence with special reference to their bearing on education.

3. History of Education: Ancient and Medieval Mr. SWIFT
Twenty-four lessons (three university credits). One-half credit toward History of Education on the State Professional Teacher's Certificate.

An introductory study in the history of education, with special attention to the education of Greece, Rome, and the early Christian centuries, to the development of different types of schools in medieval times, and to the rise of the universities and of the humanistic schools of the Renaissance. The course is designed to arouse an interest in educational problems, to secure some perspective for use in current investigation, and to give some command of the facts of educational history and some facility in the methods of historical investigation. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions.

4. History of Education: Modern Mr. SWIFT
Twenty-four lessons (three university credits). One-half credit toward History of Education on the State Professional Teacher's Certificate.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

5. Theory of Teaching Mr. QUIGLEY
Twenty-four lessons (three university credits). One-half credit toward General Pedagogy on the State Professional Teacher's Certificate.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching, with an interpretation of the fundamental facts of psychology as applied to the problems of education.

6. Philosophy of Education Mr. QUIGLEY
Twenty-four lessons (three university credits). One-half credit toward General Pedagogy on the State Professional Teacher's Certificate.

An endeavor to correlate the various educational ideals drawn from biological and psychological studies, with special consideration of recent social phases of education. An attempt to answer the question, "What does education mean to-day?"

7. School Organization and Law

Mr. RANKIN

Twenty-four lessons (three university credits). Credit for School Organization and Law on the State Professional Teacher's Certificate.

A comprehensive course in the organization and management of schools in American communities, with special reference to the duties of school boards and school superintendents, principals, and teachers, to the methods and equipment proper to schools of various grades, and to the main facts in the school law of Minnesota.

8. Industrial Education

Mr. RANKIN

Twenty-four lessons (three university credits).

The principles fundamental to vocational training in the public school system, as affecting the arrangement of school years, the course of study, and the methods of teaching.

GERMAN

1. Beginning German

Forty lessons each semester (ten university credits); both semesters. Open to all who have had no German. Juniors and seniors receive only half credit. Both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2. Intermediate

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1 or its equivalent. Both semesters must be completed before credit is given for the first semester. Students who obtain credit for this course can not receive credit also for Course 4.

First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe, or Schiller.

3. Prose and Poetry

Twenty-four lessons each semester (six university credits); both semesters. Open to all with two years of German. Not open to those who have obtained credit in Course 2. Both semesters must be completed before credit is given for the first semester.

Stern's *Aus deutschen Meisterwerken*; Goethe's *Gedichte*; Heine's *Buch der Lieder*. Geography, history, and legend. Review of German grammar throughout the year.

4. Elementary Conversation and Composition

Sixteen lessons each semester (four university credits); both semesters. Open to those who are taking or have taken Course 2 or 4. Both semesters must be completed before credit is given for the first semester.

Translation of short English selections; conversation on topics of every-day life; narrative and descriptive essays and letter writing.

5. The Drama

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have taken Courses 1 and 2, or Course 4. Both semesters must be completed before credit is given for first semester.

First semester: Modern drama. Plays of Hebbel, Hauptmann, or Sudermann. Study of the present-day drama in Germany. Assigned readings and reports. Second semester: Classic drama. Plays of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

6. Advanced Conversation, Grammar, and Composition

Sixteen lessons each semester (four university credits); both semesters. Open to those who have taken Course 6. Required of those who obtain a teacher's recommendation in German. Both semesters must be completed before credit is given for the first semester.

Essays on assigned subjects; oral exercises in German by means of discussions on every-day subjects; debates, narration, and the like.

GREEK

1. Beginning Greek

Mr. SAVAGE

Forty lessons each semester (ten university credits); both semesters. Open to those qualified, who have had no Greek. Both semesters must be completed before credit is given for the first semester.

The declensions and conjugations and the simpler rules of syntax, together with sentences based on the vocabulary of the Anabasis, and translation into Greek of idiomatic English sentences based upon the same text.

The Anabasis itself, an amount equivalent to about a book; Hadley's Greek Grammar; etymology reviewed and syntax studied sufficiently to enable the student to proceed confidently in the translation of the text; translation from English into Greek continued.

2. Essentials of New Testament Greek

Mr. HUTCHINSON

Twenty-four lessons (three university credits).

An elementary course in beginning Greek based on the New Testament. Open to those who desire merely to be able to use the New Testament in the original.

3. Elementary Course in Homer

Mr. HUTCHINSON

Twenty-four lessons (three university credits). Open to those who have read in Greek prose the equivalent of at least three books of the Anabasis.

4. Elementary Course in the Drama Mr. SAVAGE
 Twenty-four lessons (three university credits). Open to those who have read at least two books of Homer in addition to the prose equivalent of at least three books of the Anabasis.

HISTORY

1. Ancient History, Part I: Greek Mr. DAVIS
 Twenty-four lessons (three university credits). One-half credit toward Ancient History on the State Professional Teacher's Certificate.
 This course includes a brief preliminary survey of Egypt and Babylonia, showing their influence on later civilizations, followed by a study of Greek history, with special stress on the development of Sparta and Athens, the Persian Wars, the Age of Pericles, the inter-relation of politics with the artistic and literary development and finally the conquests of Alexander and the diffusion of Greek civilization over the East.
2. Ancient History, Part II: Roman Mr. DAVIS
 Twenty-four lessons (three university credits). One-half credit toward Ancient History on the State Professional Teacher's Certificate.
 A course in Roman history, including the rise of Rome from a petty city to the position of mistress of the ancient world, the great struggle with Carthage, the causes that led to the fall of the Republic, the transition to the Empire, and its decline and fall, with special emphasis on the effect of imperial institutions on modern civilization.
3. Modern History, Part I Mr. NOTESTEIN
 Twenty-four lessons (three university credits). One-half credit toward Modern History on the State Professional Teacher's Certificate.
 A study of the growth of civilization in Western Europe, with special emphasis on social and institutional development from the time of Charlemagne to the Peace of Westphalia; 800-1648 A. D.
4. Modern History, Part II Mr. NOTESTEIN
 Twenty-four lessons (three university credits). One-half credit toward Modern History on the State Professional Teacher's Certificate.
 A study of European history from the beginning of the modern period, with special emphasis on the growth of Prussia, the French Revolution, and the various lines of political, social, and industrial development in the nineteenth century.
5. United States History, Part I Mr. ANDERSON
 Twenty-four lessons (three university credits). One-half credit toward United States History on the State Professional Teacher's Certificate.
 This is the first half of a comprehensive course in American history. About two thirds of Part I is devoted to the colonial period, the remainder

to the Revolution and the closing years of the eighteenth century. The work consists of a study of the text, supplemented by a considerable amount of source study and collateral reading. The student is required to prepare written answers to questions based on the text and on the supplementary readings.

6. United States History, Part II

Mr. ANDERSON

Twenty-four lessons (three university credits). One-half credit toward United States History on the State Professional Teacher's Certificate.

A continuation of Part I, devoted mainly to a study of the period from the beginning of the nineteenth century down to 1861, with a brief survey in conclusion of the principal events from that time to the present.

LATIN

1. The Orations of Cicero

Mr. GRANRUD

Forty-eight lessons (six university credits).

This course includes six of the orations generally read in high schools, exercises in Latin composition, and a study of the life and times of Cicero. Open to those who have completed two years of preparatory Latin.

Text-books: Bishop, King, and Helm's *Cicero, Ten Orations and Letters*, Bennett's *Latin Grammar*, and D'Ooge's *Latin Composition*. The student will also be required to read and report on Strachan-Davidson's *Cicero* and *The Fall of the Roman Republic*.

2. Virgil's *Aeneid*

Mr. CLARK

Forty-eight lessons (six university credits). Open to those who have completed three years of preparatory Latin.

The course will cover the first six books of the *Aeneid* and include the study of the life and times of Virgil, the principles of Latin prosody, the literary style of the *Aeneid*, and, to a limited extent, Roman mythology.

Text-books: Virgil's *Aeneid* by Charles Knapp, Bennett's *Latin Grammar*. The student will, besides, be expected to read and report on Sellar's *Virgil*.

3. Livy, Book I

Twenty-four lessons (three university credits). Open to those who have completed four years of preparatory Latin.

The work will comprise the study of the text, the life, times, and literary style of Livy, and, in some measure, early Roman institutions, and, lastly, Latin composition.

Text-books: Westcott's *Livy*, Book I, Bennett's *Latin Grammar*, and White's *Latin-English Lexicon*.

The student will also read and report on Ihne's *Early Rome*.

4. Plautus and Terence: Selections Mr. PIKE
 Twenty-four lessons (three university credits). Open to those who have completed Course 3.

The course will consist of a study of the texts, the literary styles of Plautus and Terence, and an outline of the history and technique of the Roman drama.

Text-books: Plautus' *Menaechmi* by Fowler, Terence's *Phormio* by Elmer, and White's Latin-English Lexicon.

The student will also be required to read and report upon Sellar's Plautus and Terence in *The Roman Poets of the Republic*.

The University Library will loan the books by Strachan-Davidson, Sellar, and Ihne for one month, free of charge, provided the student returns them in good condition and pays the express charges both ways.

LITERATURE AND RHETORIC

1. Rhetoric, Part I Miss WHITNEY
 Twenty-four lessons (three university credits). One-half credit toward Rhetoric on the State Professional Teacher's Certificate.

This course is designed to give practical training in composition as well as a knowledge of rhetorical principles. Aside from the study of the text it includes practice in the analysis of the best specimens of English poetry and prose, and the writing of papers, mainly expository and argumentative in character.

2. Rhetoric, Part II Miss WHITNEY
 Twenty-four lessons (three university credits). One-half credit toward Rhetoric on the State Professional Teacher's Certificate.

A continuation of Part I, with more advanced work in analysis, and practice in writing narration and description.

3. American Literature: Outline Mr. NORTHROP
 Forty lessons (three university credits). Credit for American Literature on the State Professional Teacher's Certificate.

A study of American literary development, with special emphasis on the influence of English literature and the effect of our own national and political history.

4. English Literature: Outline Mr. NORTHROP
 Forty lessons (three university credits). Credit for English Literature on the State Professional Teacher's Certificate.

An outline sketch of English literature from the earliest times to the present, including a study of poetry, the drama, the novel, and great essays and orations.

MATHEMATICS

1. Elementary Algebra

Mr. SLOBIN

Forty lessons (no university credit).

This elementary course is offered only for the benefit of those who can not in any way pursue the subject in school and who need a knowledge of Algebra in their daily work or as a foundation for other studies.

2. Plane Geometry

Mr. KIRCHNER

Forty-eight lessons (no university credit).

This elementary course is offered only for the benefit of those who can not in any way pursue the subject in school and who need a knowledge of Plane Geometry in their daily work or as a foundation for other studies.

3. Solid Geometry

Mr. KIRCHNER

Forty lessons (no university credit). Credit for Solid Geometry on the State Professional Teacher's Certificate.

This course is designed not only to give a knowledge of the standard theorems and exercises of the text, but to develop the student's own imagination and initiative and give a well-rounded view of the subject by practice in special proofs and original exercises.

4. Higher Algebra, Part I

Mr. SLOBIN

Forty lessons (five university credits). One-half credit toward Higher Algebra on the State Professional Teacher's Certificate.

A comprehensive study of the elements of the subject, with more difficult problems and demonstrations than in the elementary course, covering the fundamental rules, factoring, highest common divisor, lowest common multiple, fractions, involution, evolution, surds, imaginaries, simple equations with one, two, or more unknown quantities, ratio, proportion, variation, and progressions.

5. Higher Algebra, Part II

Mr. SLOBIN

Twenty-four lessons (three university credits). One-half credit toward Higher Algebra on the State Professional Teacher's Certificate.

A continuation of Part I, including a study of variation, quadratic equations, special higher equations, simultaneous equations of the second degree, maxima and minima of functions, logarithms, theory of equations, and solution of numerical higher equations.

6. Trigonometry

Mr. BROOKE

Twenty-four lessons (three university credits). Credit for Trigonometry on the State Professional Teacher's Certificate.

A course in Plane and Spherical Trigonometry, designed to meet the needs of beginners and to include the subjects usually considered in the ordinary college course. The solution of triangles is treated quite fully, but not to the exclusion of analytical trigonometry.

PHILOSOPHY

- 1 (9). Ancient and Medieval Philosophy Mr. WILDE
 Twenty-four lessons (three university credits).
 This and the two following courses give such an outline of the history of thought as is desirable in a general education. Emphasis is placed upon the human significance of philosophy rather than upon its purely technical aspect. In the first semester the main work is upon the philosophies of Plato and Aristotle, but the later development is traced as far as the Renaissance.
- 2 (10). Modern Philosophy Mr. WILDE
 Twenty-four lessons (three university credits).
 Lectures on the representative systems of modern philosophy from the Renaissance to the beginning of the nineteenth century, the purpose of the course being to prepare the student to understand the philosophical tendencies of the present. The work will include a study of Bacon, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant.
- 3 (11). Ethics Mr. WILDE
 Twenty-four lessons (three university credits).
 The principles of morals; sketch of the historical development of morality followed by an analysis of its meaning, showing the elements in human nature upon which it is based and the ground of its authority; the nature of goodness, the authority of conscience, moral knowledge, duty and responsibility; the application of moral principles to certain unsettled problems of moral life.

SCIENCE

1. Botany Mr. CLEMENTS
 Twenty-four lessons (three university credits). One-half credit toward Botany on the State Professional Teacher's Certificate.
 A university course in General Botany, designed to meet the needs of students who have not the facilities of a regular laboratory. The course includes field study of autumn flowers, of weeds, trees, and shrubs, and of mushrooms and toadstools; the preparation of herbs and woody plants in garden and nature for winter; the migration of seeds and fruits; the gross structure of plants; the physiology of germination and growth.
2. Botany Mr. CLEMENTS
 Twenty-four lessons (three university credits). One-half credit toward Botany on the State Professional Teacher's Certificate.
 A continuation of Course I, taking up the study of the physiology of the adult plant, its methods of making and assimilating food, and its relations to water, light, temperature, etc.; the use of plants in every-day life; classification and relationships of flowering plants; principles of propagation and plant breeding; vegetation of North America.

3. Industrial Botany

Mr. CLEMENTS

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have had one year of high school Botany, or one semester of Botany 1.

A study of plants as materials and agents in every-day life, with especial emphasis upon their uses in the home, in the industries, and in agriculture and forestry. Attention will be paid to the origin, distribution, and cultivation of useful plants, the nature and use of the products obtained from them, and the processes employed.

4. School Gardens

Mr. CLEMENTS

Twenty-four lessons each semester (six university credits); both semesters. Prerequisites the same as for Course 3.

A garden study of the common, useful, and ornamental plants with especial reference to the development of school and experimental gardens, as well as to methods of propagation and cultivation. Stress is laid upon the correlation of the garden work with the life of the school, and a general survey is made of the development of the school garden idea.

3. Geology

Mr. LEHNERTS

Twenty-four lessons (three university credits). One-half credit toward Geology and Physiography on the State Professional Teacher's Certificate.

A general course, including a study of natural forces and phenomena, plants and animals as geologic agents, structural geology, physiographic geology, and an outline of historical geology.

4. Physical Geography

Mr. LEHNERTS

Twenty-four lessons (three university credits). One-half credit toward Geology and Physiography on the State Professional Teacher's Certificate.

A college course in the essentials of Physical Geography and Physiography, with special application of the conditions of surface and climate to human occupation and national development.

5. Commercial and Industrial Geography

Mr. LEHNERTS

Twenty-four lessons (three university credits).

A study of the world's great commercial products,—their dependence on physiographic conditions and their relation to industrial enterprise.

6. Method and Material of Geography

Mr. LEHNERTS

Sixteen lessons (two university credits).

A course on the method and material of geography, designed for teachers and for those who intend to supervise the teaching of this subject in both elementary and secondary schools.

ROMANCE LANGUAGES

FRENCH

1. Beginning French

Forty lessons each semester (ten university credits); both semesters. Open to all who have had no French. Juniors and seniors receive only half credit. Both semesters must be completed before credit is given for the first semester.

French grammar and reader; modern texts.

2. Intermediate French

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1 or its equivalent. Both semesters must be completed before credit is given for the first semester.

Prose composition; modern texts, including some of the works of Coppee, Daudet, Scribe, *et al.*

3. The Classical Period of French Literature

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1 or 2. Both semesters must be completed before credit is given for the first semester.

The reading of works and selections produced during the classical period of French literature and conversations in French concerning the same. The works of Corneille, Racine, Moliere, La Fontaine, *et al.* Composition.

4. French Literature of the Contemporary Period

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1 or 2, and Course 3. Both semesters must be completed before credit is given for the first semester.

Studies in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.

5. Romance Philology

Eight lessons each semester (two university credits); both semesters. Open to those who have completed Course 4. Both semesters must be completed before credit is given for the first semester.

Readings on the phonetical development of the French and other Romance languages from popular Latin. Reading of Old French texts.

6. History of French Literature

Eight lessons each semester (two university credits); both semesters. Open to graduate students. Both semesters must be completed before credit is given for the first semester.

A study of the evolution of the various schools and doctrines in French literature.

SPANISH

1. Beginning Spanish

Forty lessons each semester (ten university credits); both semesters. Open to all who have had no Spanish. Both semesters must be completed before credit is given for the first semester.

Spanish grammar and reader; modern texts.

2. Intermediate Spanish

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

Reading of modern Spanish texts.

3. Advanced Spanish

Twenty-four lessons each semester (six university credits); both semesters. Open to those who have completed Course 1 and 2. Both semesters must be completed before credit is given for the first semester.

Collateral readings of representative Spanish authors.

ITALIAN

1. Beginning Italian

Twenty-four lessons each semester (six university credits); both semesters. Open to all qualified to take up the work. Both semesters must be completed before credit is given for the first semester.

Italian grammar and reader; modern texts.

2. Italian Literature

Eight lessons each semester (two university credits); both semesters. Open to those who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

History of Italian literature; special, *The Divine Comedy*.

SCANDINAVIAN LANGUAGES AND LITERATURES

NORWEGIAN

1. Elementary Norwegian

Forty lessons each semester (ten university credits); both semesters. Open to all who are qualified to take the course. Both semesters must be completed before credit is given for the first semester.

Elementary study of the language, grammar, composition, select reading in easy prose and poetry.

2. Modern Norwegian Literature

Twenty-four lessons each semester (six university credits); both semesters. Open to advanced students. Both semesters must be completed before credit is given for the first semester.

History of Norwegian literature from 1814 to the present day.

SWEDISH

1. Elementary Swedish

Forty lessons each semester (ten university credits); both semesters. Open to all who are qualified to take the course. Both semesters must be completed before credit is given for the first semester.

Grammar and composition; select reading in easy prose and verse.

2. Swedish Literature

Twenty-four lessons each semester (six university credits); both semesters. Open to advanced students. Both semesters must be completed before credit is given for the first semester.

History of Swedish literature from 1710 to the present time. History of the literature and study of modern authors, including Selma Lagerlof, Geijerstam, Strindberg.

The University of Minnesota

EXTENSION DIVISION

ANNOUNCEMENT OF UNIVERSITY EXTENSION LECTURES

1912 - 13



MINNEAPOLIS
PUBLISHED BY THE UNIVERSITY OF MINNESOTA
NOVEMBER, 1912

FACULTY OF LECTURERS

- GEORGE EDGAR VINCENT, Ph.D., LL.D., President
CYRUS NORTHROP, LL.D., President, Emeritus
CEPHAS D. ALLIN, LL.B., M.A., Assistant Professor of Political Science
ARTHUR B. BALCOM, B.S., M.A., Instructor, Extension Work in Economics and Political Science
JOSEPH W. BEACH, Ph.D., Assistant Professor of English
RICHARD OLDING BEARD, M.D., Professor of Physiology
GISLE BOTHNE, M.A., Professor of Scandinavian Languages and Literatures, Head of Department of Scandinavian Languages
JOHN SINCLAIR CLARK, B.A., Professor of Latin Language and Literature
FREDERIC EDWARD CLEMENTS, Ph.D., Professor of Botany, Head of Department of Botany
HENRIETTA CLOPATH, Art Department
HARDIN CRAIG, Ph.D., Professor of English
JAMES DAVIES, Ph.D., Instructor in German
WILLIAM STEARNS DAVIS, Ph.D., Professor of Ancient History
JOHN F. DOWNEY, M.A., C.E., Dean, Professor of Mathematics, Head of Department of Mathematics
JOHN FRANKLIN EBERSOLE, M.A., Assistant Professor of Economics and Political Science
HALDOR B. GISLASON, B.A., LL.B., Instructor in Rhetoric
*JOHN HENRY GRAY, Ph.D., Professor of Economics and Politics, Head of Department of Economics and Political Science
JOHN EVENSON GRANRUD, Ph.D., Professor of Latin
GEORGE FRANCIS JAMES, Ph.D., Professor of Education, Head of Department of Education
ALBERT ERNEST JENKS, Ph.D., Professor of Anthropology
WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive Geometry
JOHN V. MARTENIS, M.E., Assistant Professor of Mechanical Engineering
JAMES BURT MINER, Ph.D., Assistant Professor of Psychology
THOMAS WARNER MITCHELL, Ph.D., Assistant Professor of Business Administration
HENRY F. NACHTRIEB, B.S., Professor of Animal Biology, Head of Department of Animal Biology
BURT LEROY NEWKIRK, Ph.D., Assistant Professor of Mathematics and Mechanics
GEORGE NORTON NORTHROP, M.A., Instructor in English
JOSEPH BROWN PIKE, M.A., Professor of Latin, Head of Department of Latin
RAYMOND V. PHELAN, Ph.D., Instructor, Extension Work in Economics

*Absent on leave from February 1, 1912, to February 1, 1913.

ALBERT W. RANKIN, B.A., Professor of Education

EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics

CHARLES ALBERT SAVAGE, Ph.D., Professor of Latin

WILLIAM A. SCHAPER, Ph.D., Professor of Political Science

GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering

CARL S. SHIPLEY, B.S., M.E., Assistant Professor of Machine Construction

CHARLES PETER SIGERFOOS, Ph.D., Professor of Zoology

ANDREW ADIN STOMBERG, M.S., Professor of Scandinavian Languages

DAVID FERDINAND SWENSON, B.S., Assistant Professor of Philosophy

FLETCHER HARPER SWIFT, Ph.D., Professor of Education

CARL W. THOMPSON, M.A., Associate Professor of Economics and Director of Bureau of Research in Agricultural Economics

LOUIS D. H. WELD, Ph.D., Assistant Professor, Extension Work in Economics and Political Science

ALBERT BEEBE WHITE, Ph.D., Professor of History

JEREMIAH S. YOUNG, Ph.D., Assistant Professor of Political Science

UNIVERSITY EXTENSION LECTURES

GENERAL INFORMATION

The University of Minnesota through the Extension Division makes the following preliminary announcement of lectures that are available to the communities throughout the State.

The lectures here listed have a bearing on the vital social, economic, and scientific problems of life. They may be given in courses of several lectures upon the same general theme, or they may be given as single lectures. Attention is called especially to the groups on economic and social questions. These should appeal especially to school and church societies, commercial clubs, civic leagues, and all similar organizations. It is believed that such societies may be able to further their good work by arranging for single lectures or courses on some of the important subjects offered here.

An effort is being made to increase very greatly the usefulness of this branch of extension work by including entertainments of every description and by securing the cooperation of various other state institutions and organizations besides the University. The completed announcements will be ready for circulation early enough to make possible the very general application of the plan next year.

In the meantime there are probably a good many ways in which the University may be of immediate service, and therefore this preliminary announcement is made.

ADDITIONAL LECTURES

From time to time new lectures and new series of lectures will be added to those listed here. Occasionally special announcements of these new lectures will be mailed to all who are interested.

In so far as possible special lectures or courses of lectures not listed in this pamphlet will be provided by the Extension Division when there seems to be a sufficient demand for them.

FEEES

There is no appropriation as yet to cover the expense of these lectures. With only a few exceptions they are to be given by members of the faculty who have their full share of heavy work in the University and who

volunteer to go out on this business simply to meet the increasing demand for this kind of educational effort.

The fees vary with the departments; so it is necessary to inquire about the terms of each lecturer employed. The general policy is to make the cost to the community as low as possible.

HOW TO SECURE THE LECTURERS

1. Apply to the Director of Extension Division, University of Minnesota, Minneapolis, for the lecture or lectures desired.
2. Duplicate contracts covering the conditions will be sent you.
3. If you can meet the conditions, sign and return one contract.
4. A statement of the fee will then be forwarded to you, which you will keep until the University fulfills its part of the contract. Then you will forward the fee and the statement to the Director of the Extension Division, who will pay the money to the Comptroller and forward the receipt to you.

HOW TO SEND MONEY

By post-office or express money order, personal check, or draft.

Make all checks, orders, and drafts payable to the University of Minnesota.

Always address the Director of the Extension Division at the University of Minnesota, Minneapolis.

AGRICULTURAL EXTENSION

Agricultural extension including lectures, demonstrations, institutes, and short courses will be carried on as usual under the direction of the Extension Division of the Department of Agriculture. Address all inquiries regarding such work to the Extension Division, University Farm, St. Paul, Minnesota.

UNIVERSITY WEEKS

Supplementary plans of University cooperation with local educational effort as exemplified in one way by the "University Weeks," first organized in June, 1912, will again be considered by the University, and correspondence is invited on that subject.

INQUIRIES

Address all inquiries except those relating to distinctly agricultural extension work to Director of Extension Division, 319 Folwell Hall, University of Minnesota, Minneapolis.

From this office you will receive application blanks for lectures and correspondence courses, and answers to all kinds of inquiries relative to courses, lectures, and plans for other extension features.

CORRESPONDENCE-STUDY

Send for the new bulletin of Correspondence-Study Courses.

COURSES OF LECTURES

ANIMAL BIOLOGY

Mr. SIGERFOOS

Series of Three Each

- Series 1. The Evolution Theory
- Series 2. The Nutrition of Animals

Single Lectures

- Lecture 1. The Evolution Theory
- Lecture 2. The Nutrition of Animals
- Lecture 3. Heredity and Environment in Animals
- Lecture 4. Color in Animals

Mr. NACHTRIEB

- Lecture 1. On the Borderland: Animal or Plant?
- Lecture 2. The Crab and the Lobster: A Study in Modern Morphology
- Lecture 3. The Leech and the Frog: A Study in Metamerism and Conrescence
- Lecture 4. The Development of the Chick and the Frog: A Study in Modern Embryology
- Lecture 5. The Horse, Past and Present: A Study in Evolution
- Lecture 6. Experimental Embryology and the Mosaic Theory of Development
- Lecture 7. Heredity, Facts and Theories
- Lecture 8. Evolution, Facts and Theories

ART

Miss CLOPATH

I. ART APPRECIATION

- Lecture 1. The Study of Pictures
- Lecture 2. Principles of Art

II. FRENCH PAINTING

- Lecture 3. French Painting in the 18th Century
- Lecture 4. Classicism and Romanticism in French Art

- Lecture 5. The Barbizon School
- Lecture 6. Impressionism
- Lecture 7. The French Realists and Post-Romantics
- Lecture 8. Famous French Painters of To-Day

III. ENGLISH PAINTING

- Lecture 9. First Portrait and Landscape Painters
- Lecture 10. The Pre-Raphaelites
- Lecture 11. Best English Painters of To-Day

IV. GERMAN PAINTING

- Lecture 12. Early German Art
- Lecture 13. The Historical Romantic and Genre Painters
- Lecture 14. Masters of German Painting

V. AMERICAN PAINTING

- Lecture 15. The Period of English Influence in American Art
- Lecture 16. The Period of French Influence in American Art
- Lecture 17. Famous American Painters

VI. ART IN NORTHERN EUROPE

- Lecture 18. Swedish Painting
- Lecture 19. Norwegian Painting
- Lecture 20. Scottish Painting
- Lecture 21. Dutch Painting
- Lecture 22. Danish Painting
- Lecture 23. Belgian Painting
- Lecture 24. Slavic Painting

The department offers to send to the schools throughout the State an exhibit of drawings, water colors, and designs made by the students of the Art Department of the University. The work comprises pencil and water color studies of plant forms, landscapes, and figures; drawings and paintings of objects, perspective studies, and charcoal drawings from the cast. The work in design is represented by decorative arrangements of lines, tones, and colors; by adaptations of plant forms and other nature forms to border designs and to designs for the decoration of cloth, leather, pottery, etc., etc. There are samples of stencils, of book covers, and examples of historical ornaments.

The drawings are mounted on strong gray paper folded to the size of twelve by eighteen inches, and these folders have only to be opened and pinned on some kind of cloth, the pins being sent along with the

exhibit. A few yards of cheese cloth nailed to the wall would answer the purpose.

In order to give their schools the benefit of this exhibition superintendents have only to send their request to Miss Henrietta Clopath, head of the Art Department, and the exhibit will be forwarded to them, the only expense for the schools being the express charges from Minneapolis and return.

The educational value of this exhibition is endorsed by Mr. Schulz, State Superintendent of Public Instruction, and by Dean James, of the College of Education. It is expected that a number of schools may have the benefit of the exhibit this year and that such collections may be sent to a still larger number of schools next year.

BOTANY

Mr. CLEMENTS

- Lecture 1. The Story of a Forest (Illustrated)
- Lecture 2. The Travels of Plants (Illustrated)
- Lecture 3. The Origin of Species To-Day (Illustrated)
- Lecture 4. Thoroughfares in Nature Study
- Lecture 5. A Classification Survey of Minnesota Lands
- Lecture 6. School Gardens

PLANTS IN EVERY-DAY LIFE

- Lecture 1. Bacteria and Man
- Lecture 2. Plants and Conservation
- Lecture 3. Edible and Poisonous Mushrooms
- Lecture 4. Life and Habits of Plants
- Lecture 5. Blood Relationship among Plants
- Lecture 6. A Plant Inventory of the Farm
- Lecture 7. Plants and City Planning
- Lecture 8. The Making of New Plants
- Lecture 9. Flowers and Insects

ECONOMICS AND POLITICAL SCIENCE

DIVISION I. LECTURES IN THE FIELD OF ECONOMICS

DEMOCRACY AND INDUSTRY

Mr. GRAY*

It will be the lecturer's aim to show how the world, under the influence of invention and discovery, has passed from an era of stagnation,

*Mr. Gray is absent on leave during the first semester, 1912-13.

local industry, and hand labor, through a period of competition, to a condition of large business units, vast accumulation of capital, machine production, world markets, and powerful labor unions. Some of the effects of this change on individuals, classes, and governments will be discussed. An attempt will then be made to point out how man's increased power of producing commodities can be made to minister more universally and effectively to human welfare.

Lecture 1. The Era of Hand Labor

The smallness of the world; apprentice and master; domestic production and local markets; the determining of price; the problems of industry then simple and local; methods of manufacture; internal and external trade.

Lecture 2. The Industrial Revolution, 1775

The great textile and other inventions; England wins industrial and commercial supremacy; but gains the labor problem, the slums, social unrest, and national decadence. The relation of these changes to the present British Budget and political movements.

Lecture 3. The Factory System and Its Problems

The occasion for, and the legal, economic, and moral basis of, factory legislation; factory legislation in England and the United States; the labor problem and the labor union.

Lecture 4. The Trust Problem

The advantages and dangers of the concentration of wealth; the methods previously tried for dealing with these questions; a changed point of view; the failure and folly of "trust busting."

Lecture 5. Wealth and the Public Welfare

The obligations of wealth to the State, to employees, to coming generations; relation of individual initiative to large fortunes; the existing and future generations. This is a question of individual efficiency, which, in its turn, is a question of democracy, freedom to vote, and economic freedom.

Lecture 6. Fitting One for His Life Work

Relation of industrial and social changes to education. Past and present: the church and education, the family and education; the school, college, and technical school as instruments of education; education in citizenship and for industry.

RESOURCES AND ECONOMIC PROBLEMS OF MINNESOTA

Mr. ROBINSON

Six lectures relating to the natural resources, leading industries, and economic problems of the Northwest, especially of Minnesota. The aim

is to ascertain what were the original resources, what use has been made of them, what are the natural lines of economic development in the future, and how this development may be furthered by public policies.

Lecture 1. How Man Depends upon Nature

An examination of the influence of surface features, climate, and natural resources upon the course of human development, especially the economic activities of man.

Lecture 2. Natural Resources and Economic Development of the Northwest

A survey of the original resources of the Northwest and the development of the extractive industries dependent upon them, with special reference to Minnesota.

Lecture 3. Agriculture in the Northwest: Its Past, Present, and Future

Frontier agriculture; the transition to specialized wheat farming; causes making for more intensive farming; changes indicated by the 1910 census of agriculture in Minnesota.

Lecture 4. The Conservation of Natural Resources

Traditional attitude and policies of the American people toward natural resources; causes and forms of waste; origin and meaning of the conservation movement; its relation to the utilization of natural resources; a practical conservation program for Minnesota.

Lecture 5. Taxation in Minnesota

The development of the Minnesota tax system; defects and inequalities of the present system, especially in the case of personal property; discussion of suggested amendments.

Lecture 6. The Tariff in Relation to Minnesota

A discussion of the relation of the tariff to producers and consumers in Minnesota, with special attention to the significance and the effects of Canadian reciprocity.

RURAL LIFE PROBLEMS

Mr. THOMPSON

This series deals with economic, social, and educational problems of rural life.

Lecture 1. Business Coöperation among Farmers

The mistakes in many of the earlier coöperative efforts among farmers are discussed, together with the essential need and practicability of various forms of business coöperation in present-day farming.

Lecture 2. Rural Progress Abroad

Progress in the conditions of rural life in Ireland, Denmark, Germany, France, and other foreign countries is outlined in connection with the improved means and methods utilized toward this end.

Lecture 3. The Marketing Problem

The handicap of the farmer in the marketing of his produce and the practical ways of improving his position; special attention is given to various kinds of coöperative marketing associations.

Lecture 4. The Coöperative Store Movement

The difficulties and advantages of coöperative stores are discussed in the light of experience both at home and abroad.

Lecture 5. The Rural Educational Problem

The difficulties of the present rural school system are reviewed and remedies discussed; special attention is given to the practical workings of the rural consolidated school.

Lecture 6. The Rural Church and Home Life

Important needs of the rural church and home life are outlined, together with a discussion of the ways and means of promoting their betterment.

INDUSTRIAL DEVELOPMENT AND ITS PROBLEMS

Mr. BALCOM

The purpose of this course will be to give a general outline of the industrial and commercial development of the United States. To this end the first two lectures will be illustrative rather than technical. Particular attention will be given to some of the important economic and political consequences of this development, both within the United States and in Europe.

Lecture 1. United States Railways

Their development; economic importance; problems.

Lecture 2. The Iron and Steel Industry in the United States

Its development and economic importance. The social problems it presents.

Lecture 3. Individualism and the Problem of Economic Waste**Lecture 4. The Relation of Political Policies to Social and Economic Conditions****Lecture 5. The Advance of Industry Interpreted in Terms of Social Progress****CURRENT BUSINESS TOPICS**

Mr. EBERSOLE

Lecture 1. Prices and the Cost of Living

The forces determining prices. The cost of living and means tending to change that cost. Future outlook.

Lecture 2. Our Present Monetary System

The evolution of money from barter to the metallic standard with paper issues. Our present monetary and banking system analyzed.

Lecture 3. The Problem of Monetary Reform

Weaknesses of the present monetary and banking system of the United States. Proposals such as the Aldrich Bank Plan explained and critically examined.

Lecture 4. The Conservation of Human Resources

Typical wastes of human energy. Important movements: (1) to lengthen human life, (2) to discourage idleness, (3) to develop and to utilize properly all individual talents, and (4) to eliminate war and military establishments.

CURRENT PUBLIC QUESTIONS

Mr. WELD

Lecture 1. Economics and Good Citizenship

Knowledge of economic questions essential to intelligent voting. A description in simple terms of the field which the science of economics covers. Brief consideration of some of the more important economic issues of the day, and their bearing on political conditions.

Lecture 2. Scientific Tariff Making

Congressional methods of fixing duties. The principle of comparative costs. The work of the Tariff Board. Recent efforts to revise the tariff.

Lecture 3. Schedule "K"

Brief history of the duties on wool and woollens. Description of the industries affected. How much do the duties raise the price of a suit of clothes? Do they lead to the use of shoddy and cotton in cloth manufacture?

Lecture 4. Advertising a Potent Influence in Modern Life

Publicity methods of manufacturers, merchants, banks, railroads, and municipalities. The psychology of advertising. The cost of advertising and its justification.

SOCIAL ECONOMICS

Mr. PHELAN

Lectures on Labor Problems

Lecture 1. Economic Development Leading to the Modern Labor Problem

The stages of industrial evolution; home economy, hired labor stage, craft guild stage, stage of domestic economy, the workshop stage, the present-day factory stage. A survey and discussion of the advantages and disadvantages of the modern, capitalistic system of production.

Lecture 2. Woman Labor

The changes in industry and business that have brought women into work outside the home. The social questions of health and of home as related to woman labor. Question of competition with men. Legislation for women and the attitude of the courts. Woman labor and crime, and also immorality. Labor unionism, politics, and government regulation in relation to woman labor. Minnesota and woman labor.

Lecture 3. Child Labor

Child labor as a phase of the general problem of the proper care of the child. Child labor an old problem. The early attitude of governments toward child labor in the factory. The little white slave of industrial England. The rights of the child; the interests of society. The little white slave of America. The peculiar child labor situation in the South. The child worker and poverty; widows' pensions. The relation of industrial education to child labor. Minnesota and child labor.

Lecture 4. Cost in Terms of Human Life and Well-Being

The Industrial Accident and the Industrial Disease. Two problems: prevention and compensation. The old doctrines of assumed risk, fellow servant, and contributory negligence. Changed industrial conditions. The modern European methods of preventing and compensating for human losses in industry. Points in controversy. Progress in the United States. Putting a financial premium on prevention of accidents and of disease.

Lecture 5. Sanitation and Hygiene in Industry

The diseases peculiar to different occupations. The social and the financial value of prevention. Foreign and American regulation of health in industry.

Lecture 6. The Labor Union Movement

The creation of a laboring class in the modern sense. Early opposition to the labor union. The changing principles of trade unionism. The different forms of labor organization. The benefits and the evils of organized labor. The advantage of the honestly organized and efficiently conducted labor union.

Lecture 7. Prevention of Labor Troubles

The strike an instrument of warfare. Methods of regulation of labor conditions in Europe, Australia, United States, and Canada. Examples of public regulation. Emphasis upon publicity and the force of public opinion.

Lecture 8. The Problem of Unemployment

The classes of the unemployed. The causes of unemployment. The remedies in Europe and the United States.

Lecture 9. Profit Sharing between Employer and Employee

The aims of profit sharing. The different plans. Significant examples. Trade union opposition to. The limitations of profit sharing as a plan for economic justice.

Lecture 10. Coöperation in Producing and in Buying Manufactured Articles

The history of coöperation. Its advantages. Its comparatively little success in America. Its limitations.

Lecture 11. Poverty

Definition of poverty. Classes of the poverty stricken. Difference between pauperism and poverty. The causes of poverty and the remedies for it. Constructive charity.

Lecture 12. Prison Labor

The purpose of imprisonment. The necessity of prison labor. The different plans of prison labor, for example, the contract plan, the Minnesota plan, the New York plan. The interests of the prisoner, his family, and of society.

Lecture 13. The Advantages and Drawbacks of Immigration

Colonist vs. immigrant. Causes of immigration. The value of immigration to this country and to Europe. The contract labor evil. Chinese and Japanese immigration. Induced immigration. Remedies.

Lectures on Economic Reform

Lecture 14. Democratic Schemes before the French Revolution

Plato's *Republic*, More's *Utopia*, Bacon's *New Atlantis*, Campanella's *City of the Sun*.

Special emphasis is laid upon such parts of the above Utopian plans as have special value at present.

Lecture 15. French Socialism from the French Revolution to 1848

The plans and theories of St. Simon, Fourier, Louis Blanc, and Proudhon.

Lecture 16. Early English Socialism

Robert Owen's plans and achievements, the Reform Bill of 1832, Chartism, and the Christian Socialists.

Lecture 17. German Socialism

Lassalle, Rodbertus, and Marx.

Lecture 18. Present-Day Socialism in Germany, England, and France

Lecture 19. Tolstoy, the Reformer

His life, his educational and economic philosophies.

Lecture 20. Socialism in the United States

A survey of the various Utopian, and of the more practical socialistic movements in this country.

Lecture 21. The Single Tax as a Plan of Economic Reform

The history, the philosophy, and the application of the single tax on land values.

Miscellaneous Lectures

Lecture 22. The High Cost of Living

How much more does it cost to live than formerly? The production and distribution phases of the problem. The qualitative factor. The many reasons for higher prices. Remedies.

Lecture 23. The Social Center

The fuller use of schools, churches, and other buildings of a public or semi-public nature for the development of community life and individual well-being. The relation of the social center to the care and training of children and young people, and to the furtherance of American Democracy.

INDIVIDUAL LECTURES ON TOPICS OF GENERAL INTEREST

In addition to the above outlined lecture-study courses, members of the department offer the following individual lectures on selected topics of general interest. Any lecture listed as a part of one of the above described lecture-study courses will also be given as an individual lecture.

Mr. GRAY

Lecture 1. Fitting One for His Life Work

Relation of industrial and social changes to education. Past and present: the church and education, the family and education; the school, college, and technical school as instruments of education; education in citizenship and for industry.

Lecture 2. Coöperation

The achievements of coöperation in Great Britain, France, India, and Denmark; the significance of the movement and its relation to economic and social conditions at home.

Mr. ROBINSON

Lecture 1. Taxation in Minnesota

The development of the Minnesota Tax System; defects and inequalities of the present system, especially in the case of personal property; discussion of suggested amendments.

Lecture 2. The Tariff in Relation to Minnesota

A discussion of the relation of the tariff to producers and consumers in Minnesota, with special attention to the significance and the effects of Canadian reciprocity.

Mr. THOMPSON

Lecture 1. Educational Need and Opportunity

The above has been delivered as a High School Commencement address, and as a lecture in church gatherings, educational meetings, and the like.

Lecture 2. The Case for and against Socialism

This lecture aims to present as clearly as possible the arguments for and against socialism.

Lecture 3. The Case for and against Single Tax

An impartial discussion showing the argument for and against single tax.

Lecture 4. The Farmer and His Work

This lecture aims to give a clear and simple presentation of the main principles involved in economical farming.

Mr. MITCHELL

Lecture 1. The New versus the Old Type of Business Management

A discussion of the defects of the ordinary type of management; of the requisites of good management; of the main features of the functional type ("scientific management") and its success.

Lecture 2. Drifting Management

A description of the various premium systems of compensating workmen with illustrations from practice showing the measure of their great success.

Lecture 3. Task and Efficiency Systems of Compensating Workmen

A description of the Task System and its off-shoots, the Gantt Task and Bonus System, the Taylor Differential Piece-Rate System, and the Emerson Efficiency Premium System, showing the principles upon which they are based, the conditions to which they are adapted, and their great measure of success.

Mr. EBERSOLE

Lecture 1. How to Utilize Our Banks

The advantages of bank connection. The variety of service offered the public. How best to use bank credit. Banker and client.

Lecture 2. Principles of Sound Investment

Forms of investment now offered to the public. Examples exhibiting violations to each principle of sound investment. Rules for the investor who desires both security and maximum return.

Lecture 3. The Peace Movement

Mr. PHELAN

Lecture 1. The Labor Union Movement

Early opposition to the trade union. The labor union in accord with capitalistic production. The changing principles of trade unionism. The different forms of labor organization, as the trade union and the industrial union. The benefits and the evils of organized labor. Harmony between the honestly, efficiently conducted labor union and the progressive employer.

DIVISION II. LECTURES IN THE FIELD OF POLITICAL SCIENCE

SOME MUNICIPAL PROBLEMS

Mr. SCHAPER

Lecture 1. What We Can Learn from the German Cities

The remarkable recent growth of the German cities, how they are governed, and what they have accomplished.

Lecture 2. City Government in England and in France

How the English and French cities are governed.

Lecture 3. Some New Experiments in American City Government

Commission government and other new plans, why these radical changes are being introduced, and what results may be expected.

Lecture 4. How to Secure Good City Government in Minnesota

The Home Rule Plan, how it came to be adopted, and why it is a disappointment. What next?

PRACTICAL PROBLEMS IN AMERICAN GOVERNMENT

Mr. YOUNG

This is a course of four lectures, each complete in itself, but contributing to a general unity. The object of the course is to discuss, in an impartial way, some of the leading political problems that now engage public attention.

Lecture 1. The Commission Plan of City Government

The city-state; phenomenal growth of cities during recent years; the city as "the plague spot" of American politics; the Galveston Plan for the redemption of city government—centralized in the hands of a small commission, non-partisan officials, the initiative and referendum, the recall; the success of the plan as far as tried.

Lecture 2. State Education for Industrial and Civic Efficiency

Modern state education as a result of increased wealth; changing viewpoint on culture and usefulness as antithetical terms; knowing and

doing; manual training and domestic science; business subjects in the curriculum; agriculture and forestry; education for vocation; social obligations of the school as a training for civic life; the study of Economics and Political Science as a preparation for the performance of industrial and political duties.

Lecture 3. The Government and Business

The object of this lecture is to discuss the changed and changing conditions of business, industry, and commerce from the standpoint of government regulation for the general welfare.

Lecture 4. Unofficial Government

This lecture traces in a non-partisan way the attempt at some recent experiments in "government by the people." The following subjects receive attention: the initiative and the referendum, the recall, the short ballot, the primary systems of nominating, and the preferential plans of voting.

STUDIES IN DEMOCRACY

Mr. ALLIN

The following three lectures discuss problems of democracy in Australasia, Switzerland, and England.

Lecture 1. Australasian Experiments in Democracy

This lecture will discuss some of the characteristic features of the social, economic, and political legislation of New Zealand and of the Australian colonies.

Lecture 2. Democracy in Switzerland

The rise of democracy in Switzerland will be outlined and discussed together with the more important legislation of recent years.

Lecture 3. Democracy in England

This lecture will lead up to and discuss the social and constitutional question at issue in Great Britain at the present time.

INDIVIDUAL LECTURES ON TOPICS OF GENERAL INTEREST

In addition to the above outlined lecture-study courses, members of the department offer the following individual lectures on selected topics of general interest. Any lecture listed as a part of one of the above described lecture-study courses will also be given as an individual lecture.

Mr. SCHAPER

Lecture 1. What We Can Learn from the German Cities

The remarkable recent growth of the German cities, how they are governed, and what they have accomplished.

Lecture 2. How to Secure Good City Government in Minnesota

The Home Rule Plan, how it came to be adopted, and why it is a disappointment. What next?

Mr. YOUNG

Lecture 1. The Commission Plan of City Government

The city-state; phenomenal growth of cities during recent years; the city as "the plague spot" of American politics; the Galveston-Des Moines plan for the redemption of city government—centralized in the hands of a small commission, non-partisan officials, the initiative and referendum, the recall; the success of the plan as far as tried.

EDUCATION

Mr. JAMES

- Lecture 1. Education and Efficiency
- Lecture 2. The Schools of the People
- Lecture 3. Religious Education
- Lecture 4. The Moral Training of Children
- Lecture 5. The Ultimate in Education
- Lecture 6. Democracy in the Public Schools

SPECIAL TALKS FOR TEACHERS OR SCHOOL OFFICERS

Mr. SWIFT

- Lecture 1. Our School Lands and Permanent School Funds
- Lecture 2. The Acquisition and Beautifying of School Grounds
- Lecture 3. School Room Decoration
- Lecture 4. Dramatization as a Method in Teaching
- Lecture 5. Books Worth Knowing, or a Teacher's Library
- Lecture 6. The Meaning of Play and Its Place in Education

GENERAL LECTURES

Mr. SWIFT

- Lecture 1. The Story as a Factor in Moral Education, illustrated by reading from "The Most Beautiful Thing in the World."
- Lecture 2. Makers of Modern Education
 - 1. Rousseau
 - 2. Pestalozzi
 - 3. Herbart
 - 4. Froebel
 - 5. Dewey
- Lecture 3. Schools of Other Lands and Other Days. Illustrated
- Lecture 4. Education Our Birthright

Lecture 5. Education and Social Betterment

Lecture 6. Teachers of the East: Buddha, Socrates, Christ

LANTERN TRAVEL TALKS

Mr. SWIFT

Through Italy

Through England

Through Germany

Lectures on European Education

The Montessori System and Early Education

Present Conditions in European Schools

The Schools of England

The Schools of Germany

The Schools of France

Student Life in Germany

Student Life in England

DEMOCRACY IN EDUCATION

Mr. RANKIN

Lecture 1. Democracy in Administration

General historical résumé: Origin of school boards in America; functions of school boards; development of the superintendency; preparation of superintendents, principals, supervisors, and special teachers; functions of these school officers; dangers in an administrative system.

Lecture 2. Democracy in Teaching

Perils to the individual in teaching; school discipline as affecting democracy; the teacher's place in the community; the teaching process and democracy.

Lecture 3. Democracy in the Curriculum

What universal education connotes; the needs of men which are fundamental; proper demands upon the child by the school; standards of accomplishment; school laboratories.

ENGINEERING

MECHANICAL DRAWING

Mr. KIRCHNER

Lecture 1. Significant Marks (Graphic, Theoretical, and Practical), Representation and Interpretation

A survey of the development of the systems of delineation, with illustrations.

- Lecture 2. The Science of Extension and Position (Geometry, Qualitative), Concepts of Space, and Spatial Relations
- Lecture 3. The World on Paper (Drawing, Mathematics, and Geography), Maps and Map Making
- Lecture 4. Lettering and Composition (Drawing and Design), the Alphabet
Origin, development, and application.
- Lecture 5, 6, and 7. Design and Ornament (Fine Arts and the Industries)
1. Design and Composition
 2. Ornament—Symbolic and Aesthetic
 3. Applied Design

MECHANICAL ENGINEERING

Mr. KAVANAUGH

- Lecture 1. Development of the Locomotive
- Lecture 2. The Manufacture of Iron and Steel

Mr. MARTENIS

- Lecture 1. The Heating and Ventilation of Homes and Buildings

Mr. SHIPLEY

- Lecture 1. The Automobile

Mr. NEWKIRK

- Lecture 1. The Gyroscope. A Practical Demonstration

ELECTRICAL ENGINEERING

Mr. SHEPHARDSON

- Lecture 1. Commercial Applications of Electricity, Historical Development
- Lecture 2. Materials of Electrical Engineering
- Lecture 3. Ohm's Law. Units
- Lecture 4. Line Losses. Calculation of Wiring. National Electrical Code
- Lecture 5. The Dynamo and Motor
- Lecture 6. Electric Lighting, Incandescent and Arc Lamps

ENGLISH

AMERICAN LITERATURE

Mr. CRAIG

- Lecture 1. Irving and Longfellow
- Lecture 2. Emerson and the New England Renaissance

- Lecture 3. Poe and Hawthorne: Artists and Originators
- Lecture 4. Whitman: The Voice of American Democracy
- Lecture 5. Lanier: The Old South and the New
- Lecture 6. Bret Harte: The Literature of the West

ENGLISH COMEDY

Mr. CRAIG

- Lecture 1. Elizabethan Comedy
- Lecture 2. The Comedy of Manners: Congreve and Sheridan
- Lecture 3. Melodrama Old and New
- Lecture 4. The Nineteenth Century: Revival of Comedy

THREE TYPES OF TRAGEDY

Mr. CRAIG

- Lecture 1. Attic Tragedy: The *Antigone* of Sophocles
- Lecture 2. Elizabethan Tragedy: Shakespeare's *Hamlet*
- Lecture 3. The Tragic Problem Play: Ibsen

SHAKESPEARE

Mr. CRAIG

- Lecture 1. The Tragedy of Youth: Hamlet and Romeo
- Lecture 2. The Comedy of Youth: Benedick and Prince Hal
- Lecture 3. The Tragedy of Manhood: Othello and Macbeth
- Lecture 4. The Comedy of Manhood: Falstaff and Jaques
- Lecture 5. The Tragedy of Age: Lear and Woolsey
- Lecture 6. The Comedy of Age: Prospero

MAIN CURRENTS OF NINETEENTH CENTURY POETRY

(A course of three lectures or three independent lectures)

Mr. CRAIG

- Lecture 1. Wordsworth: The Dawn of the Century
- Lecture 2. Tennyson: The Summation of Nineteenth Century Poetry
- Lecture 3. Browning: The Application of Ideas to Life

SCOTTISH LITERATURE

Mr. CRAIG

- Lecture 1. Burns and the Poetry of the People
- Lecture 2. Scott and Scotland
- Lecture 3. Barrie and His Contemporaries in Scottish Literature

PRELIMINARY MILTON COURSE

Mr. NORTHROP

- Lecture 1. Historical Background of the Period
The world and its problems into which Milton was born. Emphasis upon the social life.
- Lecture 2. Milton's Early Education
The schools of his day.
- Lecture 3. Milton and Cambridge
- Lecture 4. Critical Treatment of the Early Poems
- Lecture 5. Milton and Music
Special study of *Comus* with the musical setting by Lawes.
- Lecture 6. Milton the Puritan

INDIVIDUAL LECTURES ON TOPICS OF GENERAL INTEREST

Mr. CRAIG

- Lecture 1. Culture and Strenuousness
- Lecture 2. The South and the Nation
- Lecture 3. The Romantic Movement in American Literature
- Lecture 4. The Short Story
- Lecture 5. Self-Cultivation in English
- Lecture 6. Sohrab and Rustum
- Lecture 7. Realism and Romance: Hardy and Stevenson
- Lecture 8. Rudyard Kipling, Poet and Prose Writer. One or two lectures
- Lecture 9. The Religious Drama

Mr. NORTHROP

- Lecture 1. What Shakespeare Read
- Lecture 2. Some Diaries and Memoirs of the Seventeenth Century
- Lecture 3. The First Theatre
- Lecture 4. Oxford and Her Sons
- Lecture 5. The Vocation and the Avocation

Mr. BEACH

- Lecture 1. The Nature and Function of Humour
- Lecture 2. The Relations of Humour and Wit
- Lecture 3. The Function of Poetry, or What is Poetry Good For?
- Lecture 4. The Essentials of Good Poetry
- Lecture 5. Classes of Poetry
- (a) Poetry of the Imagination: Spencer, Milton, Keats, and Tennyson.
- (b) Poetry of the Feeling: Burns, Byron.
- (c) Dramatic Poetry: Chaucer, Shakespeare, Browning.
- (d) Reflective Poetry: Wordsworth, Browning.

Lecture 6. Humour in the English Novel

One, two, three, or more lectures on Fielding, Smollett, Jane Austin, Dickens, Thackeray, Meredith.

Lecture 7. English Humorous Poetry

One, two, or more lectures on Chaucer, Butler, Pope, Swift, Cowper, Burns, Lowell, Holmes.

Lecture 8. English Comedy

Ben Jonson, Shakespeare, Congreve, Sheridan, Oscar Wilde, Bernard Shaw, with some reference to Molière.

Lecture 9. George Meredith

- (a) The Philosophy of Meredith.
- (b) Meredith as a Poet.
- (c) The Comic Spirit in Meredith.
- (d) Meredith's Novels.

HISTORY

Mr. DAVIS

Lecture 1. Sicily: Its Past and Present

Lecture 2. The First Crusade: Its Misery and Its Triumph

A series of five talks on Martin Luther considered as a man and as the hero of Protestant Germany.

Mr. WHITE

Lecture 1. History and Life

Lecture 2. Ireland and the Beginnings of Modern Civilization

HYGIENE

Dr. BEARD

DIVISION I

Lecture 1. The Sanitary Conditions of the Dwelling

Lecture 2. The Disposal of Refuse

Lecture 3. The Sanitation of School Buildings

Lecture 4. Medical Inspection in the Schools

Lecture 5. The Hygiene of the Street and of Public Conveyances

Lecture 6. The Water Supply

DIVISION II

Lecture 1. The Values of Food Stuffs

Lecture 2. The Uses of Water

Lecture 3. The Feeding of School Children

- Lecture 4. The Hygiene of the Skin
- Lecture 5. The Uses of Clothing
- Lecture 6. The Ventilation of the Home

LATIN AND GREEK

DIVISION I. LECTURES ON ROMAN CIVILIZATION

Mr. PIKE

Lecture 1. The Latin Language

The purpose of this lecture is to bring out the salient characteristics of the Latin language and to show that these are but the expression of the characteristics of the Roman people.

Lecture 2. Roman Life in the Time of Pliny the Younger

The purpose of this lecture is to give a glimpse of the brighter side of Roman life as pictured in the interesting correspondence of Pliny the Younger.

Mr. CLARK

Lecture 3. The Roman Family

Lecture 4. Early Roman Religion

Lecture 5. The Development and Influence of Roman Law

DIVISION II. LECTURES ON ROMAN ARCHITECTURE, SCULPTURE, AND PAINTING

Mr. GRANRUD

First Series

Lecture 1. Rome and the Campagna

Lecture 2. The Roman Forum and Its Life

Lecture 3. The Forums and Palaces of the Cæsars

Lecture 4. The Designs and Equipment of Temples

Lecture 5. The Theatres, Amphitheatres, and Circuses

Lecture 6. Pompeian Baths and Roman Thermæ

Lecture 7. Memorial Arches and Sepulchral Monuments

Lecture 8. Characteristics of Roman Architecture

Second Series

Lecture 1. Portrait Sculpture

Lecture 2. Historical Reliefs

Lecture 3. The Bay of Naples and Pompeii

Lecture 4. The Roman House and Its Furniture

Lecture 5. Pompeian Wall Decoration and Painting

Lecture 6. The Cathedrals of Venice, Florence, Pisa, and Milan

Lecture 7. The Cathedrals of Rome and the Masterpieces of Raphael and Michelangelo

Lecture 8. Characteristics of Roman Art

Lectures illustrated with numerous black and colored lantern slides; they attempt to portray the artistic side of the Romans, to describe the intimate and vital connection of Roman art and life, and to indicate briefly the supreme importance of Roman achievement, at least in architecture.

DIVISION III. LECTURES ON GREEK CULTURE

Mr. SAVAGE

Lecture 1. Greek Literature and Its Influence

Some of the leading characteristics of the literature of the Greeks will be presented, and the influence of Greek thought, especially in literature and philosophy, will be briefly discussed. (Not illustrated.)

Lecture 2. Sappho and the Greek Lyric

The leading characteristics of Greek elegiac and lyric poetry will be presented, and a few illustrative readings will be given; the personality and literary work of Sappho will be discussed. (Not illustrated.)

Lecture 3. The Greek Drama

The leading characteristics of the Greek drama will be presented. The Greek theatre will be described, and views of many theatres will be shown, and one or two representative Greek plays will be presented by means of slides.

Lecture 4. The Gods of Greek Mythology

Certain of the leading aspects of Greek mythology will be presented. The personalities and chief attributes of the more important deities of Greece will be discussed. The lecture will be illustrated with lantern slides.

MISCELLANEOUS LECTURES

Mr. DOWNEY

Lecture 1. Extremes and Extremists

Lecture 2. Leaders and Leadership

Lecture 3. Sherman's Great Campaign

Lecture 4. Shams

Lecture 5. A Pedestrian Tour through the Scottish Highlands

Lecture 6. Through England and Western Germany on a Bicycle

Lecture 7. Some English and Scotch Cathedrals

Lecture 8. The Atlanta Campaign (one or two lectures as desired)

Lecture 9. A Walk through the South of Ireland

A course of six lectures on Country and Village Scenes and Literary Shrines in England and Scotland.

MUSIC

Mr. DAVIES

- Lecture 1. Vocal Music, Good and Bad
- Lecture 2. Robert Burns. Burns as a Song Writer
- Lecture 3. The Irish Melodies of Tom Moore
- Lecture 4. The German Folk Song
- Lecture 5. The English Folk Song
- Lecture 6. Modern German Song Writers
- Lecture 7. Oscar Wilde
- Lecture 8. Modern Dramatic Tendencies
- Lecture 9. Rudyard Kipling

(Illustrated by readings from his works.)

PUBLIC SPEAKING

Mr. GISLASON

- Lecture 1. Sources of Power in Public Speaking

The aim of this lecture is to give a popular presentation of what is effective in public speaking.

PHILOSOPHY AND PSYCHOLOGY

Mr. SWENSON

- Lecture 1. The Value of Two Points of View: A Chapter from the Psychology of Seeing and Hearing
- Lecture 2. Applications of Psychology to Business
- Lecture 3. Religion and Music: A Study of Some Points of Contact between Esthetics and Religious Life
- Lecture 4. Herbert Spencer and the Philosophy of Evolution
- Lecture 5. Two Opposite Poles of Idealistic Philosophy
A comparative study of the two great original Scandinavian thinkers of the nineteenth century, Bostrom and Kierkegaard.
- Lecture 6. Human Nature and Business
- Lecture 7. Following the Crowd: A Trait in Human Nature

Mr. MINER

- Lecture 1. How We Learn
- Lecture 2. The Inheritance of Mental Traits

- Lecture 3. The Place of Mind in Evolution
- Lecture 4. The Backward Child
- Lecture 5. Mental Control of Health
- Lecture 6. Suggestion and the Subconscious Mind
- Lecture 7. Mind Reading
- Lecture 8. The Evidence of Life after Death

SCANDINAVIAN

MODERN NORWEGIAN LITERATURE FROM WERGELAND TO THE PRESENT TIME

Mr. BOTHNE

(Lectures in Norwegian. Numbers 7 and 8 also in English.)

- Lecture 1. Iceland
- Lecture 2. Petter Dass
- Lecture 3. Ludvig Holberg
- Lecture 4. Henrik Wergeland
- Lecture 5. J. S. Welhaven
- Lecture 6. Asbjørnsen and Moe
- Lecture 7. Bjørnson
- Lecture 8. Ibsen and Norway
- Lecture 9. Grundtvig

Mr. STOMBERG

- Lecture 1. Silent Forces
- Lecture 2. Light from the Northland: Scandinavian Contributions to Civilization
- Lecture 3. Optimistic Reflections
- Lecture 4. Selma Lagerlöf: Teacher of Optimism (Sweden's foremost Woman Writer)
- Lecture 5. Educational Ideals in Sweden

SOCIOLOGY AND ANTHROPOLOGY

THE PEOPLES OF THE UNITED STATES

Mr. JENKS

- Lecture 1. Our European Ancestors
- Lecture 2. Our Colonial Forefathers—the English, Scotch, Irish, and Welsh
- Lecture 3. Our Continental Teutonic Immigrants—the Germans, Dutch, and Scandinavians

- Lecture 4. The Italian and the Jew in the United States
- Lecture 5. The Arrival of the Slavs
- Lecture 6. Our Race Problems, and the Future American

ANTHROPOLOGY

- Lecture 1. Earliest Man
- Lecture 2. The Races of Man
- Lecture 3. Woman's Share in Primitive Culture
- Lecture 4. From Savagery to Barbarism
- Lecture 5. Civilization and Enlightenment
- Lecture 6. The Future Man

Illustrated with Slides:

- Lecture 1. The Savages of the Philippines
- Lecture 2. The Culture Peoples of the Philippines

COURSE OF FIVE LECTURES

- Lecture 1. Origin and Evolution of Man
- Lecture 2. Origin, Development, and Future of Races
- Lecture 3. Origin and Development of Language
- Lecture 4. The Quest for Food
- Lecture 5. The Development of the Family