The University of Minnesota Bulletin

College of Dentistry

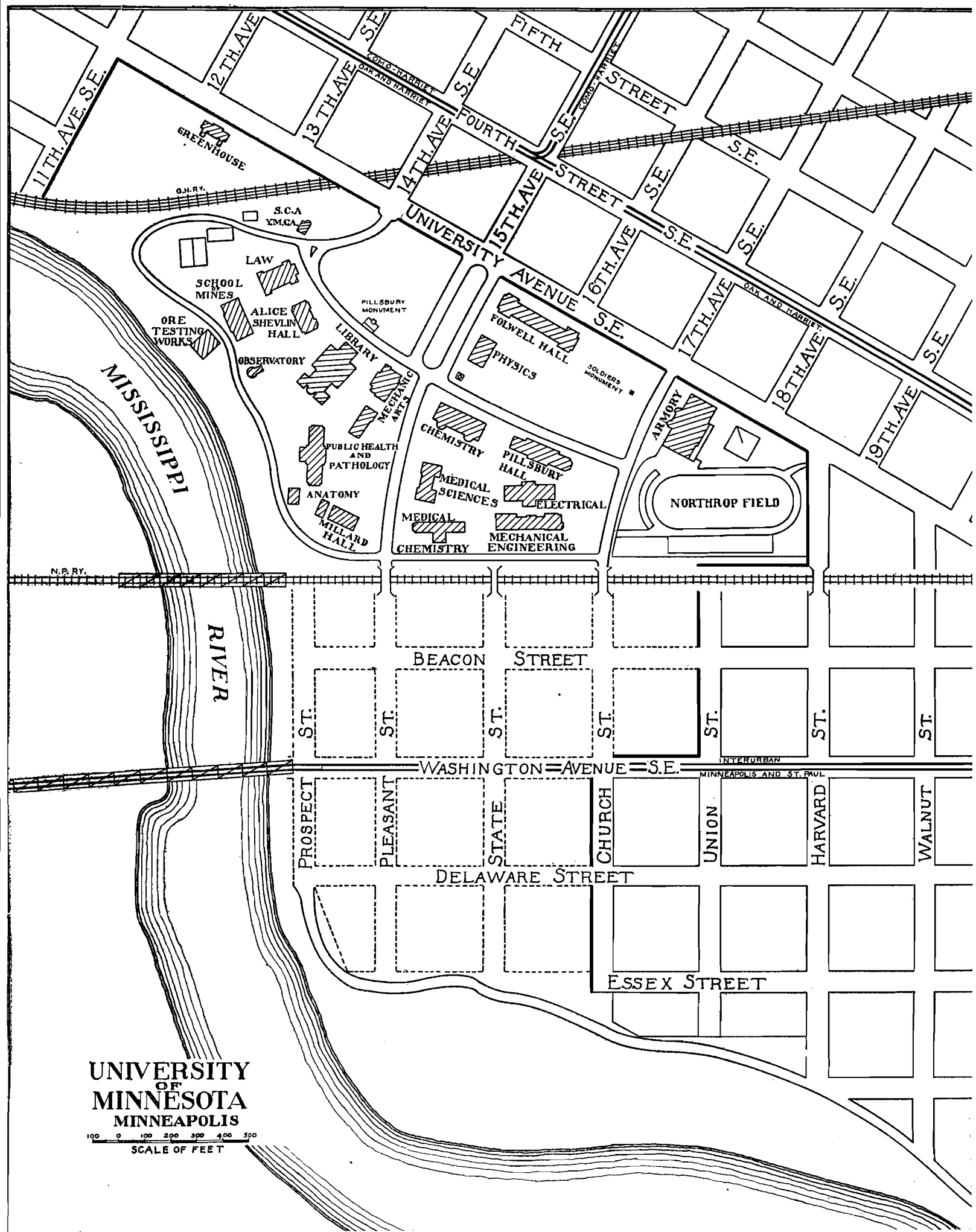
1909-1910

Volume XII January 30, 1909 No. 1

Entered at the Postoffice
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 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.


11TH. AVE. S.E.
12TH. AVE
13TH. AVE
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FIFTH STREET S.E.
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UNIVERSITY AVENUE S.E.
COMO-HARRIET
OAK AND HARRIET
GREENHOUSE
O.N.RY.
S.C.A
Y.M.C.A.
LAW
SCHOOL OF MINES
ALICE SHEVLIN HALL
ORE TESTING WORKS
OBSERVATORY
LIBRARY
PILLSBURY MONUMENT
MECHANIC ARTS
PUBLIC HEALTH AND PATHOLOGY
ANATOMY
MILLARD HALL
FOLWELL HALL
PHYSICS
SOLDIERS MONUMENT
CHEMISTRY
PILLSBURY HALL
MEDICAL SCIENCES
ELECTRICAL
MEDICAL CHEMISTRY
MECHANICAL ENGINEERING
ARMORY
NORTHROP FIELD
MISSISSIPPI RIVER
N.P.RY.
BEACON STREET
WASHINGTON AVENUE S.E.
INTERURBAN
MINNEAPOLIS AND ST. PAUL
PROSPECT ST.
PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
WALNUT ST.
DELAWARE STREET
ESSEX STREET
UNIVERSITY OF MINNESOTA
MINNEAPOLIS
100 0 100 200 300 400 500
SCALE OF FEET

CALENDAR FOR 1909-1910

1909

JULY

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

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15	16	17	18	19	20	21
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29	30	31	..	..	..	..
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SEPTEMBER

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5	6	**7**	8	9	10	11
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OCTOBER

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31	..	..	..	..	..	..

NOVEMBER

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28	29	30	..	..	..	..
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DECEMBER

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1910

JANUARY

S.	M.	T.	W.	T.	F.	S.
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30	31	..	..	..	..	..

FEBRUARY

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13	14	15	16	17	18	19
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27	28	..	..	..	..	..
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MARCH

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6	7	8	9	10	11	12
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APRIL

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3	4	5	6	7	8	9
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MAY

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8	9	10	11	12	13	14
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29	**30**	31	..	..	..	..
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JUNE

..	..	..	1	2	3	4
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26	27	28	29	30	..	..
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University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration.
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	25	Friday	Good Friday, recess two days
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

The School Year for 1910-11 will begin Tuesday, September 13

PROGRAM—ENTRANCE EXAMINATIONS
1909–10

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botony
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	9	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	10	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	11	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

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 SCHOOL OF AGRICULTURE
- SHORT COURSE FOR FARMERS
- THE DAIRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1909
The HON. A. E. RICE, WILLMAR	1909
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL. D., President
ERNEST B. PIERCE, B. A., Registrar
JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C. E., Dean of the College of Science, Literature and the Arts

FREDERICK S. JONES, M.A., Dean of the College of Engineering and the Mechanic Arts

JOHN W. OLSEN, B.S., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

EUGENE L. MANN, B.A., M.D., Dean of the College of Homeopathic Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, Ph.D., Dean of the School of Chemistry

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

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ADA L. COMSTOCK, M.A., Dean of Women

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
PRESIDENT CYRUS NORTHROP

The College of Science, Literature and the Arts
DEAN JOHN F. DOWNEY — PROFESSOR JOHN H. GRAY
PROFESSOR J. C. HUTCHINSON — PROFESSOR H. F. NACHTRIEB
PROFESSOR NORMAN WILDE

The College of Engineering and the Mechanic Arts
DEAN FREDERICK S. JONES — PROFESSOR GEORGE D. SHEPARDSON

The College and School of Agriculture
DEAN JOHN W. OLSEN — PROFESSOR HARRY SNYDER
PROFESSOR SAMUEL B. GREEN

The College of Law
DEAN WILLIAM S. PATTEE — PROFESSOR HENRY J. FLETCHER

The College of Medicine and Surgery
DEAN F. F. WESBROOK — PROFESSOR THOMAS G. LEE

The College of Homeopathic Medicine and Surgery
DEAN EUGENE L. MANN

The College of Dentistry
DEAN ALFRED OWRE

The College of Pharmacy
DEAN FREDERICK JOHN WULLING

The School of Mines
DEAN WILLIAM R. APPLEBY

The School of Chemistry
DEAN GEORGE B. FRANKFORTER

The College of Education
DEAN GEORGE F. JAMES

The Graduate School
DEAN HENRY T. EDDY

The Dean of Women
ADA L. COMSTOCK

General Alumni Association
DAVID P. JONES

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

The College of Dentistry

FACULTY

CYRUS NORTHROP, LL.D., President
ALFRED OWRE, D.M.D., M.D., C.M., Dean, Professor of Operatic Dentistry and Dental Metallurgy
RICHARD O. BEARD, M.D., Professor of Physiology
THOMAS G. LEE, B.S., M.D., Professor of Histology and Embryology
GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry
FRANK F. WESBROOK, M.A., M.D., Professor of Pathology and Bacteriology
THOMAS B. HARTZELL, M.D., D.M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery
OSCAR A. WEISS, D.M.D., Professor of Prosthetic Dentistry and Orthodontia
CHARLES A. ERDMANN, M.D., Professor of Anatomy
F. W. Springer, E.E., Professor of Electrical Engineering
JAMES M. WALLS, D.M.D., Professor of Clinical Operative Dentistry
FOREST H. ORTON, D.D.S., Professor of Crown and Bridge-Work
IRA HARRIS DERBY, B.S., Assistant Professor of Chemistry
R. H. MULLIN, B.A., M.B., Assistant Professor of Pathology and Bacteriology
WINFIELD S. NICKERSON, Sc.D., M.D., Assistant Professor of Histology and Embryology
F. H. SCOTT, Ph.D., M.B., Assistant Professor of Physiology
M. R. WILCOX, M.D., Assistant Professor of Physiology
H. A. BRITZIUS, M.A., M.S., Instructor in Technic
NORMAN J. COX, B.S., D.M.D., Instructor in Operative Dentistry
G. M. DAMON, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy
C. F. DISEN, M.D., Demonstrator of Anatomy
E. FIDLAR, M.B., Junior Demonstrator of Pathology and Bacteriology
H. S. GODFREY, D.M.D., Instructor in Operative Dentistry
R. O. GREEN, D.D.S., Instructor in Operative Dentistry
CHARLES A. GRIFFITH, D.D.S., Instructor in Operative Dentistry
J. A. HANDY, Ph.C., Instructor in Chemistry
EARLE R. HARE, B.S., M.D., Instructor in Anatomy
MARY V. HARTZELL, D.M.D., Instructor in Comparative Dental Anatomy
U. E. HEDDY, D.D.S., Instructor in Crown and Bridge-Work
R. R. JONES, D.D.S., Instructor in Operative Dentistry
W. F. LASBY, B.S., D.D.S., Instructor in Prosthetic Dentistry

H. C. LAWTON, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy
J. F. LEMSTROM, M.D., Instructor in Histology and Embryology
HERMAN A. MAVES, D.D.S., Instructor in Operative Dentistry
OSCAR OWRE, M.D., Instructor in Oral Surgery
JAY N. PIKE, D.D.S., Instructor in Orthodontia
H. M. REID, D.D.S., Instructor in Prosthetic Dentistry
H. E. ROBERTSON, A.B., M.D., Demonstrator in Pathology
J. F. SCHEFCIK, B.S., Ph.G., M.D., C.M., Instructor in Materia Medica
J. P. SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry
C. C. TYRELL, B.A., M.D., Prosector of Anatomy
ANDREW J. WEISS, Instructor in Technics
AMOS S. WELLS, B.A., D.D.S., Instructor in Crown and Bridge-Work
F. N. WILSON, Assistant in Anatomy
FRANK R. WRIGHT, D.D.S., M.D., Instructor in Anaesthesia and Oral Surgery

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MRS. M. C. CLYDE, Professional Nurse
MISS H. E. COOKE, Professional Nurse
A. L. MOORE, Infirmary Clerk

General Information, Rules and Regulations

The regular course covers a period of three years of collegiate study, each year representing nine months in actual attendance.

The University now offers an optional six year course of study. The first three years of the course are given in the College of Science, Literature and the Arts. The last three years are given in the College of Dentistry. It leads to the bachelor's degree at end of the first four years and to the degree of doctor of dental surgery at the end of the six year course.

For schedule of lectures, announcements, changes in college rules, etc., see bulletin board.

Rules and regulations of the infirmary and labratories are posted in their respective places.

REQUIREMENTS FOR ADMISSION

Graduates of the following courses, provided their credits satisfy the requirements as indicated in the following list of subjects: are admitted to the College of Dentistry without conditions:

(a) Any four-year course of a Minnesota State high school

(b) A four-year course of other accredited schools in the state

(c) A four-year course of schools in any other state accredited to the state university of that state

(d) The advanced Latin or English course of the Minnesota State normal schools.

The term CREDIT 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 a credit means the equivalent of ten recitation periods per week for thirty-six weeks.

Required of All

English	four credits
Elementray Algebra	one credit
Plane Geometry	one credit
Latin	one credit
Manual Training	one credit

Electives

(Seven credits must be selected from the following list)

MATHEMATICS

Higher algebra, one half credit
Solid geometry, one half credit

LATIN

Caesar, four books, one credit
Cicero, six orations, one credit
Virgil, six books, one credit

GREEK

Grammar, one credit
Anabasis, four books, one credit

GERMAN

Grammar, one credit
Literature, one credit

FRENCH

Grammar, one credit
Literature, one credit

SPANISH

Grammar, one credit
Literature, one credit

NORWEGIAN-SWEDISH
- 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

BUSINESS SUBJECTS, accepted only as parts of a well defined course
- History of commerce, one half credit
- Commercial geography, one half or one credit
- Elementary economics, one half credit
- Business law, one half credit
- Business arithmetic, one half credit
- Elementary bookkeeping, one half credit
- Advanced bookkeeping and business practice, one credit
- Stenography and typewriting, two credits
- Business spelling and correspondence, one half credit

PHYSICS, one credit

CHEMISTRY, 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

MANUAL SUBJECTS, accepted only as parts of a well defined course
- Freehand drawing, two credits
- Mechanical drawing, two credits
- Shop work, two credits
- Modeling and wood carving, one credit
- Domestic art and science, two credits

Students having no credit in manual training will be required to demonstrate, by test, the possession of mechanical ability.

Certificates of graduation must be presented on the regular University admission blanks, which may be obtained from the registrar.

Students not having credentials as indicated in either (a), (b), (c), or (d), are required to take the regular entrance examinations. See program page 3.

State High School Board certificates are accepted in lieu of examinations in the subjects they represent.

MATRICULATION AND REGISTRATION

After matriculating with the registrar of the University and paying the regular fees, students will be assigned seats, benches and lockers in the order of their registration with the dean of the college.

Students shall have their registration completed not later than the day previous to the day set for regular work to begin.

No one is recognized as a student of the school or admitted to classes, until his receipts are presented to and countersigned by the dean; this applies to both semesters.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English classics

(b) The principles of rhetoric

(c) Practice in written expression

(a) English classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's MACBETH; Milton's PARADISE LOST, books one and two; Burke's CONCILIATION WITH AMERICA: Carlyle's essay on BURNS. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected; at least two of Shakespeare's plays, besides the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

HIGHER ALGEBRA, FIRST PART (one half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below, they are not prepared to pursue sucessfully at the University the second part of higher algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

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

SOLID GEOMETRY (one half year). Any of the standard texts on this subject will furnish the necessary preparation. The exercises requiring solutions and demonstrations should not be omitted.

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

CAESAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is exepcted to be familiar with the life of Caesar and an account of his wars.

CICERO (one year). Any six orations from the following list: AGAINST CATILINE, POET ARCHIAS, LIGARIUS, MARCELLUS, MANILIAN LAW (to count as two orations), the fouteenth PHILLIPIC. The student should also be familiar with the life of Cicero.

VIRGIL (one year). Six books of the AENEID, or five of the AENEID and one of the METAMORPHOSES of Ovid, or the ECLOGUES. The student should be familiar with the life of Virgil and an account of his times and writtings. A correct rythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

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

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

(3) From two to three hundred German idioms.

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

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

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

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

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

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

NORWEGIAN (two years). First year, grammar and reader; one of Bjornson's stories. Second year, grammar reviewed; Raabe's History of Norway and a modern story or some easy play; composition ad conversation.

SWEDISH (two years). First year, the essentials of Swedish grammar; reading of easy prose and verse. Second year, grammar reviewed and composition; works of Tegner and Runeberg; elementary history of literature.

ANCIENT HISTORY (one year).

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermidiate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put on the evolution of institutions, and considerable attention should be paid to the later Helenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterwards to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intellectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

ENGLISH HISTORY (one half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

SENIOR AMERICAN HISTORY (one half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

AMERICAN GOVERNMENT (one half year). This should be study of our government, national, state and local, as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the constitution of the United States, the constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship, such as as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil, and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

BUSINESS SUBJECTS: The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that graduates of business courses are now admitted to certain departments of the University on the same footing as the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent should embrace the required English and mathematics, together with some work in history, science, and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: First, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business law. Second, courses dealing with the technique of business. The latter may be further subdivided into the mathematics of business, includ-

ing business arithmetic, bookkeeping and business practice; and the language of business, including stenography, typewritting and business correspondence.

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

COMMERCIAL GEOGRAPHY (one half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemented by map work and assigned readings.

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

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

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

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

ADVANCED BOOKKEEPING AND BUSINESS PRACTICE (one year). Thorough drill on standard business forms, such as bills, receipts, checks, notes, etc., also on the use and meaning of business symbols and abbreviations. The student should become accquainted with the bill book and the invoice book, and loose leaf and voucher system of bookkeeping. Each student should carry on a business of his own, first as an individual, then as a partnership, and finally as a corporation. Credit on this course should mean that the student lacks only age and actual business experience to become a competent bookkeeper.

STENOGRAPHY AND TYPEWRITING (two years). This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone. Nothing but the touch method should

be used in typewriting. The essentials are first, accuracy and speed in taking dictation and transcribing notes; secondly, correct spelling, capitalization, punctuation and paragraphing. The minimum speed at the end of the first year should be 75 words per minute in dictation and 25 words per minute on the machine; and at the end of the second year, 100 words per minute in dictation and 35 words per minute in transcribing notes. Thorough training should also be given in care of the machine, in modern methods of manifolding and in filing papers.

SPELLING AND BUSINESS CORRESPONDENCE (one half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form of business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to most prominent industries of the locality.

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

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

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

BOTANY (one or one half year). Schools which give one half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxonomy should be the aim of the course.

ZOOLOGY (one or one half year). The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the difference in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc.—in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy and give a healthful stimulation. to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be turned out along the line indicated above.

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of laboratory work will depend upon conditions,

but even under the best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

ASTRONOMY (one half year). An elementary course in general astronomy as presented in any good modern text book.

GEOLOGY (one half year). These subdivisions should receive special attention; physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals modifying the earth; and a brief survey of historical geology.

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

MANUAL SUBJECTS: In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school should offer all the subjects indicated. Not to exceed twenty-five per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

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

FREEHAND DRAWING (two credits)
MECHANICAL DRAWING (two credits)
JOINERY (one half credit)
WOOD TURNING AND CABINET MAKING (one half credit)
PATTERN MAKING AND FORGE SHOP (one half credit)
MACHINE SHOP INCLUDING CHIPPING
FILING AND WORK ON THE IRON LATHE (one half credit)
DRILL PRESS AND IRON PLANER
CLAY MODELING (one half credit)
WOOD CARVING (one half credit)
DOMESTIC ART, INCLUDING CAREFULLY GRADED EXERCISES IN SEWING (one credit)
DOMESTIC SCIENCE, INCLUDING PRACTICAL COOKERY, AND HOUSEHOLD ECONOMY (one credit)

ADVANCED STANDING

Applicants for advanced standing must present satisfactory evidence of possessing the preliminary educational qualifications required of the class they desire to enter.

They must also satisfy the professors of the branches from which they wish to be exempt, that the work pursued by them in other institutions

was equal in scope and amount to that passed by the class they propose to enter.

No credits are accepted unconditionally, the faculty reserving the privilege of examining any applicant when deemed necessary.

All certificates pertaining to advanced standing must be presented to the dean who will send them to the respective professors for acceptance or report of further requirements for acceptance.

Students coming from other schools must make up their technic conditions under supervision of the instructors of this school, at the convenience of the instructor.

One-year credit will be allowed graduates in medicine, but the dental technic branches of the first year must be taken and completed before advanced work in these branches can be entered upon.

EXAMINATIONS, STANDINGS AND CONDITIONS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject.

No student will be allowed to omit any freshman work in order to make up entrance conditions, except by special permission of the department affected.

Students will not be permitted to substitute private work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered to remove conditions at the opening of the school year in September. The examinations at the end of semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by a conference of the heads of the departments in which the work is pursued during that year.

All standings shall be reported officially to and from the registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove a condition until he presents a receipt from the cashier for the fee of said examination.

Conditions must be removed at the begining of the school year in September. No student who has any conditions unremoved at the close of this examination is allowed to continue with his class without the express permission of the dean upon the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work (by reason of having "failed") must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given in any year will become a "failed" student and must repeat the entire work of that year.

Students who carry "failures" into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

Practical work in the infirmary is not allowed to students having conditions, or incompleteness in any technic work.

ATTENDANCE AND DISCIPLINE

Attendance upon all lectures, and infirmary and labratory hours, as scheduled, is obligatory. A complete record of each student's attendance is kept, and all absences and tardinesses are noted.

Students to be eligible for final examinations, must have a record of not less than eighty per cent in attendance.

Habitual absence, continued indifference to study, or persistently poor scholarship, may subject the student to temporary or permanent suspension.

All laboratory courses must be taken in full and must invariably be entered upon during the first week in which they begin.

The connection of any student with this college may be terminated at any time, without a return of fees, whenever such action may be advisable on the ground of immorality or disorderly conduct, or a failure to conform to any of the established rules.

Students detected in the use of oustide help, as notes, etc., in quizzes or examinations, or of rendering assistance to other students during examinations, will be suspended or expelled. The possession of any secret aids while under examination, will be deemed presumptive evidence of guilt, and will subject the student to the same penalty as if detected in using them.

Any student detected in stealing will be permanently expelled from the college.

The practice of dentistry by students, except under the direct supervision of a preceptor, is prohibited by law in the state of Minnesota. Any student detected in violating this law will be suspended or expelled.

DEGREES

The degree of doctor of dental surgery is conferred by the Board of Regents upon the students who are recommended, by vote of the faculty, for graduation. Candidates for the degree must possess the following essential qualifications:

(1) Twenty-one years of age.

(2) Good moral character.

(3) Three full college years spent in the study of dentistry; the third year, at least, in this University, and the remainder in this or other recognized schools of dentistry.

(4) Satisfactory examinations passed in all branches of the curriculum.

FEES

The annual fee is one hundred and fifty dollars ($150.00). It includes all charges for matriculation, lectures, laboratory courses, dissections, technic materials, microscopes and graduation.

One-half of this fee will be payable when the student matriculates. The accountant's receipts for the portion will entitle the holder to take entrance examinations and to classify. The second half will be payable at the opening of the second semester. These receipts must be presented to and countersigned by the dean before entering upon the work of each semester.

A deposit of five dollars ($5.00) will be required in addition to the first semester fee, to cover loss of and breakage or damage to college property. This will be returned at the end of the year, providing there is no charge against the student. This fee is to be deposited with the University accountant each year when the student matriculates.

If the applicant fails to pass the entrance examinations, his fee will be returned by the accountant.

After having entered upon the course of study, fees are not returnable, and no rebate will be recommended should a student discontinue work, but the faculty may recommend the application of a part to the succeeding year.

The fee for condition examinations is one dollar ($1.00)

The fee for advanced standing examinations is one dollar ($1.00)

The fee for special examinations is five dollars ($5.00)

Special and graduate students will pay to the accountant a fee of thirty dollars per year for each study they pursue, and additional fees, varying from ten to thirty dollars, for each laboratory course they may select.

INSTRUMENTS, BOOKS, TOOLS AND MATERIALS

All students are required to provide themselvse with instruments, books, tools and materials as prescribed by the college.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

SUMMARY EXPENSES

	1st yr.	2d yr.	3d yr.
Tuition, Instruments, Tools and Books. . .	**$200 00**	**$350 00**	**$175 00**

SPECIAL LECTURES

Occasional lectures are given during the senior year on subjects having a general bearing upon the practice of dentistry, such as: Ethics Jurisprudence, Public educational measures, etc.

ALUMNI ASSOCIATION

An association of the graduates of the college has its annual meeting during commencement week.

President, E. F. Wanous, Syndicate Block, Minneapolis.

Secretary, B. A. Sandy, Andrus Building, Minneapolis.

The Department of Medicine

The Department of Medicine includes the following colleges:

The College of Medicine and Surgery

FRANK F. WESBROOK, M.A., M.D., C.M., Dean

THOMAS G. LEE, B.S., M.D., C.M., Librarian Department of Medicine

The College of Homeopathic Medicine and Surgery

EUGENE L. MANN, B.S., M.D., Dean

The College of Dentistry

ALFRED OWRE, D.M.D., MD., Dean

The College of Pharmacy

FREDERICK J. WULLING, Phm.D., LL.M., Dean

Each college is self-governed as to its internal affairs, having its own faculty and an independent curriculum. The laboratories and staff ot the College of Medicine and Surgery provide instruction for all students in each of the four colleges as required in the following branches:

Gross and microscopic anatomy and embryology, physiology, chemistry, physiological chemistry, pathology and bacteriology, pharmacology, principles of surgery and clinical microscopy.

BUILDINGS AND EQUIPMENT

The department occupies six buildings, five of which are situated upon the University campus, viz.: Millard Hall, the medical science building, the laboratory of chemistry, the laboratory of anatomy and the institute of Public Health and Pathology. In addition, two more buildings, a University hospital and a building for operative surgery, are provided for and will be erected.

Millard Hall contains the offices of the deans of the college of homeopathic medicine and surgery and of the college of dentistry; a large amphitheatre and lecture rooms for the several colleges, the library and reading room of the department, the laboratory of materia medica, the operating rooms and laboratories of dentistry and the dental infirmary.

LIBRARY OF MEDICAL DEPARTMENT

Thomas G. Lee, B.S., M.D., Librarian

The Medical Library consists of the following collections: The general clinical library, the libraries of the College of Dentistry and Pharmacy, the department libraries of pathology and bacteriology, histology and embryology, anatomy, and physiology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, etc., and about 175 current periodicals. In addition to the above,

the Libraries of the State Board of Health, of Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medical Society with some 5,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications.

Course in Dentistry

FRESHMAN YEAR

FIRST SEMESTER

ANATOMY 1, 2, 3 and 4, twelve hours, Professor Erdmann and Assistants
CHEMISTRY 1 and 3, sixteen hours, Professor Frankforter and Assistants
COMPARATIVE DENTAL ANATOMY 1, two hours, Dr. Hartzell
DENTAL ANATOMY 1, three hours, Drs. Damon and Lawton
PROSTHETIC DENTISTRY 1, fourteen hours, Drs. Damon and Lawton

SECOND SEMESTER

ANATOMY 5, twelve hours, Professor Erdmann and Assistants
DENTAL ANATOMY 2, three hours, Drs. Damon and Lawton
HISTOLOGY AND EMBRYOLOGY 5, eight hours, Professor Lee and Assistants
PHYSIOLOGY 1, six hours, Professor Beard and Assistants
PROSTHETIC DENTISTRY 2, eight hours, Drs. Damon and Lawton

JUNIOR YEAR

FIRST SEMESTER

CROWN AND BRIDGE-WORK 1, eight hours, Professor Orton and Assistants
MATERIA MEDICA 1, two hours, Dr. Schefcik
OPERATIVE DENTISTRY 1, fifteen hours, Professors Owre, Walls and Assistants
ORTHODONTIA 1, six hours, Professor Weiss and Assistants
PATHOLOGY AND THERAPEUTICS 1, two hours, Professor Hartzell and Assistants
PROSTHETIC DENTISTRY 3, eleven hours, Professor Weiss and Assistants

SECOND SEMESTER

CROWN AND BRIDGE-WORK 2, eight hours, Professor Orton and Assistants
DENTAL METALLURGY 1, two hours, Professor Owre
MATERIA MEDICA 2, two hours, Dr. Schefcik
OPERATIVE DENTISTRY 2, fifteen hours, Professors Owre, Walls and Assistants
ORTHODONTIA 2, four hours, Professor Weiss and Assistants
PATHOLOGY AND BACTERIOLOGY 1, two hours, Professor Wesbrook and Assistants
PATHOLOGY AND THERAPEUTICS 2, two hours, Professor Hartzell and Assistants
PROSTHETIC DENTISTRY 4, eleven hours, Professor Weiss and Assistants

SENIOR YEAR

FIRST SEMESTER

CROWN AND BRIDGE-WORK 3, six hours, Professor Orton and Assistants
DENTAL ELECTRICITY 3, one hour, Professor Springer
OPERATIVE DENTISTRY 3, twenty hours, Professors Owre, Walls and Assistants
ORAL SURGERY 1, three hours, Professor Hartzell and Assistants
ORTHODONTIA 3, five hours, Professor Weiss and Assistants
PHYSICAL DIAGNOSIS AND ANOETHESIA 1, one hour, Drs. Wright and Owre
PROSTHETIC DENTISTRY 5, eight hours, Professor Weiss and Assistants

SECOND SEMESTER

CROWN AND BRIDGE-WORK 4, six hours, Professor Orton and Assistants
DENTAL METALLURGY 1, two hours, Professor Owre
OPERATIVE DENTISTRY 4, twenty hours, Professors Owre, Walls and Assistants
ORAL SURGERY 2, three hours, Professor Hartzell and Assistants
ORTHODONTIA 4, five hours, Professor Weiss and Assistants
PHYSICAL DIAGNOSIS AND ANOESTHESIA 2, one hour, Drs. Wright and Owre
PROSTHETIC DENTISTRY 4, eight hours, Professor Weiss and Assistants

Courses of Instruction

ANATOMY

CHARLES A. ERDMANN, M.D., Professor of Anatomy
EARLE R. HARE, B.S., M.D., Instructor in Anatomy
C. F. DISEN, M.D., Demonstrator of Anatomy
C. C. TYRRELL, Ph.B., M.D., Prosecutor in Anatomy
F. N. WILSON, Assistant in Anatomy

1. OSTEOLOGY — PROFESSORS ERDMANN, DRS. HARE AND TYRRELL
Four credits (twelve hours of each week, for six weeks)
First quarter
Required of freshmen.
Lectures and recitations upon the human skeleton and supplementary work on the osteology of domestic mammals. Practical study of the bones of the human body, and recitations from the specimen.

2. SYNDESMOLGY — PROFESSOR ERDMANN, DRS. HARE AND TYRRELLL
Two credits (twelve hours of each week, for three weeks)
First quarter
Open to students having completed course 1. Required of freshmen.
Lectures and recitations covering the articulations, including the structture and movements of joints. Demonstrations from the specimen and preparation.

3. SPLANCHNOLOGY — PROFESSORS ERDMANN, DRS. HARE AND TYRRELL
Three credits (twelve hours of each week, for four and one-half weeks)
Second quarter
Open to students having completed course 2
Lectures and recitations on the thoracic and abdominal vicera, supplemented by the study of dissected specimens and models.

4. NEUROLOGY — PROFESSOR ERDMANN, DRS. HARE AND TYRRELL
Three credits (twelve hours of each week for four and one-half weeks)
Second quarter
Open to students having completed course 3
Lectures and recitations on the cerebro-special and sympathetic nervous system.

5. DISSECTION — DRS. DISEN, HARE AND TYRRELL
Six credits (twenty-four laboratory hours each week, for nine weeks)
Fourth quarter
Open to students having completed course 4. Required of freshmen.
Dissection of a complete lateral half of the human body, with special reference to the head and neck. Dissection of the human and compartive brain.

CHEMISTRY

G. B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry
I. H. DERBY, B.S., Assistant Professor of Chemistry
J. A. HANDY, Ph.C., Instructor in Chemistry

1. GENERAL CHEMISTRY — ASSISTANT PROFESSOR DERBY AND MR. HANDY
Five credits (four recitation hours and twelve laboratory hours for nine weeks) First quarter
Required of freshmen.

3. CROWN AND BRIDGE-WORK — PROFESSOR ORTON AND ASSISTANTS
Three credits (six laboratory hours per week) — First semester
Open to students completing 1 and 2. Required of seniors.
Clinical lectures dealing with questions arising in the infirmary and clinical practice covering the entire field of crown and bridge-work.

4. CROWN AND BRIDGE-WORK
Continuation of 3 as outlined

DENTAL ANATOMY

G. M. DAMON, D.D.S., Instructor in Prosehetic Dentistry and Dental Anatomy

H. C. Lawton, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy

1. DENTAL ANATOMY — DR. DAMON, DR. LAWTON
Two credits (one recitation and two laboratory hours per week) — First semester
Required of Freshmen.
This course will consist of lectures, recitations and such laboratory work as drawing dissection, modeling and carving of teeth.

2. DENTAL ANATOMY — DR. DAMON, DR. LAWTON
Two credits (one recitation hour and two laboratory hours per week) — Second semester
Open to students completing course 1. Required of freshmen.
Continuation of course 1 as outlined above.

DENTAL ELECTRICITY

F. W. SPRINGER, E.E., Professor of Electrical Engineering

3. DENTAL ELECTRICITY — PROFESSOR SPRINGER
One credit (two recitation hours per week for nine weeks) — First quarter
Required of seniors.
A course of instruction will be given upon the different forms of batteries, dynamos and motors in use in dental practice. Their construction, use, care and operation. Electricity as used in surgery and for therapeutic purposes, including application of x-rays, will be made clear by laboratory demonstrations and practical application.

DENTAL METALLURGY

A. OWRE, D.M.D., M.D., C.M., Professor of Operative Dentistry and Dental Metallurgy

1. DENTAL METALLURGY — PROFESSOR OWRE
Two credits (two recitation hours per week) — Second semester
Required of juniors.
Lectures, recitations and demonstrations, taking up the most important metals with special reference to those used in dentistry.

Lectures and laboratory work. The course includes a detailed study of chemical and physical properties of the non-metals and their more important compounds.

3. QUALITATIVE CHEMISTRY — ASSISTANT PROFESSOR DERBY AND MR. HANDY
Five credits (four recitation hours and twelve laboratory hours for nine weeks) — Second quarter
Open to students completing course 1. Required of freshmen.
Lectures, recitations and laboratory work. The course includes the general functions of the metals and acids with their qualitative separation and indentification.
For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry in the department of physiology, in the pathology of the large number of lines.
The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology and in the clinical laboratories in connection with the microscopy of the urine.

COMPARATIVE DENTAL ANATOMY

M. V. HARTZELL, D.M.D., Instructor in Comparative Dental Anatomy.

1. COMPARATIVE DENTAL ANATOMY — DR. HARTZELL
Two credits (four recitation hours per week for nine weeks) — Second quarter
Open to students completing anatomy 1 and 2. Required of freshmen.
The instruction in this subject embraces a comparative study of animal life, giving special attention to number, form and arrangement of teeth, and their adaption to food habits, ranging from the horny teeth of the invertebrates, to the complex tooth-forms of the most highly specialized animals of the present time. The lectures will bc illustrated with the stereopticon, casts, models and skulls.

CROWN AND BRIDGE-WORK

F. H. ORTON, D.D.S., Professor of Crown and Bridge-Work
A. S. WELLS, B.A., D.D.S., Instructor in Crown and Bridge-Work
U. E. HEDDY, D.D.S., Instructor in Crown and Bridge-Work
H. A. BRITZIUS, M.A., M.S., Instructor in Crown and Bridge Technic

1. CROWN AND BRIDGE-WORK — PROFESSOR ORTON AND ASSISTANTS
Five credits (two recitation and six laboratory hours per week) — First semester
Required of juniors.
Lectures, recitations, demonstrations and laboratory work. The latter includes all the more important forms of crowns and bridges.

2. CROWN AND BRIDGE-WORK — PROFESSOR ORTON AND ASSISTANTS
Five credits (two recitation and six laboratory hours per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1, as outlined above.

HISTOLOGY AND EMBRYOLOGY

T. G. LEE, B.S., M.D., Professor of Histology and Embryology
W. S. NICKERSON, Sc.D., M.D., Assistant Professor of Histology and Embryology
J. F. LEMSTROM, M.D., Instructor in Histology and Embryology

5. HISTOLOGY AND EMBRYOLOGY — PROFESSOR LEE AND ASSISTANTS
Six credits (eight recitation and eight laboratory hours per week)
Fourth quarter

Required of freshmen.

The course will consist of lectures, laboratory work and demonstrations. The instruction will include a general consideration of the structure and the properties of protoplasm, the cell, cell division, the formation of the germ layers and the differentiation of tissues and organs. Also a detailed study of the structure of the various tissues, epithelium, connective, bone, muscle, blood and lymph; the vascular and lymphatic system, the respiratory system, the excretory system and the nervous system. Special emphasis will be laid upon the full knowledge of the development and structure of the head, mouth, jaw, teeth and the other portions of the digestive system.

Each student will prepare a number of specimens illustrating the structure of the teeth and jaws. The work is based upon the study of human tissues supplemented by considerable amount of comparative work on other forms for the purpose of a better understanding of the structural conditions in man.

MATERIA MEDICA

J. F. SCHEFCIK, B.S., Ph.G., M.D., C.M., Instructor in Materia Medica

1. MATERIA MEDICA — DR. SCHEFCIK
Two credits (two recitation hours per week) — First semester
Required of juniors.

This subject is covered as thoroughly as its importance demands. The writing and correct composition of prescriptions is an important feature. Particular attention is devoted to all therapeutic measures pertaining to dentistry. Practical work consists of the study of crude drugs and preparations, with demonstrations of all the pharmaceutical processes of importance.

2. MATERIA MEDICA — DR. SCHEFICK
Two credits (two recitation hours per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1 as outlined above.

OPERATIVE DENTISTRY

A. OWRE, D.M.D., M.D., C.M., Professor of Operative Dentistry and Dental Metallurgy
J. M. WALLS, D.M.D., Professor of Clinical Operative Dentistry
H. S. GODFREY, D.M.D., Instructor in Operative Dentistry
N. J. COX, B.S., D.M.D., Instructor in Operative Dentistry
H. A. MAVES, D.D.S., Instructor in Operative Dentistry
R. L. GREEN, D.D.S., Instructor in Operative Dentistry

C. A. GRIFFITH, D.D.S., Instructor in Operative Dentistry
R. R. JONES, D.D.S., Instructor in Operative Dentistry

1. OPERATIVE DENTISTRY — PROFESSORS OWRE, WALLS AND ASSISTANTS
Eight credits (three recitation and ten laboratory hours per week)
First semester
Required of juniors.
Lectures, recitations, demonstrations and laboratory work. The object of the latter is to teach technical procedure as much as possible before clinical practice is begun.

2. OPERATIVE DENTISTRY — PROFESSORS OWRE, WALLS AND ASSISTANTS
Eight credits (three recitation and ten laboratory hours per week)
Second semester
Open to students completing 1. Required of juriors.
Lectures, recitations and clinical practice.

3. OPERATIVE DENTISTRY — PROFESSORS OWRE, WALLS AND ASSISTANTS
Eleven credits (two recitation and eighteen laboratory hours per week)
Required of seniors. First semester
Lectures, recitations, conference work, demonstrations and clinical practice covering the entire field of operative dentistry.

4. OPERATIVE DENTISTRY — PROFESSORS OWRE, WALLS AND ASSISTANTS
Eleven credits (two recitation and eighteen laboratory hours per week)
Second semester
Open to students completing 3. Required of seniors.
Continuation of course 3 as outlined above.

ORAL SURGERY

T. B. HARTZELL, D.M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery
F. R. WRIGHT, D.D.S., M.D., Instructor in Anæsthesia and Oral Surgery
O. OWRE, M.D., Instructor in Oral Surgery

1. ORAL SURGERY — PROFESSOR HARTZELL AND ASSISTANTS
Two credits (one recitation and two laboratory hours per week)
First semester
Open to students completing courses 1 and 2, pathology and therapeutics.
Required of seniors.
The subject is taught by lectures, recitations and practical demonstrations upon the abundant clinical material available in the infirmary.

2. ORAL SURGERY — PROFESSOR HARTZELL AND ASSISTANTS
Two credits (one recitation and two laboratory hours per week)
Second semester
Open to students completing 1. Required of seniors.
Continuation of course 1 as outlined above.

ORTHODONTIA

O. A. WEISS, D.M.D., Professor of Prosthetic Dentistry and Orthodontia
J. N. PIKE, D.D.S., Instructor in Orthodontia
W. F. LASBY, B.S., D.D.S., Instructor in Prosthetic Dentistry
A. J. WEISS, Instructor in Technics

1. ORTHODONTIA — PROFESSOR WEISS AND ASSISTANTS
Three credits (six laboratory hours per week) — First semester
Required of juniors.
This course consists entirely of technic work in the laboratory, comprising a brief course in the technique of steel which is followed by a comprehensive course in making regulating appliances, and the preparation of materials for the same.

2. ORTHODONTIA — PROFESSOR WEISS AND ASSISTANTS
Three credits (three laboratory hours per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1 as outlined above.

3. ORTHODONTIA — PROFESSOR WEISS AND ASSISTANTS
Three credits (one recitation and four laboratory hours per week)
Required of seniors. — First semester
This course consists of lectures and recitations in which the theory and practice of orthodontia is fully considered.
An ample clinic is provided which affords a comprehensive training in the practice of orthodontia. Every student is required to treat at least one case of irregularity of the teeth but may treat two or three cases.

4. ORTHODONTIA — PROFESSOR WEISS AND ASSISTANTS
Three credits (one recitation and four laboratory hours per week)
Second semester
Open to students completing 3. Required of seniors.
Continuation of course 3 as outlined above.

PATHOLOGY AND BACTERIOLOGY

F. F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology

R. H. MULLIN, B.A., M.B., Assistant Professor of Pathology and Bacteriology

H. E. ROBERTSON, B.A., M.D., Demonstrator in Pathology

E. FIDLAR, M.B., Junior Demonstrator of Pathology and Bacteriology

1. BACTERIOLOGY AND PATHOLOGY — PROFESSOR WESBROOK AND ASSISTANTS
Two credits (four recitation hours per week for nine weeks)
Second semester
Required of juniors.
A course of lectures, recitations and demonstrations of the general principles underlying pathology and bacteriology.

PATHOLOGY AND THERAPEUTICS

T. B. HARTZELL, D.M.D., M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery

1. PATHOLOGY AND THERAPEUTICS — PROFESSOR HARTZELL
One and one-half credits (one recitation and one laboratory hour per week) — First semester
Required of juniors.
These subjects are taught by lectures and recitations involving general pathology as a foundation for the special pathology of the oral cavity; paying particular attention to the therapeutic requirements of the lesions of the mouth and teeth.

The work in pathology is supplemented by laboratory work under the care of the chair of pathology, department of medicine.

2. PATHOLOGY AND THERAPEUTICS — PROFESSOR HARTZELL
One and one-half credits (one recitation and one laboratory hour per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1 as outlined above.

PHYSICAL DIAGNOSIS AND ANÆSTHESIA

T. B. HARTZELL, D.M.D., M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery
F. R. WRIGHT, D.D.S., M.D., Instructor in Anæsthesia and Oral Surgery
O. OWRE, M.D., Instructor in Oral Surgery

1. PHYSICAL DIAGNOSIS AND ANÆSTHESIA — PROFESSOR HARTZELL, DR. WRIGHT AND DR. OWRE
One-half credit (one laboratory hour per week) — First semester
Required of seniors.
The subject of physical diagnosis will be taught didactically and practically, and will have direct bearing upon the subject of anæsthesia and will be as complete as its importance demands.
A course in urinalysis will be given in connection with this course.
The technics of anæsthetics, both general and local, receive full consideration. All anæsthetics are administered in the clinic, and full instruction concerning their use is given. The members of the senior class are required, under direction, to administer them and extract teeth under these agents.

2. PHYSICAL DIAGNOSIS AND ANÆSTHESIA — PROFESSOR HARTZELL, DR. WRIGHT AND DR. OWRE
One-half credit (one laboratory hour per week) — Second semester
Open to students completing 1. Required of seniors.
Continuation of course 1 as outlined above.

PHYSIOLOGY

RICHARD OLDING BEARD, M.D., Professor of Physiology
F. H. SCOTT, Ph.D., M.B., Assistant Professor of Physiology
M. R. WILCOX, M.D., Assistant Professor of Physiology
J. P. SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry

1. PHYSIOLOGY — PROFESSOR BEARD AND ASSISTANTS
Six credits (twelve recitation hours per week for nine weeks) — Third quarter
Required of freshmen.
This subject is taught by recitations and lectures, illustrated by practical demonstrations. These embrace the discussion and, so far as possible, the observation of the physiological ingredients of the animal body; of the physiology of cell life or the fundamental properties of the cell; of the nutritive media, blood lymph and chyle; of the elementary functions of the nervous system; the muscular tissues; the vascular mechanism; the alimentary canal; the organs of secretion, excretion and respiration, and of the functino of metabolism.

PROSTHETIC DENTISTRY

O. A. WEISS, D.M.D., Professor of Prosthetic Dentistry and Orthodontia

H. M. REID, D.D.S., Instructor in Prosthetic Dentistry

G. M. DAMON, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy

W. F. LASBY, B.S., D.D.S., Instructor in Prosthetic Dentistry

A. J. WEISS, Instructor in Technics

1. PROSTHETIC TECHNICS — DRS. DAMON AND LAWTON
   Seven credits (fourteen laboratory hours per week) — First semester
   Required of freshmen.
   This course consists entirely of technic work in the laboratory, comprising impression materials and their uses and the simpler processes of plate-work.

2. PROSTHETIC TECHNICS — DRS. DAMON AND LAWTON
   Four credits (eight laboratory hours per week) — Second semester
   Open to students completing 1. Required of freshmen.
   Continuation of course 1 as outlined above.

3. PROSTHETIC DENTISTRY — PROFESSOR WEISS AND ASSISTANTS
   Six credits (one recitation and ten laboratory hours per week) — First semester
   Open to students completing 1 and 2. Required of juniors.
   This course consists of lectures and recitations in which the principles and practice of plate-work are fully considered.
   The technic work in this course is a continuation of that begun in the freshmen year ,and consists of the more difficult plate-work. This work is graded and consists only of practical processes; obsolete processes and unnecessary repetition are avoided.

4. PROSTHETIC DENTISTRY — PROFESSOR WEISS AND ASSISTANTS
   Six credits (one recitation and ten laboratory hours per week) — Second semester
   Open to students completing 3. Required of juniors.
   Continuation of course 3 as outlined above.

5. PROSTHETIC DENTISTRY — PROFESSOR WEISS AND ASSISTANTS
   Four credits (eight laboratory hours per week) — First semester
   Open to students completing 4. Required of seniors.
   Lectures and recitations cover the treatment of cleft palate cases and other special forms of prosthesis.
   An excellent clinic for general prosthetic dentistry affords ample opportunity for the student to treat a variety of cases by various methods of practice.

6. PROSTHETIC DENTISTRY — PROFESSOR WEISS AND ASSISTANTS
   Four credits (eight laboratory hours per week) — Second semester
   Open to students completing 5. Required of seniors.
   Continuation of course 5 as outlined above.

Students

Graduates 1908—43

Bandelin, William John, Arlington
Bergh, Charles John, St. Paul
Broderson Clarence, Fountain City, Wis.
Bunce, Elmer Wayland, Minneapolis
Coleman, Louren M., Ellendale, N. D.
Conway, Jesse Francis; Lake City
Conway, Steven Vincent; Minneapolis
Countryman, Ralph Williams; Minneapolis
Franta, Valentine Adolph; Montgomery
Grafsland, Edwin; Lake Park
Hagberg, Gust Adolph, Brainard
Harmon, Harry Weston; Faribault
Harrison, Francis Randall; St. Cloud
Higgins, Clifford Crumbaugh; Kirkwood, Ohio
Hull, Isaac Stephenson, St. Paul
James, Meredith Jay; Lake Crystal
James, William Henry; Lake Crystal
Johnson, Joseph, Edina Mills
Kjelland, Joseph Almon; Rushford
Knoche, Karl George, St. Paul
Lawton, Harry Comegys, St. Paul
Leary, Daniel James; Portage, Wis.
Lier, Edfor Menton; Ashby
Madden, Fred M.;Watertown
Miesen, Peter James; St. Peter
Moore, Thomas John; Chatfield
Munns, Herbert Allen; Minneapolis
Olson, Charles John; Hastings
Radermacher, Harley Adolph; Barron, Wis.
Rayman, Frederick Luverne; Austin
Remele, Herman Charles; Minneapolis
Sandstrom, Carl L.; Cloquet
Schapler, John Earl; Pipestone
Schmitz, Leroy Christian; Jamestown, N. D.
Simon, Edwin James; Faribault
Snyder Lynn; Lake City
Spurbeck, Lee; Two Harbors
Tanner, William Paul; Cannon Falls
Trench, William; Dennison
Van Dyke, Arthur Alexander; Alexandria
Whitson, Abram Page; Packwauckee, Wis.
Will, Mellville Bruce; Mapleton
Williams, Louis; Ashland, Wis.

THIRD YEAR—48

Bakke, Frederick Charles; Stephen
Basford, Clarence Meredith
Bird, Clement Keyes,; West Concord
Cahill, John Francis; Waseca
Chapman, Edgar; Minneapolis
Coad, Cecil Walters; Minneapolis
Coulter, Mellville Rankin; Anoka
Crone, William Herman; Minneapolis
Cryderman, William Jacob; Devils Lake, N. D.
Davis, Oscar Detorest; Detroit
Doris, John R.; St. Paul
Ebersperger, Joseph F.; Minneapolis
Ernst, Max Emil Paul; St. Paul
Gustafson, Richard Elmer; Winthrop
Janecky, Joseph William; Hutchinson
Kohagen, John Benjamin; Duluth
Larson, Arnold John; Minneapolis
Lawrence, Edward; Winthrop
Linder, William Floyd; Minneapolis
Lippit, Dunbar Francis; Duluth
Lund, William Theodore; Dawson
McFadden, Charles Atkinson; Duluth
McPhail, Archie; Spring Valley
Metcalf, George Robert; Osakis
Michalson, Abraham; Hudson, Wis.
Mittelstaedt, Frank August; Milbank, S. D.
Moos, William H., St. Cloud
Nesse, George Allen; Mabel
Nordin, Emil Nels; Marine Mills
O'Neil, James W.; Lake City
Pagenkopf, Alford Albert; Mapleton
Philips, Frank John; Lansing
Porter, Irving Lester; Willmar
Quast, Louis Chris; Janesville
Rand, Henry Dane; St. Paul
Rayman, Fay Washington; Austin
Ruggles, Arthur Millette; Osakis
Salisburg, Earl; Minnewauken, N. D.
Schwartz, Charles; Minneapolis
Scribner, Marguerite Sawyer; Minneapolis
Solberg, Chris Bernard; Montevideo
Solem, Paul Oscar; Minneapolis
Swanson, Arthur Emanuel, Minneapolis
Thulien, Carl Augustus; St. James
Walker, Arthur William; Alexandria
Wiethoff, Charles; Minneapolis
Wilson, Edgar Osiander; Kasson
Winter, Seward Randall; Minneapolis

SECOND YEAR—49

Adams, Frank William; Willmar

Allison, James Hawxhurst; Anoka
Bantle, George Anthony; St. Paul
Bellingham, Roscoe Charles; Bellingham
Braafladt, Ole Andrew; Belview
Brekhus, Peter John; Minneapolis
Commers, Leo Phillip; Minneapolis
Dunbar, Francis Warren; Minneapolis
Dvorak, Joseph William; Renville
Eckman, Philip; Granite Falls
Goldblum, Hal Sol; Minneapolis
Grandy, Alfred William; Bath Gate, N. D.
Greenberg Jack
Haarlow, Arnold William; Baldwin, Wis.
Hanneman, Rudy William; Plainview
Hanson, William Cornelius; Sleepy Eye
Harris, Leslie; Park River, N. D.
Hauck, Oscar W.; Wood Lake
Higgins, Robert Cloyd Dillon; Sydney, Ohio
Holm, Edward Olaf; Waubay, S. D.
Hughes, Carl Leo; Hope, N. D.
Keller, Frank Raymond; Minneapolis
Kost, Walter Henry; St. Paul
Krejci, Fred Otto; Hutchinson
La Due, Nelson Vivian; Fertile
Little, Arthur Paul; Appleton
Lyman, Harry Harlam; Caledonia
McBeth, Ewing Clevland, Spokane, Wash
McKenzie, Morell Dion; St. Paul
Maker, John Adolph; Lake Crystal
Maland, James William; Rushford
Murphy, Dennis Joseph; Lakefield
Nelson, Harry Wilhelm; Minneapolis
Nelson, Roy Harrison; Hope, N. D.
Oberg, Clarence Emanuel; Minneapolis
Pattridge, Mark Otis; Tracy
Petri, Carl Hjalmar; Minneapolis
Plaas, George Arthur; Red Wing
Reynolds, George Westfall; Minneapolis
Rounds, William T.; Sleepy Eye
Samuels, Harvey Charles; Minneapolis
Saunders, Benjamin Harrison; Parkers Prairie
Sheils, Arthur George; West Concord
Smetana, Edward E.; Hopkins
Stangeby, Torlief Ludwig; Minneapolis
Stone, Milton Blan; St. Peter
Thomson, Erwin Emmerson; Minneapolis
Wells, Harry Asa; Minneapolis
Whitney, Harry Carroll; Wessington Springs; S. D.

FIRST YEAR—77

Altermatt, Wallace Adolph; Springfield
Bancroft, John Albert; Blue Mounds, Wis.
Barnum, Elbert Wetherald; Pine City
Brede, Otto Henry; Minneapolis
Bren, Edward James; Tabor
Campbell, William Downer; Wabasha
Clayton, Harry Frederick; St. Paul
Cole, Bert LeRoy; St. Paul
Cooperman, Oscar; Minneapolis
Cornwall, John Thomas; Eveleth
Delmore, Hubert Francis; Marshfield, Wisconsin
De Mots, Edward Gilbert; Sioux Center, Iowa
Deslaurier, Albert Joseph; St. Paul
Dinwoody, George Christian; St. Paul
Doty, Charles Henry; Minneapolis
Dvorak, Edward John
Ernst, Henry William
Fairchild, Guy Buchanan; Grand Forks, N. D.
Flagstad, Carl Oscar
Fossum, Oscar Eilert; St. James
Franchere, Harold; Lake Crystal
Franta, Edward Frank; Montgomery
Gauthier, Victor Edmund; Cloquet
Greene, Henry Stewart; Luverne
Gross, Samuel; Minneapolis
Hagen, Paul; Crookston
Hall, Henry Joseph; Rochester
Harrington, Earl Fremont
Hartl, Frank Joseph; Kiner, N. D.
Hartung, William John; St. James
Haycock, William James; Tracy
Hedman, Carl Edwin; St. Paul
Henderson, James L.; St. Paul
Iltis, Henry Charles; Chaska
Johnson, George Edwald; Minneapolis
Johnston, Warren Wesley; Minneapolis
Kelly, John Patrick; Minneapolis
Larson, George; Atwater
Luhman, Archie; Dorer
Lundquist, Arthur; Minneapolis
McCarthy, Francis Michael; Branierd
McDougall, William; Royalston
Magnuson, Frank Arthur; St. Paul
Majerus, John; Helena, Montana
Maves, Theodore William; St. Peter
Maybury, Richard Samuel; St. Cloud
Monroe, William Hutchinson
Moore, William Arthur; Chatfield
Mulligan, William Howard; Minneapolis
Oien, Gerhard Oseander; Boyd
Oram, Warren Wright; Willmar
Peterson, Johan Ferdinand; Bemidji

Porter, Walter Raymond; Willmar
Radermacher, Ralph James; Le Seuer Center
Rauch, Benjamin; Minneapolis
Rexford, Sidney Mark; Spring Valley
Rieke, Harvey Wesley; Fairfax
Ritchie, Hugh; Cannon Falls
Roll, William August; Clontarf
Rosen, Maurice Calvin; Minneapolis
Rudolph, Charles Eugene; Annandale
Seifert, Arthur Vincent; New Ulm
Sieberg, Edward; Oakes, N. D.
Smith, Harvey Willrad; Verndale
Steinfeldt, Abe Arnold; Minneapolis
Stickney, Truman Leander; Minneapolis
Thomas, James Alfred; Spencer, Iowa
Thorburn, Lloyd Mungo; Marshall
Van Gilder, Jesse Stillman; Cannon, Falls
Vig, Richard; Fosston
Walhus, Martin J.; Spring Grove
Walters, Kenneth Hugo; Caselton, N. D.
Washburn, Dwight Wells; Plainview
Weeks, Arthur Freeman; Litchfield
Williams, Robert Edgar; Akeley
Wolf, George Emil; St. Paul
Ziegler, Sam; Stillwater

SPECIALS—19

Benjaminin, Harley George; Minneapolis
Brady, Charles Patrick; Red Lake Falls
Britzuis, Harry Adam; Minneapolis
Broderson, Clarence C.; Fountain City, Wisconsin
Capron, Harry; Minneapolis
Carpenter, Dwight Jefferson; Minneapolis
Chapman, LeRoy Marion; Lanesboro
Conway, Steven Vincent; Minneapolis
Donald, Raymond Bristol; Minneapolis
Ertl, Rudolph William; Minneapolis
Ingersoll, Howard George; Branierd
Kaiser, Frederick John; Wells
Mittwer, Arthur Edward; Minneapolis
Moorhouse, Raymond Richard; Minneapolis
Remele, Herman Charles; Minneapolis
Ringnell, Ernest Berrhart; Minneapolis
Schmid, Adolph Robert; Springfield
Scott, Louis William; Waseca
Verne, Paul Conrad; Minneapolis

The University of Minnesota Bulletin

General Information

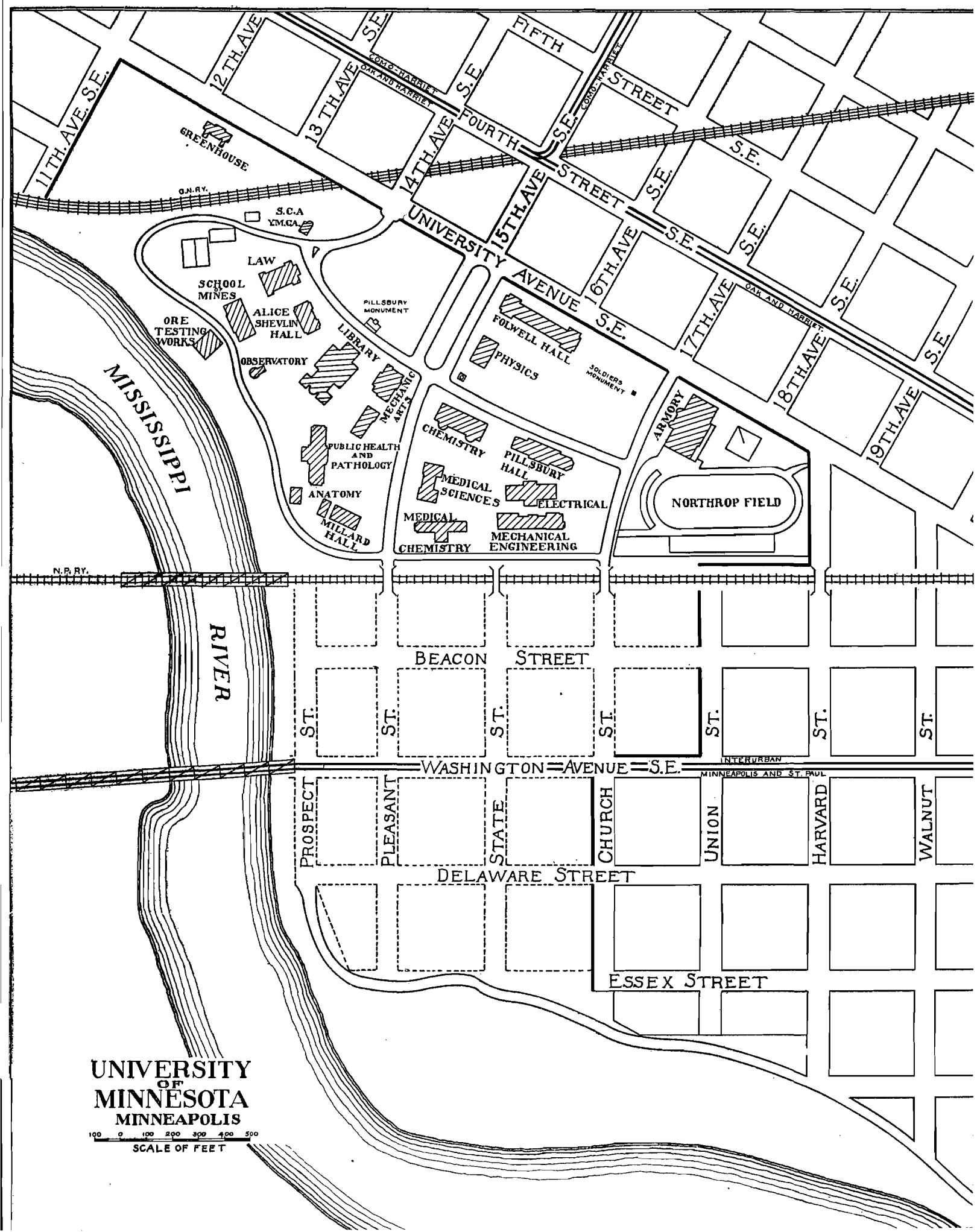
1909-1910

Volume XII April 15, 1909 No. 2

Entered at the Postoffice
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 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.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PUBLIC HEALTH AND PATHOLOGY
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FOLWELL HALL
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ARMORY
NORTHROP FIELD
MISSISSIPPI RIVER
N.P.RY.
BEACON STREET
WASHINGTON AVENUE S.E.
INTERURBAN
MINNEAPOLIS AND ST. PAUL
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PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
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100 0 100 200 300 400 500
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1910

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University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration.
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	25	Friday	Good Friday, recess two days
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

Program—Entrance Examinations
1909–10

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botony
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The School Year for 1910-11 will begin Tuesday, September 13

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 SCHOOL OF AGRICULTURE
- SHORT COURSE FOR FARMERS
- THE DAIRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

Description of Departments

In the College of Science, Literature and the Arts, there is a four-year course of study leading to the degree of Bachelor of Arts. The work of the first two years is elective within certain limitations as to the range of subjects from which the electives may be chosen. The remaining work of the course is entirely elective, with the provision that a certain number of long courses be selected. The course is so elastic that it permits the student to make the general scope of his course classical, scientific or literary, to suit his individual purpose.

In this college are given also the two years of college work required for entrance to the College of Medicine and Surgery; the first two years of work of the six-year course in Science and Medicine, leading to the degrees of Bachelor of Science and Doctor of Medicine; the one year of college work required for entrance to the College of Law; and various non-professional subjects required in other schools and colleges of the University.

The College of Engineering and the Mechanic Arts was founded "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 municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being 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 College of Agriculture offers a four-year course in agriculture. The degree of Bachelor of Science, in Agriculture is conferred upon completion of the course. Students in this College may specialize along the line of forestry or of home economics and secure the degree, Bachelor of Science (in Forestry, or in Home Economics).

The School of Agriculture offers a three-year course of study and is a training school for practical farm life and in domestic economy. The College of Agriculture is open to graduates of this School who have completed the fourth year of work required for admission to the College.

The Dairy School offers practical instruction in dairying, specially designed for those who are actually engaged in the manufacture of butter and cheese.

The Short Course for Farmers is designed to be of the greatest help possible to those actually engaged in farming.

THE CROOKSTON SCHOOL OF AGRICULTURE offers a course of study quite similar to that given in the School of Agriculture.

THE COLLEGE OF LAW aims to educate its students by means of the study of jurisprudence, familiarizing them with the fundamental principles of positive law. Education, and not simply information, is the prime object. The power to think clearly, to reason cogently, to investigate thoroly, to generalize clearly, and to express thoughts accurately are the prime objects of legal education. The method of work generally pursued consists in the study of reported cases, preparing written analysis of the same, and such lectures as are necessary to give the student a symmetrical view of the science of jurisprudence. The art of practice is taught so far as possible in the law school. A system of courts embracing a court of the Justice of the Peace, and the District and Supreme Courts of the state is organized and maintained. The students pass through each of these courts in order. Students familiarize themselves with the rules of the District and Supreme courts of the state. Jury trials are conducted throughout the senior year. Appeals, motions for new trials, arguments, and all the other points of practice in the courts of the state are considered. The degree of Bachelor of Laws is granted upon the completion of the three year day course, or the four year evening course, which degree entitles the holder to admission to the bar without examination.

THE COLLEGE OF MEDICINE AND SURGERY was established as such in 1888, the University Medical Department having been established in 1884 to examine students and confer degrees. The College provides now the only medical teaching in Minnesota, having taken over the Medical Department and students of Hamline University in 1908.

The requirements for entrance are a four year high school course, including two years of Latin; and two years of college work equivalent to the academic work of this University and including at least one year each of physics, inorganic chemistry, qualitative analysis, biology and language. Four years of thirty-six full weeks of laboratory, recitational, didactic and clinical work are required in medicine.

The college is housed on the campus in six commodious modern buildings. The University owns and controls a dispensary near by and controls the St. Paul dispensary. The Elliott Memorial Hospital is in process of organization on the campus.

The Twin Cities' population of 550,000, with hospitals and dispensaries are used for teaching.

The following courses of study are offered:

1. M. D. Course.—Four years of graded study.

2. Combined B. S., M. D. Course.—Two years of required courses in the academic department, in biology, botany, mathematics, language

and economics, followed by four years of medicine, permit of the double degree in six years.

3. Combined B. A., M. D. Course.—Students presenting three years of college work in the academic department, which include the B. A. degree at the end of their required entrance studies, may take the first year in medicine.

Similar affiliations with outside colleges have been made whereby the B. A. degree is conferred by the outside colleges.

4. Training School for Nurses.—(See school bulletin).

5. Embalming School.—(See special announcement).

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

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY offers two courses of study: A four year course of nine months each leading to the degree of M. D., requiring two years of collegiate work for admission; a six year course, the first two years in the College of Science, Literature and the Arts and the last four years in the College of Homeopathic Medicine and Surgery—at the completion of four year's work the degree of B. S. is conferred, and, on completion of the six years, the degree of M. D.—requiring the high school diploma for admission.

THE COLLEGE OF DENTISTRY offers a three-year course of study, of nine months each. Upon completion of the prescribed course the degree of Doctor of Dental Surgery is conferred.

THE COLLEGE OF PHARMACY was organized in 1891 upon request of the Minnesota State Pharmaceutical Association. In the organization and conduct of the college, the Board of Regents and the faculty have had and have the co-operation of the pharmacists of the Northwest. The college is of the University grade and maintains a high standard of entrance and graduation requirements. Every effort is made to comply with the demands of the pharmaceutical profession of the Northwest and elsewhere. The college offers a regular course extending over two or three years leading to the degree Bachelor of Pharmacy, and two post-graduate courses, the first requiring at least one additional year of resident work and leading to the degree Master of Pharmacy, and the second requiring one or two additional years of work and leading to the degree Doctor of Pharmacy. It is now contemplated to add a four-year course to include somewhat more than is now included in the regular two-year course and about two years of academic work. This course will lead to the degree Bachelor of Science in Pharmacy, and will in all respects be at least the equal of similar courses given in other University colleges of pharmacy. The course will probably be inaugurated in 1910. The Board of Regents have also authorized a course somewhat lower than the regular course now given to comply however with the requirements of the American Conference of

Pharmaceutical Faculties. This course probably will not begin until 1911 and will probably not lead to any degree or to the degree Pharmaceutical Graduate.

THE SCHOOL OF MINES was established in 1889. Its buildings and laboratories are located on the grounds of the University of Minnesota. Students of the School of Mines have, therefore, all the opportunities afforded by a large university. Two regular courses of study are offered, namely, mining engineering and metallurgy, leading to the degrees of Engineer of Mines (E. M.) and Metallurgical Engineer (Met. E.), respectively. The courses in the school are designed with a view of preparing men to enter their profession with a thorough grounding in mathematics, in the sciences, and in the fundamental principles of mining engineering and metallurgy. The technical courses consist of lecture work in mining, metallurgy and allied subjects supplemented by laboratory work in assaying, chemistry, ore dressing and metallurgy; field work in plane and underground surveying; actual practical mining and metallurgical work in Minnesota and western mining centers. A system of apprenticeship during summer vacations has been inaugurated. This work has become part of the curriculum and is required of all students who are candidates for degrees.

Minnesota's enormous iron ore production continually brings before the public the necessity for trained men to aid in the development of the country's mineral resources. The state has developed its School of Mines with this end in view.

THE COLLEGE OF EDUCATION offers a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

Students are admitted to the college only after the completion of at least two full years of college work, during which time they should have pursued at least one course in general psychology, and prospective high school teachers should have given especial attention to one or more of the subjects which they expect to teach. The two years' course of study, beginning with the junior year, leads to the degree of Bachelor of Arts in Education. Preparation for teaching is planned to include a thorough grounding in the correct use of English, an adequate training in general and in educational psychology, in the history and organization of schools, in educational theory, and in the practice of teaching; and also, quite aside from the liberal training of the regular college course, specific preparation in both the subject matter and the methods of those subjects in the secondary curriculum which each candidate proposes to teach. A third year leads to the degree of master of arts, including advanced studies in

education and philosophy, and in one or more of the subjects of the secondary curriculum, at the option of the candidate.

In addition to the ordinary academic and professional studies connected with the training of the teacher, the college offers an opportunity for observation and practice teaching under supervision, as well as special facilities in voice culture, public school music, and physical culture, together with elementary and advanced courses in drawing, domestic art and domestic science, manual training and business education—those specialized forms of the secondary curriculum which are being introduced so rapidly into the public high schools of Minnesota.

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY offers three courses. Two of these, the Analytical and the five year course in Arts and Chemistry, are designed for those who wish to become teachers of chemistry, analysts and investigators. The four year Analytical course leads to the degree of Bachelor of Science in Chemistry, while the five year course leads to the degree of Bachelor of Arts after four years and Bachelor of Science in Chemistry at the end of the fifth.

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

The two buildings occupied by the school contain six large laboratories and about twenty smaller ones well equipped for carrying on a wide range of work.

THE GRADUATE SCHOOL gathers into a single organization and unites for the purposes of administration all the activities of the University in all its schools and colleges in so far as they relate to advanced instruction offered for the second or higher degrees, viz.: Master of Arts and Doctor of Philosophy conferred for advanced, non-technical study; Master of Science and Doctor of Science for technical study; Master of Laws and Doctor of Civil Law for advanced legal studies. The privileges of this school are in general open to all Bachelors of Arts, of Science, pure and applied, and of Laws, from reputable colleges and universities having courses substantially equivalent to those at this University.

THE UNIVERSITY SUMMER SCHOOL is organized for a six weeks' session in June and July under the direction of the State Department of Public Instruction. In the elementary section courses are given for teachers in all the common school branches and in preparation for the state teacher's certificates. In the college section courses are given for high school teachers and in preparation for the state professional certificate. Students who desire University entrance credits and credits toward the bachelor's degree may secure these by pursuing not more than two full courses at each session.

SPECIAL COURSES. In practically all of the colleges, students of mature age and adequate preparation are permitted to pursue, under the direction of the faculty, one or two distinct lines of study.

EXTENSION LECTURES. Professors in the University are prepared to give a limited number of extension lectures from time to time. For subjects, speakers, terms and dates, application should be made to the chairman of the committee on University Extension.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS . . . . The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS . . . . . The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER . . . . . The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL . . . . . The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL. D., President
ERNEST B. PIERCE, B. A., Registrar
JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C. E., Dean of the College of Science, Literature and the Arts

FREDERICK S. JONES, M.A., Dean of the College of Engineering and the Mechanic Arts

JOHN W. OLSEN, B.S., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

EUGENE L. MANN, B.A., M.D., Dean of the College of Homeopathic Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, 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

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ADA L. COMSTOCK, M.A., Dean of Women

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
PRESIDENT CYRUS NORTHROP

The College of Science, Literature and the Arts
DEAN JOHN F. DOWNEY — PROFESSOR JOHN H. GRAY
PROFESSOR J. C. HUTCHINSON — PROFESSOR H. F. NACHTRIEB
PROFESSOR NORMAN WILDE

The College of Engineering and the Mechanic Arts
DEAN FREDERICK S. JONES — PROFESSOR GEORGE D. SHEPARDSON

The College and School of Agriculture
DEAN JOHN W. OLSEN — PROFESSOR HARRY SNYDER
PROFESSOR SAMUEL B. GREEN

The College of Law
DEAN WILLIAM S. PATTEE — PROFESSOR HENRY J. FLETCHER

The College of Medicine and Surgery
DEAN F. F. WESBROOK — PROFESSOR THOMAS G. LEE

The College of Homeopathic Medicine and Surgery
DEAN EUGENE L. MANN

The College of Dentistry
DEAN ALFRED OWRE

The College of Pharmacy
DEAN FREDERICK JOHN WULLING

The School of Mines
DEAN WILLIAM R. APPLEBY

The School of Chemistry
DEAN GEORGE B. FRANKFORTER

The College of Education
DEAN GEORGE F. JAMES

The Graduate School
DEAN HENRY T. EDDY

The Dean of Women
ADA L. COMSTOCK

The University Library
JAMES T. GEROULD

General Alumni Association
DAVID P. JONES

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

Faculty

CYRUS NORTHROP, LL.D., President — 519 Tenth Ave. S. E.
Office, Library Building

AMOS W. ABBOTT, M.D. — 10 E. 17th St.
Clinical Professor of Diseases of Women.

EVERTON J. ABBOTT, B.A., M.D. — 425 Dayton Ave., St. Paul
Clinical Professor of Medicine and Chief of Medical Clinic.

HOWARD S. ABBOTT, B.L. — 900 Sixth St. S. E.
Professor of Corporation Law

A. E. Ahrens, M. D., — 1947, Rondo St. St. Paul
Lecturer in Surgery

H. C. ALDRICH, M. D. — 2431 Hennepin Ave.
Professor of Gynecology

FRANK MALOY ANDERSON, M. A. — 1629 University Ave. S. E.
Professor of History.

CHARLES M. ANDRIST, M.L. — 706 Delaware St. S. E.
Assistant Professor of French.

WILLIAM R. APPLEBY, M.A. — 911 Fifth St. S. E.
Dean of the School of Mines and Professor of Metallurgy.

E. E. AUSTIN, M.D. — 2744 3rd Ave. S.
Professor of Gynaecology.

FREDERICK H. BASS, B. S. — 429 Union St. S. E.
Assistant Professor of Municipal and Sanitary Engineering.

GEORGE N. BAUER, Ph. D. — 4903 41st Ave. S.
Professor of Mathematics.

JOSEPH W. BEACH, Ph. D. — The Ashmore, 325 6th Ave. S. E.
Assistant Professor of English.

RICHARD OLDING BEARD, M.D. — 1775 Hennepin Ave.
Professor of Physiology.

J. F. BECK, M.D. — 2200 Bloomington Ave.
Associate Clinician.

JOHN W. BELL, M.D. — 5127 Lake Harriet Boulevard
Emeritus Professor of Medicine and Physical Diagnosis.

CHARLES W. BENTON, M.A., Litt.D. — 516 Ninth Ave. S. E.
Professor of French Language and Literature.

A. E. BOOTH, A.B., M.D. — 1708 Como Ave.
Professor of Orthopaedia

ANDREW BOSS — 1443 Raymond Ave., St. Paul
Professor of Agriculture and Animal Husbandry.

WILLIAM BOSS — 1439 Raymond Ave., St. Paul
Professor of Farm Structures and Farm Mechanics

GISLE BOTHNE, M.A. 1105 Sixth St., S. E.
Professor of Scandinavian Languages and Literature

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Professor of Preventive Medicine

WARREN S. BRIGGS, M.D. Cor. Summit & St. Albans, St. Paul
Professor of Surgery

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Professor of Mathematics and Mechanics

JABEZ BROOKS, D.D. 1708 Laurel Ave.
Senior Professor of Greek Language and Literature

EDGAR D. BROWN, Phm.D., M.D. 3129 Lyndale Ave. So.
Acting Professor of Materia Medica and Pharmacology.

JOHN C. BROWN, M.A. 934 15th Ave. S.E.
Assistant Professor of Animal Biology

ROME G. BROWN, M.A., LL.B 1918 Queen Ave. S.
Special Lecturer on Water Rights

COATES P. BULL, B. Agr. 2137 Commonwealth Ave.
Assistant Professor of Agriculture

CHARLES W. BUNN 549 Portland Ave., St. Paul
Lecturer on Federal Jurisdiction

OSCAR C. BURKHARD, M.A. 410 17th Ave. S.E.
Assistant Professor of German

RICHARD BURTON, Ph.D. 2109 Blaisdell Ave.
Professor of English Literature

WILLIAM H. BUSSEY, Ph.D. 1811 4th St. S. E.
Assistant Professor of Mathematics

A. B. CATES, M.A., M.D. 2824 Park Ave.
Professor of Obstetrics

EDWARD G. CHEYNEY, B.S. 1205 Raymond Ave., St. Paul
Assistant Professor of Forestry

PETER CHRISTIANSON, B.S., E.M. 208 Beacon St. S. E.
Assistant Professor of Assaying

JAMES T. CHRISTISON, M.D. 820 Lincoln Ave., St. Paul
Professor of Diseases of Children

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HARRY C. LAWTON, D.D.S. 489 Grand Ave. St. Paul
Instructor in Prosthetic Dentistry and Dental Anatomy

J. F. LEMSTROM, M.D. 115 N. 12th St.
Instructor in Histology and Embryology

CHARLES N. MCCLOUD, Phm.D., M.D. 965 Selby Ave., St. Paul
Lecturer on First Aids to the Injured

JEANETTE M. MCLAREN, M.D. 441 Selby Ave., St. Paul
Clinical Instructor in Obstetrics

J. S. MACNIE, M.D. 2113 Bryant Ave. S.
Clinical Instructor in Diseases of the Eye and Ear

JAMES E. MANCHESTER, Sc.D. 405 Oak St. S. E.
Instructor in Mathematics

HERMAN A. MAVES, D.D.S. 711 Douglas Ave.
Instructor in Operative Dentistry

CARL M. MELOM, M.A. 506 15th Ave. S. E.
Instructor in French and Spanish

MARTHA B. MOORHEAD, M.D. 914 2nd Ave. So.
Lecturer in Domestic Hygiene

OSCAR B. NELSON, C.E. 1827 14th Ave, So.
Instructor in Civil Engineering

WILLIAM B. NEWHALL, M.E. 2702 Humboldt Ave. So.
Instructor in Civil Engineering

CHARLES W. NICHOLS, M.A. 313 8th Ave. S. E.
Instructor in Rhetoric

WALLACE NOTESTEIN, Ph.D. 812 4th St. S. E.
Instructor in History

OSCAR OWRE, M.D. 511 W. Franklin Ave.
Instructor in Oral Surgery

E. H. PARKER, M.D. 1311 Yale Place
Clinical Instructor in Diseases of Nose and Throat

PETER PETERSON 3709 Clinton Ave.
Instructor in Foundry Practice

RAYMOND V. PHELAN, Ph.D. 1629 University Ave. S. E.
Instructor in Economics

JAY N. PIKE, D.D.S. 1617 Franklin Ave.
Instructor in Orthodontia.

C. E. PYLE, B.S., D.V.M. 2225 Langford Ave., St. Paul
Instructor in Domestic Bacteriology

EDWARD QUIGLEY 2442 15th Ave. S.
Instructor in Forge Work

WALTER R. RAMSEY, M.D. The Angus, St. Paul
Clinical Instructor in Diseases of Children

JEAN RANKIN, M.A. 916 5th St. S. E.
Instructor in Education

SOREN P. REES, B.S., M.D. 1721 James Ave. S.
Instructor in Physical Diagnosis and Clinical Medicine

H. M. REID, D.D.S. 2014 Queen Ave. S.
Instructor in Prosthetic Dentistry

WILLIAM H. RICHARDS 416 Havard St. S. E.
Instructor in Carpentry and Pattern Work

HARRY P. RITCHIE, Ph.B., M.D. 46 Crocus Place, St. Paul
Clinical Instructor in Surgery

H. E. ROBERTSON, B.A., M.D. 627 Oak St. S. E.
Demonstrator in Pathology

H. B. ROE Agricultural College
Instructor in Mathematics

BERT A. ROSE 41 S. 6th St.
Instructor of Cadet Band

NORMAN W. ROSE, M.E. 406 Oak St. S. E.
Instructor in Drawing

FRANK B. ROWLEY, B.S., M.E. 311 Havard St. S. E.
Instructor in Drawing

A. G. RUGGLES, M.A. 1465 Raymond Ave., St. Paul
Instructor in Entomology

WILLIAM T. RYAN, E.E. 1406 7th St. S. E.
Instructor in Electrical Engineering

J. FRANCIS SCHEFCIK, B.S., Ph.G., M.D., C.M. 1400 Spruce Place
Instructor in Materia Medica

JULIUS PARKER SEDGWICK, B.S., M.D. 2015 Kenwood Parkway
Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children.

W. D. SHELDON, M.D. 3233 Irving Ave. S.
Clinical Instructor in Medicine, and Instructor in Therapeutics

JUNIATA SHEPPERD, M.A. Agricultural College
Instructor in Domestic Science

S. CARL SHIPLEY, B.S., M.E. 209 State St. S. E.
Instructor in Machine Work

CHARLES F. SHOOP, B.S. 1916 14th Ave. N.
Instructor in Mechanical Engineering

ROYAL R. SHUMWAY, B.A. 716 12th Ave. S. E.
Instructor in Mathematics

ANNA M. SMITH 1485 Raymond Ave., St. Paul
Librarian School of Agriculture

CHARLES N. SPRATT, M.D. 1804 Park Ave.
Clinical Instructor in Diseases of the Eye and Ear

EDITH STAPLES St. Anthony Park
Instructor in Domestic Art

THOMAS W. STUMM, M.D. 394 Selby Ave. St. Paul
Clinical Instructor in Medicine

SAMUEL E. SWEITZER, M.D. 1729 Irving Ave. S.
Clinical Instructor in Dermatology and Genito-Urinary Diseases.

C. C. TYRRELL, B.A., M.D., 2428 Central Ave.
Prosector in Anatomy

HENRY UBRICH 602 Buchanan St. S. E.
Instructor in Carpentry

HENRY L. ULRICH, M.D. 519 1st Ave. S.
Assistant in Clinical Microscopy

J. A. VYE 1449 Cleveland Ave. N., St. Paul
Instructor in Farm Accounts and Secretary of the Experiment Station.

J. A. WATSON, M.D. 1303 Yale Place
Clinical Instructor in Diseases of Nose and Throat

AMOS S. WELLS, B.A., D.D.S. 3901 Lyndale Ave. N.
Instructor in Crown and Bridge Work

ANDREW J. WEISS 3705 Stevens Ave.
Instructor in Technics

H. B. WHITE, B.S.A. School of Agriculture
Instructor in Carpentry

NELLIE A. WHITNEY, B.A. 4432 Stevens Ave.
Instructor in Rhetoric

GRACE B. WHITRIDGE 654 Hague Ave., St. Paul
Instructor in Physical Culture

VAN H. WILCOX, M.D. 812 Pillsbury Building
Instructor in Operative Surgery

A. D. WILHOIT, M.A. 1155 Raymond Ave., St. Paul
Instructor in Agricultural Chemistry and Soils

CHARLES WILLIAMS, M.A. 312 Union St. S. E.
Instructor in German

ARCHIE D. WILSON, B.Agr. 1466 Raymond Ave., St. Paul
Instructor in Agriculture

RICHARD WISCHKAEMPER 516 Beacon St. S. E.
Instructor in German

FRANK R. WRIGHT, D.D.S., M.D. 713 Pillsbury Building
Instructor in Anaesthesia and Oral Surgery.

JAMES ZIMMERMAN, B.A. 1201 5th St. S. E.
Instructor in Chemistry

Historical Sketch

When Minnesota was organized as a territory March 3, 1849, it was understood that a grant of public lands would be made by Congress for the endowment and support of a university as in the case of all other states carved out of this old northwest territory.

On December 10, 1850, delegate Sibley gave notice of a bill to grant two townships (46,080 acres) which became law on February 19, 1851. Meantime the Minnesota legislature had by Act, Feb. 13, created the University of Minnesota and made over to that corporation the proceeds of all lands which Congress might grant.

The location of the institution was fixed by this law "at or near the Falls of St. Anthony," by virtue of an understanding relating to the distribution of public buildings. A board of twelve regents elected in classes by the legislature had charge till 1860. In the fall of 1851, a preparatory school was opened. In 1856 intoxicated by the boom which was then raging, the regents began the erection of the rear part of the "old main" building. Before it was finished the panic of 1857 came on. The board could not pay the contractors nor meet the interest on the bonds they had been authorized to sell.

In the winter of 1860 the legislature replaced the old board of twelve regents by one of five appointed by the Governor. At the end of four years this board had not been able to put the finances of the University on a sound footing. Senator John S. Pillsbury laid before the legislature of 1864 a plan to pay off the accumulated debt by the sale of less than one-third of the land grant. A special board of three regents, headed by Mr. Pillsbury, was created to make the experiment. At the close of 1866 this board reported the debt substantially liquidated. A debt of gratitude is due to the creditors and bondholders for scaling down their just claims and accepting sums far below their dues. By means of a small appropriation the special board renovated the building, purchased furniture and appliances, and in November, 1867, opened the preparatory department, to which girls as well as boys were admitted.

This board having accomplished its purpose prepared for the legislature the bill which enacted into law February 13, 1868, became the actual charter of the University. By far the most important element was that which united with the University endowment proper the expected income from the congressional land grant of 1862 for the support of colleges of Agricultural and Mechanic Arts.

At the close of the college year of 1869 a small company of preparatory students were found ready for college instruction. A faculty of nine professors and instructors was elected and began their work in September. In this year William Watts Folwell was appointed president.

In 1873 two students were graduated at the first commencement. Some twenty years now passed in quiet work and growth, mostly in the academic department. A good beginning was made in that of engineering and mechanic arts, but in spite of most earnest endeavors by the regents the College of Agriculture developed slowly. There was little demand for proper agricultural instruction and the pedagogy of that branch had not been developed.

In the year 1870 Congress confirmed to the state a second grant of public land for a state university ingeniously embodied in the enabling act of Feb. 26, 1857, which the departmental authorities at Washington had persistently refused to recognize.

In September, 1884, Cyrus Northrop succeeded to the presidency and not long after began that great development familiar to all.

The Colleges of Law and Medicine were organized on a self-paying basis. New buildings sprang up, nobly equipped, and the faculties were reinforced as means accumulated. The growth of the College of Agriculture has been remarkable. The congressional appropriations for experiment stations and additional endowment have greatly increased its efficiency and prosperity. The College of Engineering has also enjoyed a rapid and cumulative development. The Colleges of Pharmacy, Dentistry, the School of Mines, Chemistry, Education, and the Graduate School have been added in recent years, the result of public demands for special technical training and research.

Equipment

GROUNDS AND BUILDINGS

The twenty-three buildings of the University used by all departments of instructoin save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University avenue and the river and between eleventh and nineteenth avenues southeast, in the city of Minneapolis. The campus is well wooded with a fine grove of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement. At the last session of the legislature provision was made for the expenditure of four hundred fifty thousand dollars in campus enlargement during the course of the years 1907-1909. Private benefactors have added fifty thousand dollars to that amount. Condemnation proceedings are now in progress for the purpose of obtaining the land desired. About thirty additional acres situated to the south of the present campus will probably be secured· The Department of Agriculture, including the college and school of agriculture, has a separate campus at St. Anthony Park, in the city of St. Paul, where are located the twenty-five buildings provided for this department and the state experiment station. Adjoining this campus is the University farm of about four hundred twenty acres.

ASTRONOMICAL OBSERVATORY

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

GYMNASIUM

The gymnasium is located in the armory, and is well equipped with a variety of gymnastic appliances. The object of the gymnasium is to provide all of the students of the University opportunity for exercise to build up their general health. It also provides special training to correct physical defects and functional derangements. The gymnasium is in charge of a professional medical director and assistant, and the

training is under their direct supervision. A thorough physical examination is offered each student immediately before and after the gymnasium course, and a record is made of the same. The examination of these records shows a marked improvement in the standard of health of the average student during his college course. The gymnasium is open at all times to all young men in the University who are free to use the apparatus and to pursue a course of physical training under the direct supervision of the director and his assistant. In some of the colleges of the University this work is required of all men.

MILITARY DRILL

The Act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in military science and tactics at all institutions that are its beneficiaries. The armory is located on the University campus and has all the facilities usually provided in a modern armory. The United States government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

THE ONE-MILE LIQUOR LAW

A state law provides that "it shall be unlawful for any person to sell or dispose of any spirituous, vinous, or malt liquors within the distance of one mile of the Main Building of the University of Minnesota, as now located in the city of Minneapolis; provided that the provision of this section shall not apply to that part of the city of Minneapolis lying on the west side of the Mississippi River."

ATHLETIC ORGANIZATIONS

The Athletic Association is an organization having for its object the general physical well-being of the students and the encouragement of a proper spirit in favor of hearty, manly sports.

Board of Control for Athletics. The athletic sports of the University are under the supervision of a board of control made up of eleven members; two are members of the faculty, two are alumni, and seven are students. This board arranges the schedule of games, manages the finances, and exercises a general supervision over all matters connected with athletic contests. It has charge of the whole of the athletic grounds of the University, Northrop Field. This field, containing about six acres, lies immediately adjoining the armory. It contains a modern cinder track, tennis courts, baseball diamond, and football gridiron. The grand stands have a seating capacity of about fifteen thousand. A large portion of this field was a gift to the University from the heirs of the late John S. Pills-

bury, and the brick wall surrounding it is the gift of his son, Mr. A. F. Pillsbury. It is generally conceded to be one of the finest fields in the West.

MUSEUMS AND COLLECTIONS

The museums of the University contain material obtained from various sources, arranged with special reference to its use for illustration. Among the more notable collections are the following:

GEOLOGY AND MINERALOGY. This museum includes the Kunz collection of minerals, purchased of George F. Kunz; several suits of crystalline rocks secured from various sources; the Ward collection of casts contributed in part by citizens of Minneapolis; collection of rocks, fossils, minerals and economic products of Minnesota; upwards of 9,000 entries gathered by the geological survey of the State; the Sardeson collection of paleozoic fossils of Minnesota, Wisconsin, Iowa, and neighboring states, comprising 30,000 specimens; a series of 3,000 thin sections of typical rocks and minerals largely representing Minnesota localities; purchased material comprising a fine collection of crystals; 5,000 minerals and 3,000 specimens of economic minerals and crystalline rocks, and a collection of over 4,000 photographs and lantern slides.

Mr. Arus S. Williams, of Minneapolis, has given to the University his extensive collection of negatives and photographs. During many years of active work as a photographer, he has collected a series of several thousand plates representing geologic and geographic subjects, commercial views and historic scenes. These will prove of great value in illustrating the physical, commercial and political history of the State. They are recognized as the A. S. Williams collection of Photographs and Photographic Negatives.

ZOOLOGY. The zoological museum contains all the material collected by the Zoological survey; a collection of mounted Minnesota birds representing about one-third of the species found in the state; a number of the mammals of the state and a few from the more western states; a collection of fishes, molluscan shells, Philippine Island corals and other foreign material.

The ornithological room contains the excellent Thomas S. Roberts and Franklin Benner collection of skins, nests and eggs of Minnesota birds. The entomological collectian contains over 3000 named Minnesota insects, is particularly rich in aphidæ and contains the Guthrie collection of collembola. Other groups of animals are more or less numerously represented, and are receiving annual additions from the Zoological Survey.

BOTANY. The material forming the museum in botany includes the general herbarium numbering about 400,000 specimens and comprising the series of plants collected by the state botanist; an alcoholic collection of material for dissection; a collection of woods

of Minnesota; a limited series of carboniferous and cretaceous fossil plants, including the Lesquereaux collection from the Minnesota River localities.

MINING AND METALLURGY.—A museum of mining and metallurgy is located in the mining building. Representative ores of all the most important metals, drawings, photographs of furnaces, sectional furnace models and samples of all the different furnace products are exhibited to the public and are used as illustrative material for regular classes. Various mine appliances, pieces of machinery, underground photographs, models of mine timbering with sectional maps of some of the large Minnesota properties, complete the collection. A collection has been begun of ores from all the important mines on the Mesabi range. These samples with analyses show well the character of ore produced by the state.

SOCIOLOGY AND ANTHROPOLOGY. This department has recently acquired wall-charts and maps which present graphically a large number of sociological facts, from various parts of the United States; a collection of plaster-cast crania and skulls showing man's ancestors, fossil man from western Europe, typical members of the various living races and sub-races, both normal and artificially deformed; a collection of face-masks in color, presenting well the Oceanic peoples; a series of busts in white, presenting facial and cranial characteristics of a considerable number of different peoples; natural cranial, skull and skeletal materials from some dozen different continental and insular geographic areas; and the Guthrie collection of ethnologic specimens from the Bulu tribe of Kamerun province, Africa, presenting the material culture of a savage people in the Tropics.

TECHNOLOGY. A cabinet of specimens illustrating the products and processes of applied chemistry is being collected by the professor of chemistry, as opportunity offers. The collection embraces fuel, ores, furnace products, textile materials, both raw and manufactured, dyewoods and other materials used in dyeing; specimens illustrating the bleaching and printing of cotton, linen and woolen goods, earthenware, pottery, etc.

CLASSICS. Some material illustrating classical geography, topography, chronology, mythology, and art has been collected, consisting mainly of plans and charts, casts, pictorial illustrations, fac-similes of manuscripts and inscriptions.

ENGLISH. A few fac-similes of manuscripts, plates that may serve the purpose of archeological instruction, publication of texts, reprints of blackletter books and of original editions, photographs and portraits have been gathered.

CIVIL ENGINEERING. The department is collecting samples

of road material typical of the various localities of the State, and leading materials used in street paving, such as granite, trap rock, brick and asphaltum. A set of standard sections of steel and wrought iron is provided for illustration in the study of structural design.

MECHANICAL ENGINEERING. The collection consists of models of mechanical motions especially relating to the work in kinematics; sectioned apparatus, such as steam engines, pumps, valves, injectors, water meters and steam separators; various collections of drop forgings in iron, steel and copper; miscellaneous samples of commercial work representing the product of special machines; groups of standard nuts, bolts and screws; samples of belting, ropes, steel and iron cables, rawhide gears, pipe fittings and other material especially useful for illustrative purposes.

ELECTRICAL ENGINEERING. This museum contains a growing collection of samples furnished by various manufacturers and dealers for demonstrating the merits of different products and for illustrating modern practice; an excellent collection showing the development of electrical instruments, telephone apparatus, measuring instruments, lightning arresters, switches, primary and secondary batteries, early forms of dynamos and motors, lighting apparatus and various industrial applications of electricity; also a collection of samples from repair shops and elsewhere, illustrating the effects of wear, accidents and abuse.

ENGINEERING MATHEMATICS. This department has recently added to its apparatus used for illustration in teaching, several types of slide-rules, including those of Thatcher, Faber, Keuffel and Esser, Schureman's Computer, Boucher's Calculator; also Amsler's Polar Planimeter.

MATHEMATICS. The collection includes the Schroeder wooden and the Schilling gypsum, string and paper models for Solid Analytical Geometry, many of the Schilling models for illustrating the Theory of Surfaces, several of the Schilling mechanical devices for describing various loci, the Keufel and Esser models for Solid Geometry, and large slated globes, suitably mounted, for use in Spherical Geometry and Spherical Trigonometry.

LIBRARIES

THE UNIVERSITY LIBRARY CONSISTS OF:

1. The general library.
2. The college libraries, including those of law, medicine, engineering, agriculture, and mines.
3. The departmental libraries, including those of arts, astronomy, animal biology, botany, chemistry, French, geology, German, Greek, Latin, mathematics, military science, physics, rhetoric, and Scandinavian.

The whole number of bound volumes owned by the University is about one hundred and twenty thousand, unbound books and pamphlets

about twenty thousand. About seven hundred and thirty current periodicals are received.

The general library is open to students and the public from eight A. M. to ten P. M. except Sundays and legal holidays.

The departmental libraries are designed especailly for the work of their respective departments and consist mainly of books of reference and current periodicals relating to technical subjects. The private collections of the professors are usually available upon application when necessary for research.

Besides the University library the following libraries are easily accessible: the Minneapolis public library, containing over one hundred sixty thousand bound volumes and over fourteen hundred of the leading newspapers, magazines and periodicals of the world; the St. Paul public library with about ninety-five thousand volumes; the Minnesota Historical Society library of about eighty-five thousand volumes, and the state library of about fifty-nine thousand volumes in the capitol in St. Paul; the Minnesota Academy of Natural Sciences library of twelve thousand titles.

Assistants, Scholarships, Loans and Prizes

ASSISTANTS

It is the policy of the University to encourage graduate study and to provide for assistance in laboratories, reading of test and examination papers, supervision of note books, and similar services by the appointment of assistants in departments where such services are required. The general principles which now control the making of such appointments are: (1) the appointments are made by the board of regents, upon the nomination of the head of the department concerned and its ratification by the dean of the college; (2) appointments are for one year only, but may be renewed; (3) the appointees must be graduate students, who are taking work along the lines of the assistantships to which they are appointed; (4) assistants are not regularly placed in charge of classes, and when exceptions are made to meet emergencies, the arrangement is regarded as a temporary one, and in no case to extend beyond the current year.

SCHOLARSHIPS

THE MOSES MARSTON SCHOLARSHIP IN ENGLISH

Friends and pupils of the late Professor Moses Marston have given one thousand dollars as a memorial fund. The annual income of the fund is to be used to help some student in the English course. The award of the income is made on the basis of pecuniary need and of deserving scholarship.

THE ALBERT HOWARD SCHOLARSHIP FUND

Under the last will and testament of Mr. James T. Howard, of the town of St. Johnsbury, Vermont, $4,166.81 was left to the University to establish a scholarship to be known as the Albert Howard Scholarship. This scholarship is assigned by the executive committee of the board of regents upon the recommendation of the faculty.

THE COLLEGE WOMEN'S CLUB SCHOLARSHIP

The College Women's Club of Minneapolis has established a scholarship for the benefit of women students in this University. For the year 1909-10 this scholarship amounts to $150. In awarding it the preference

will be given to students in the junior and senior classes and to graduate students. Application for this scholarship may be made to Miss Comstock, Dean of Women.

STUDENT LOAN FUNDS

THE GILFILLAN TRUST FUND

The Hon. John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the board of regents to assist worthy students, needing such aid, to secure an education. The regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the regents for the administration of the fund may be learned by addressing the President of the University.

THE ELLIOT SCHOLARSHIP LOAN FUND

To fulfill the wishes of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of $5,000 was placed in the hands of the board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest at the earliest convenience of the recipients.

THE PURITAN COLONY SCHOLARSHIP LOAN

The Puritan Colony of the National Society of New England Women has established a loan fund for women students of the University. For the year 1909-10 this scholarship loan amounts to one hundred dollars It is available for women students of New England birth or ancestry. In awarding it the preference will be given to young women in the junior and senior classes. Application for it may be made to Miss Comstock, Dean of Women.

STUDENTS' TRUST FUND

The class of 1902 left with the School of Agriculture a fund of $100 "to assist by temporary loans at a reasonable rate of interest, deserving students needing such help, who are not below the B class in the School of Agriculture." This fund is in charge of a committee constisting of the secretary, the principal, the preceptress, and the president of the A class.

THE LUDDEN TRUST

The Honorable John D. Ludden, of St. Paul, gave the University of Minnesota $5,000 to be held, invested and re-invested by the University, through its Board of Regents, and the income thereof to be collected, received and applied by said Board of Regents to the financial assistance of students of either sex in the school of agriculture..

This fund produces $200 a year. Those wishing to avail themselves of its benefits should apply to the executive committee of the Board of Regents of the University of Minnesota.

Mr. Ludden has since donated another $5,000 for a like purpose so that the yearly income is now $400.

PRIZES

THE JOHN S. PILLSBURY PRIZE

Three prizes of one hundred, fifty, and twenty-five dollars each, offered by the heirs of the late John S. Pillsbury, are awarded for the best work in the department of rhetoric, as evidenced finally by an oration in public.

THE '89 MEMORIAL PRIZE IN HISTORY

The class of 1889, at graduation, established a prize of twenty-five dollars each year, to be known as the '89 Memorial Prize, and to be given for the best thesis in history by a member of the graduation class. The award is made by a professor of history in some other institution.

THE WILLIAM H. DUNWOODY PRIZE

Mr. William H. Dunwoody has provided a cash prize of seventy-five dollars for the members of the team winning the inter sophomore debate, and another prize of twenty-five dollars for the student in the sophomore class writing and delivering the best oration.

THE FRANK H. PEAVEY PRIZE

Mrs. Frank T. Heffelfinger continues the prize of one hundred dollars. established by her father, the late Frank H. Peavey. This prize consists of seventy-five dollars for the members of the team winning the freshman-sophomore debate, and another prize of twenty-five dollars to the student in the freshman or sophomore class writing and delivering the best oration.

THE JAMES T. WYMAN PRIZE

A prize of twenty-five dollars is offered by the Hon. James T. Wyman, of Minneapolis, through the department of economics and political science,

for the best essay of three to five thousand words by an undergraduate student, on the subject of "The Influence of Immigration upon the Development of the Northwest."

THE WILLIAM JENNINGS BRYAN PRIZE

The Hon. William Jennings Bryan has given the University the sum of two hundred dollars for the encouragement of studies in political science. The annual income will be given as a prize to the writer of the best essay upon the topic to be announced each year. The competition is open to all students of the College of Science, Literature, and the Arts.

THE FRANK O. LOWDEN PRIZE

The Hon. Frank O. Lowden, of Chicago, offers as a prize to be competed for by the Northern Oratorical League, an endowment of three thousand dollars, which will yield an annual income of about one hundred seventy-five dollars. A prize of one hundred dollars will be given to the orator winning the first place, fifty dollars to the orator winning second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

THE ROLLIN E. CUTTS PRIZE IN SURGERY

Dr. Mary E. Smith Cutts, '91 Medical, has given to the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of $500.00, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

THE BRIGGS PRIZE IN FOUNDRY PRACTICE

For the encouragement of studies 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 essay 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 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.

PHARMACEUTICAL ASSOCIATION PRIZE

Nomination for membership in the American Pharmaceutical Association and the first year's dues are offered annually by Dean Wulling to the student in the College of Pharmacy earning the highest total average of all standings.

Student Organizations and Publications

RELIGIOUS ORGANIZATIONS

THE STUDENTS' CHRISTIAN ASSOCIATION was organized in 1869, its object being to promote growth in Christian character, and to engage in such religious work as may be deemed expedient and necessary. The association owns a commodious building, which serves as the headquarters for student religious activity. All persons in sympathy with the object of the association are eligible to membership.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION has as its object the promotion of "growth in grace and Christian fellowship among its members and aggressive Christian work, by and for students." This association leases the Students' Christian Association building and keeps it constantly open, with a general secretary in charge. All men in sympathy with the object of the association are eligible to membership. This building is maintained as the social and religious headquarters of all young men in the University.

This association provides an employment bureau whose serivces are free to students in all departments of the institution, as well as a committee to help students find comfortable rooms and boarding places. The association also maintains an educational department in which students may make up their entrance conditions at a nominal charge for instruction. The general secretary will be pleased to correspond with any young man intending to come to the University. Any inquiry about board, room, employment, or general information will gladly be answered, and a hand-book will be sent to anyone wishing it. Address the general secretary of the Young Men's Christian Association, University of Minnesota, Minneapolis, Minnesota.

THE YOUNG WOMEN'S CHRISTIAN ASSOCIATION is the center of Christian life among the young women of the University. Its object is "to deepen spiritual thought in the University woman, to environ her with a semblance of home, to bring to her friendship, assistance and sociability by stimulating student fellowship, to give her personal help when necessary; thus developing in her the Christ ideal of culture in womanhood."

To this end frequent socials and informal teas are given throughout the year; twice each week twenty-minute prayer meetings are held; a dozen circles meet one hour a week for devotional Bible study; and from time to time missionary meetings are held. The general secretary

devotes all of her time to the association and will be pleased to correspond with any young woman who wishes information regarding the University.

All young women are invited to visit the Young Women's Christian Association before registering. Women from the upper classes will be there during the opening days to give advice and assistance.

THE BISHOP GILBERT SOCIETY was organized by the Episcopal students, about three years ago. The purpose of the organization is to promote the religious influences of the Episcopal students in the University. Prominent speakers address the society during the year. Besides this, the society tends to promote good fellowship among its members. A club house has been planned and will soon be in process of construction.

THE UNIVERSITY CATHOLIC ASSOCIATION was organized by the Catholic students in the spring of 1900. The purpose of the association is the study of the Bible and of the doctrines and history of the Catholic Church. Membership is open to anyone connected with the University. Regular meetings are held every Sunday afternoon in the rooms of either the Young Men's or Young Women's Christian Association, through the courtesy of these organizations. The association is planning to erect a building near the campus at an early date.

Aside from the religious objects, the association tends to promote good fellowship among its members. Early in each University year a reception is tendered to new students and during the year two or more socials are held. Further information may be obtained by addressing the secretary of the association at the University.

LITERARY, SCIENTIFIC, AND MUSICAL ORGANIZATIONS

PHI BETA KAPPA. A chapter of the honorary society of PHI BETA KAPPA was established at the University in 1892. A small proportion of the graduates of the College of Science, Literature, and the Arts are elected to membership each year. Election is based upon high scholarship and character.

SIGMA XI. A chapter of the honorary scientific society of SIGMA XI was established at the University in 1896. A small proportion of the graduates of the scientific and technical departments are elected to membership each year. Election is based upon high scholarship and character.

THE GRADUATE CLUB is a club organized for the purpose of fostering a greater interest in graduate work, for mutual help, and for discussion of topics under investigation.

THE MINNESOTA LITERARY UNION is a federation of the members of the following societies: Shakopean, Forum, Castalian, Minerva, and Arena. Four meetings are held each year.

LITERARY SOCIETIES. The above named literary societies of the

Minnesota Literary Union are mainly debating clubs. Every student is welcome to attend the literary sessions, but the business sessions are usually held behind closed doors. Students desiring to join should make early application to some member of the society he prefers, as the membership is limited. Membership limit: Shakopean 35 men; Forum 30 men; Minerva 30 women; Law Literary, unlimited, law students; Castalian 35 men; Theta Epsilon 30 women; Thalian 25 women; Acanthus 30 women.

THE DEBATING BOARD has charge of home and inter-collegiate oratorical contests.

THE NORTHERN ORATORICAL LEAGUE is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, Oberlin College, the State University of Iowa, the University of Chicago, and the University of Minnesota. Its purpose is to foster an interest in public speaking and to elevate the standard of oratory by holding annual contests. The contests are open only to undergraduates.

THE DRAMATIC CLUB is organized for the study and practice of dramatic art.

THE EUTERPEAN CLUB is a regularly organized body of singers, composed of forty of the women students of the University. The selection of voices is made at the beginning of each school year. The club is under the direction of Professor Scott.

THE GLEE AND MANDOLIN CLUBS give a public concert each year at the University and make a tour of the state during the holidays.

THE UNIVERSITY BAND is organized as a part of the military system of the University and is composed of about sixty musicians. It is under the efficient leadership of an instructor in music, and furnishes music for military and many other University affairs.

AMERICAN CHEMICAL SOCIETY. A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

THE SOCIETY OF ENGINEERS meets once in two weeks to listen to addresses by prominent engineers and for the discussion of various engineering topics. The Year Book of this society is published annually. It is devoted to the publication of articles upon engineering subjects by professors and students.

THE SCHOOL OF MINES SOCIETY meets once a month to listen to addresses by students, alumni and well-known mining and metallurgical engineers on various topics interesting to the professions. All students regularly registered in the School of Mines are eligible to membership. This society forms an important connecting link between the graduates in the field and the School of Mines.

THE MINNESOTA SECTION OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS meets monthly in St. Paul and Minneapolis alternately. Students of the College of Engineering are wlecome at these meetings.

THE GRANGE is comprised of the members of the faculty of the Department of Agriculture and others connected with the institution and interested in its welfare. Meetings are held on the first and third Monday evenings of each month. The order is intended to bring those connected with the College and Station in closer touch with one another and with the many lines of work carried on in the several divisions. Its further purpose is to keep in closer touch with the scientific world and the grange work of the state and nation.

THE PHILOMETHIAN 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 meets once a week and presents a program including readings, recitations, debates, etc. The membership is limited to forty and is only for students in the College of Agriculture.

THE FORESTRY CLUB was organized by the Forestry students for the promotion of good fellowship and mutual interests. The specific object of the club is to keep the members up to date on Forestry Literature and current affairs in the lumber world.

THE NORTHWESTERN BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION meets six times a year at the College or elsewhere in the Twin Cities. Pharmacy students are always welcome at these meetings and are eligible to membership in the Branch.

PUBLICATIONS

THE MINNESOTA DAILY is published five times each week during the University year by an organization of University students.

THE JUNIOR ANNUAL, called "The Gopher" is a book published annually by the junior class of the University.

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

THE MINNE-HA-HA is a humorous monthly magazine, published by the students of the University. It depicts life upon the campus in a satirical vein. The board of editors consists of ten members, chosen from the student body.

THE MINNESOTA ALUMNI WEEKLY is published every Monday during the University year. The Weekly is published entirely in the interest of the alumni and is devoted to alumni news and such University news as may be of special interest to the alumni.

THE YEAR-BOOK OF THE SOCIETY OF ENGINEERS is published annually It is devoted to the publication of articles upon engineering subjects by professors and students.

THE MINNESOTA FORESTER is the official organ of the Minnesota State Forestry Association. It is edited by the Forestry Department of the University and is devoted to the advancement of the Forestry movement with special emphasis on farm forestry.

THE SCHOOL OF MINES BULLETIN is published annually in April. It is devoted entirely to information concerning the alumni of the School of Mines. A complete record of each alumnus is published from the time of graduation to the time of publication of the Bulletin. The School of Mines Society issues this publication and sends it to every alumnus of the School.

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

WOMEN STUDENTS

After June first, 1909, the Registrar will supply a list of recommended boarding and rooming places to any women requesting such information. Young women who wish to earn a part of their expenses may generally learn of opportunities by communicating with Miss Ada Comstock, Dean of Women. During the college year Miss Comstock holds office hours every week day in the council room in Alice Shevlin Hall. At such times she welcomes any woman student who cares to come to her whether for advice, information, or an informal talk.

During the summer Miss Comstock's address is Moorhead, Minnesota. She will be glad to correspond with young women who are planning to enter the University or with their parents.

SHEVLIN HALL.—Through the generosity of Hon. Thomas H. Shevlin, the University now possesses in Alice Shevlin Hall a building admirably designed and equipped for the use of its women students. It is a two-story and basement structure, the material used being pressed brick with stone trimmings. It has a frontage of one hundred and fourteen feet on Pillsbury avenue and a depth of fifty-five feet. The purpose of this building is to furnish suitable rest and study rooms for the women attending the University. The building contains several society rooms, a large lunch room, and a general reception hall.

THE STUDENT GOVERNMENT ASSOCIATION FOR WOMEN.—This organization was formed for the purpose of aiding in the care and conduct of Alice Shevlin Hall. Every women student in the University is regarded as a member. There are no dues. The association makes rules for the guidance of those using Alice Shevlin Hall; it provides committees to enforce the rules; it gives permission for the holding of social functions in the building; and it controls the expenditure of any surplus in the receipts from the lunch room.

THE WOMEN'S LEAGUE.—This organization is open to all women who are students in the University. It is governed by a council made up of student members from the four college classes. It makes its headquarters in the council room in Alice Shevlin Hall. The aim of the organization is to promote good fellowship and sociability among the women of the University. For this purpose it gives receptions and parties for girls at regular intervals throughout the year. It also endeavors to aid in any project which may be of benefit to the University, and particularly to the women students. At present it is interested in the effort to secure dormitories.

Admission

Admission to the colleges or schools of the University is either by certificate or by examination. The candidate must offer fifteen year credits of high school work so chosen as to include those subjects required by the college or school which he wishes to enter. Of these fifteen year credits prescribed for admission the six in list A are required for admission to the freshman class in all the colleges and schools of the University except the College of Pharmacy, and no substitutions are accepted.

Certain of the nine additional credits to be selected from list B are prescribed by individual colleges, as indicated under requirements of individual colleges.

The term CREDIT 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 a credit means the equivalent of ten recitation periods per week for thirty-six weeks.

LIST A

English.....four credits
Elementary Algebra.....one credit
Plane Geometry.....one credit

LIST B

MATHEMATICS
- Higher algebra, one half credit
- Solid geometry, one half credit

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

GERMAN
- Grammar, one credit
- Literature, one credit

FRENCH
- Grammar, one credit
- Literature, one credit

SPANISH
- Grammar, one credit
- Literature, one credit

NORWEGIAN-SWEDISH
- 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
PHYSICS, one credit
CHEMISTRY, 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
COMMERCIAL GEOGRAPHY, one half or one credit
BUSINESS SUBJECTS, accepted only as parts of a well defined course
- History of commerce, one half credit
- Economic History of England, one half credit
- Economic History of the United States, one half credit
- Elementary economics, one half credit
- Business law, one half credit
- Elementary bookkeeping, one half credit
- Advanced bookkeeping and business practice, one credit
- Stenography and typewriting, two credits
- Business spelling and correspondence, one half credit

MANUAL SUBJECTS, accepted only as parts of a well defined course
- Freehand drawing, two credits
- Mechanical drawing, two credits
- Shop work, two credits
- Modeling and wood carving, one credit
- Domestic art and science, two credits

REQUIREMENTS OF INDIVIDUAL COLLEGES

College of Science, Literature, and the Arts

List A.....6 credits
List B, elective.....9 credits

Entrance examination in English is required of all candidates for admission to the freshman class.

All who do not present credits for both higher algebra and solid geometry are required to take mathematics five times per week through the freshman year.

Graduates of accredited schools shall present all entrance grades marked; "passed," "passed with credit," or "passed with honor," and each subject marked "passed" shall count as an entrance condition unless a State High School Board certificate be presented for each subject so marked. For further detailed information see bulletin of the college.

College of Engineering and the Mechanic Arts

List A.....6 credits
List B
Chemistry.....1 credit
Higher Algebra.....½ credit
Solid Geometry.....½ credit
Language.....2 credits
*Elective.....5 credits

Entrance examinations in elementary and higher algebra, plane and solid geometry are required of all except those who present Minnesota High School Board certificates for these subjects.

*Business subjects will not be accepted, and of the manual subjects only mechanical drawing and shop work may be counted towards admission.

College of Agriculture

For high school graduates,
List A.....6 credits
List B.....9 credits

For graduates of the School of Agriculture see bulletin of the College of Agriculture.

School of Agriculture

See bulletin of the School of Agriculture.

College of Law

List A.....6 credits
List B.....9 credits

In addition students must present credits showing the completion of one full year of collegiate work in Arts and Science.

College of Medicine and Surgery

1. For Candidates for the Degrees B. S & M. D.

List A.....6 credits
List B.
Latin.....2 credits

Higher Algebra.....½ credit
Solid Geometry.....½ credit
Elective.....6 credits

In addition two years of prescribed college work in science, literature and the arts, comprising the following named subjects:

Second part Higher Algebra.....one semester
Trigonometry.....one semester
General Inorganic Chemistry.....one year
Qualitative Analysis.....one year
General Zoology.....one year
Comparative Anatomy of Vertebrates.....one year
General Botany.....one year
Elements of Economics.....one semester
Economic Conditions in American Cities.....one semester
Rhetoric.....one year
Military Drill.....two years
Physical Culture.....one year
*German.....two years
or German and French.....two years

*Students who enter without German are required to take two years of German.

Students who enter with two years of German must take one year of German, and may elect German or French for the other year.

2. For Candidates for the Degree M. D.

List A.....6 credits

List B.
Latin.....2 credits
Elective.....7 credits

Two years of regular college work in science, literature and the arts including specifically the following subjects:

Biology (Zoology or Botany).....one year
General Inorganic Chemistry.....one year
Qualitative Analysis.....one year
Language (German or French).....one year
Physics.....one year

College of Homeopathic Medicine and Surgery

Same as for Medicine and Surgery above.

College of Dentistry

List A.....6 credits
List B.
Latin.....1 credit
Manual Training.....1 credits
Elective.....7 credits

College of Pharmacy

English.....2 credit
Elementary Algebra.....1 credit
Plane Geometry.....1 credit
Physics.....1 credit
Latin.....2 credits
Elective, (see bulletin College of Pharmacy)

School of Mines

List A.....6 credits
List B.
Higher Algebra.....½ credit
Solid Geometry.....½ credit
Elective.....8 credits

Entrance examinations in elementary and higher algebra, plane and solid geometry are required of all candidates for admission.

School of Analytical and Applied Chemistry

List A.....6 credits
List B.
Higher Algebra.....½ credit
Solid Geometry.....½ credit
Chemistry.....1 credit
Elective.....7 credits

Every applicant for admission to the Applied Course must either present State High School Board certificates for the mathematical subjects required for admission, or take the entrance examinations in said subjects at the University.

College of Education

List A.....6 credits
List B.....9 credits

In addition two years of collegiate work in any college or university of recognized standing are required.

Graduate School

See bulletin of that school.

ADMISSION BY CERTIFICATE

Graduates of the following courses, provided their preparation satisfies the specific requirements of the college they desire to enter, will be admitted to the freshman class without conditions, except where entrance examinations are required.

(a) Any four-year course of a Minnesota State High School or other accredited school in the state.

(b) A four-year course of schools in any other state accredited to the State University of that state.

(c) The advanced Latin or English course of the Minnesota state normal schools.

A candidate wishing to enter the University from an accredited school should furnish the registrar an official statement of his preparatory work certified to by the principal of the school from which he comes. Blank certificates for admission for school year 1909-1910 may be secured from the registrar, and should be filled out and returned to him for approval before August 1st, 1909. An applicant will be admitted conditionally who is deficient in not more than three half year credits (one year credit in the College of Engineering), and such entrance conditions must be removed before the beginning of the sophomore year; provided, that no student entering the College of Engineering or the School of Mines may be conditioned in Mathematics except upon special permission of the department of Mathematics.

ADMISSION BY EXAMINATION

For program of entrance examinations see page 3.

Whenever admission is by examination, the candidate must pass examinations in the credits specifically, required for entrance to the college in question, and in addition sufficient credits from the group of electives in list B, to make a total of fifteen year credits; provided that, if the total deficiency does not exceed three half year credits (in the College of Engineering one year credit), the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions. Provided that no student entering the College of Engineering or the School of Mines may be conditioned in mathematics except upon special permission of the department of mathematics.

LIST OF ACCREDITED SCHOOLS

Graduates of the following Minnesota State High Schools will be admitted to the University of Minnesota without conditions, provided

that their credentials satisfy the specific requirements of the college to which entrance is desired.

Ada
Adrian
Aitkin
Albert Lea
Akeley
Alden
Alexandria
Amboy
Annandale
Anoka
Appleton
Argyle
Arlington
Atwater
Austin
Bagley
Barnesville
Belle Plaine
Bemidji
Benson
Bird Island
Biwabik
Blooming Prairie
Blue Earth
Brainerd
Breckenridge
Browns Valley
Buffalo
Caledonia
Cambridge
Canby
Cannon Falls
Cass Lake
Chaska
Chatfield
Chisholm
Clarkfield
Cloquet
Cokato
Cottonwood
Crookston
Dawson
Delano
Detroit
Dodge Center
Duluth
  Central
  Industrial
Eagle Bend
E. Grand Forks
Elbow Lake
Elgin
Elk River
Elmore
Ely
Eveleth
Excelsior
Fairfax
Fairmount
Faribault
Farmington
Fergus Falls
Fertile
Fosston
Frazee
Fulda
Gaylord
Glencoe
Glenwood
Graceville
Grand Meadow
Grand Rapids
Granite Falls
Hallock
Halstad
Harmony
Hastings
Hawley
Hector
Henderson
Herman
Heron Lake
Hibbing
Hinckley
Hopkins
Houston
Howard Lake
Hutchinson
Jackson
Janesville
Jordan
Kasota
Kasson
Kenyon
Kerkhoven
Lake Benton
Lake City
Lake Crystal
Lakefield
Lake Park
Lamberton
Lanesboro
Le Roy
Le Sueur
Le Sueur Center
Litchfield
Little Falls
Long Prairie
Luverne
Lyle
McIntosh
Mabel
Madelia
Madison
Mankato
Mantorville
Mapleton
Marshall
Mazeppa
Milaca
Minneapolis
  Central
  East
  North
  South
  West
Minneota
Montevideo
Montgomery
Monticello
Moorhead
Mora
Morris
Morton
Mountain Lake
New Prague
New Richland
New Ulm
Northfield
North St. Paul
Olivia
Ortonville
Osakis
Owatonna
Park Rapids
Paynesville
Pelican Rapids
Perham
Pine City
Pine Island
Pipestone
Plainview
Preston
Princeton
Red Lake Falls
Red Wing

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

Graduates of the following private schools will be admitted to the freshman class under same conditions governing admission of high school graduates, provided, that the regular four-year course taken satisfies the specific requirements of the college to which entrance is desired and provided also, that the student be recommended by the principal of the school for admission to the University:

St. Mary's Hall, Faribault
St. Paul Academy
Shattuck Military Academy, Faribault

Stanley Hall, Minneapolis
Windom Institute, Montevideo

Concordia College, Moorhead
Pillsbury Academy, Owatonna
St. Joseph's Academy, St. Paul
St. Paul's College, St. Paul Park
The Loomis School, St. Paul
The Backus School for Girls, St. Paul
The College of St. Catherine, St. Paul
St. Margaret's Academy, Minneapolis
The Winona Seminary, Winona
St. John's College, Collegeville
St. Thomas College

ADMISSION AS UNCLASSED STUDENTS

Whenever in the judgment of the enrollment committee an applicant presents satisfactory reasons for not taking the regular course, such applicant may be admitted as an unclassed student. He must take the same examinations or present the same credentials as are required of those who enter the freshman class. Exceptions can be made only upon vote of the faculty. A new application must be made each semester to the enrollment committee. Provided, that no unclassed student shall be admitted to the School of Mines.

ADMISSION TO STUDY MUSIC

Students who enter the University for the express purpose of studying music, must take the same examinations or present the same credits that are required of those who apply for admission to the freshman class. No student is admitted for the purpose of studying music, unless he presents a certificate from the department of music showing that he is qualified to pursue the courses offered.

ADMISSION TO ADVANCED STANDING

1. FROM OTHER COLLEGES

This University accepts records from all reputable colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in the college to which admission is sought, subject to the approval of the departments concerned. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show:

(a) The subject studied; if a language, the books read, etc.
(b) The time spent upon each subject
(c) Ground covered in laboratory work, in case of laboratory subjects
(d) The result. It is sufficient to state that the subject was completed creditably.

Records from institutions whose entrance requirements are not as high as those of this University will not be accepted for equivalent rank. The credits to be allowed in such cases will be determined by the Enrollment Committee of the college in question.

2. FROM MINNESOTA NORMAL SCHOOLS

Graduates of the "advanced graduate course" of a Minnesota State Normal School are admitted to the College of Science, Literature, and the Arts (see bulletin of College of Science, Literature, and the Arts) with advanced standing equivalent to one year's credit.

Individual graduates of the "Advanced Latin course" (five year) or of the "Advanced English course" (five year) of a Minnesota State Normal School, who on the basis of maturity and ability, present certificates of special fitness from the president of the Normal School, will be admitted with advanced standing under the same regulation and proviso.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth*; Milton's *Paradise Lost*; Carlyle's essay on *Burns*. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

HIGHER ALGEBRA, FIRST PART (one-half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below, they are not prepared to pursue successfully at the University the second part of higher algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

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

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

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

CAESAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

CICERO (one year) Any six orations from the following list. AGAINST CATILINE, POET ARCHIAS, LIGARIUS, MARCELLUS, MANILIAN LAW (to count as two orations), the fourteenth PHILLIPIC. The student should also be familiar with the life of Cicero.

VIRGIL (one year). Six books of the AENEID, or five of the AENEID and one of the METAMORPHOSES of Ovid, or the ECLOGUES. The student should be familiar with the life of Virgil and an account of his times and writings. A correct rythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

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

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

(3) From two to three hundred German idioms.

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

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

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

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

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

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

NORWEGIAN (two years). First year, grammar and reader; one of Bjornson's stories. Second year, grammar reviewed; Raabe's History of Norway and a modern story or some easy play; composition and conversation.

SWEDISH (two years). First year, the essentials of Swedish grammar; reading of easy prose and verse. Second year, grammar reviewed and composition; works of Tegner and Runeberg; elementary history of literature.

ANCIENT HISTORY (one year)

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterward to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intellectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

ENGLISH HISTORY (one-half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

SENIOR AMERICAN HISTORY (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

AMERICAN GOVERNMENT (one-half year.) This should be a study of our government, national, state and local,as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the Constitution of the United States, the constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship,such as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil and criminal cases.

To make the government seem a real working organization to the student, he

should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

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

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

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

BOTANY (one or one-half year). Schools which give one-half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxonomy should be the aim of the course.

ZOOLOGY (one or one-half year. The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc. —in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out along the line indicated above.

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under the best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

ASTRONOMY (one-half year). An elementary course in general astronomy as presented in any good modern text-book.

GEOLOGY (one-half year). These subdivisions should receive special attention: physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals modifying the earth; and a brief survey of historical geology.

PHYSIOGRAPHY (one-half year). The following topics should be emphasized: meteorology, the leading facts relating to the atmosphere and its phenomena, includ-

ing some acquaintance with the work of the United States weather bureau; land sculpture, as it treats of the origin, development and decadence of land forms, and the influence of these processes on the physical environment of man.

COMMERCIAL GEOGRAPHY (one-half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemented by map work and assigned readings.

BUSINESS SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A BUSINESS COURSE

The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to certain colleges of the University on the same footing as the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent should embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: first, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business law; second, courses dealing with the technique of business. The latter may be further subdivided into the mathematics of business, including business arithmetic, bookkeeping and business practice; and the language of business, including stenography, typewriting and business correspondence.

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

ECONOMIC HISTORY OF THE UNITED STATES (one-half year). A study of American history with special attention to the economic factor. It should be based on some text book such as Wright, Coman or Nogart and supplemented by collateral reading, especially in books such as Semple and Brigham on geographic influences.

This course will naturally follow the one on English history and may take the place of the usual political American history.

ECONOMIC HISTORY OF ENGLAND (one-half year). A study of English history with special reference to causes and effects of her economic development. It should be based on some of the smaller economic histories such as Cheyney, Price or Cunningham and McArthur.

This course, where given, will naturally follow the courses in general European history, and may take the place of the usual political English history.

ELEMENTARY ECONOMICS (one-half year). In the study of economics it is desirable to avoid two extremes, abstract theory on the one hand, and controversial questions such as the tariff, trusts, and trade unions on the other hand. Emphasis

should be placed on historical and descriptive matter, especially relating to the economic development of England and the United States. Some good elementary text book should be mastered and a reasonable amount of collateral reading required.

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

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

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

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

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

Spelling and Business Correspondence (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to the most prominent industries of the locality.

MANUAL SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A MANUAL TRAINING COURSE

In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school, should offer all of the subjects indicated. Not to exceed twenty-five

per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, business subjects, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

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

Freehand Drawing (two credits)
Mechanical Drawing (two credits)
Joinery (one-half credit)
Wood Turning and Cabinet Making (one-half credit)
Pattern Making and Forge Shop (one-half credit)
Machine Shop, including Chipping
Filing and Work on the Iron Lathe (one-half credit)
Drill Press and Iron Planer
Clay Modelling (one-half credit)
Wood Carving (one-half credit)
Domestic Art, including Carefully Graded Exercises in Sewing (one credit)
Domestic Science, including Practical Cookery, and Household Economy (one credit)

Degrees

The candidate for a degree must complete the requirements for graduation in his course. 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 (the one immediately preceeding the granting of the degree) must be spent at the University, before such degree shall be granted, and PROVIDED that examination, in every case, be held before a committee of the faculty appointed for that purpose.

For detailed information concerning requirements see the bulletins of the separate colleges and schools.

The degrees Bachelor of Arts, Bachelor of Arts in Education, Bachelor of Science, Master of Science, Master of Arts, Doctor of Philosophy, Civil Engineer, Mechanical Engineer, Electrical Engineer, Engineer of Mines, Metallurgical Engineer, Bachelor of Science in Chemistry, Bachelor of Science in Chemical Engineering, Bachelor of Science in Agriculture, Bachelor of Science in Forestry, Bachelor of Science in Home Economics, Doctor of Civil Law, Master of Laws, Bachelor of Laws, Doctor of Medicine, Doctor of Dental Surgery, and Bachelor of Pharmacy, are conferred, after recommendation by the deans of the respective colleges, by vote of the Regents.

THE UNIVERSITY STATE TEACHER'S CERTIFICATE

Graduates of the University may apply for and receive upon vote of the faculty, the University State Teacher's Certificate under the following conditions:

First: They must have maintained a good average of scholarship throughout the four years of college study.

Second: They must have the recommendation of at least one department concerned with high school studies.

Third: They must have completed one semester of Psychology and three semesters of Education, including courses 1 and 2.

This certificate by state law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of success, the certificate may be made permanent by the endorsement of the State Superintendent of Public Instruction and the President of the University.

Expenses

All fees for incidental, laboratory or other charges are payable at the beginning of each semester or term.

FEES

College of Science, Literature and the Arts

	Per semester
Incidental fee, resident	$10.00
Incidental fee, non-resident	20.00
Animal Biology, courses 1 to 4, 8, 9, 15, each	3.00
Botany, courses 1 to 16, each	3.00
Chemistry 1, 2, 3, each	5.00
Chemistry, 4	7.00
Chemistry, 5	10.00
Geology 10 and 11, each	1.00
Mineralogy, 1 and 2	3.00
Mineralogy, 3	15.00
Music, 1, 2, 3 and 8, each	4.00
Music, 4 and 5	32.00 to 64.00
Music, 6	2.00
Physics, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 17, each	3.00
Physics, 7, 11, and 16, each	5.00

Drill suit, $15.00
Gymnasium suit, $2.00
Locker fees, $1.50
Deposit fee—military department, $5.00

College of Engineering

Incidental fee, resident	$15.00
Incidental fee, non-resident	30.00

Freshman Year

First semester	
Shop work	4.50
Second semester	
Shop work	4.50

Sophomore Year

	Per semester
First semester	
Chemistry	5.00
Physics	3.00
Shop work	4.50
Biology or Botany	3.00
Second semester	
Same as for first semester.	

For Classes Graduating in 1910-1911

Junior Year

First semester	
Shop work	$4.50
Materials Testing Laboratory	6.00
Electrical Laboratory	1.50
Physics	3.00
Second semester	
Steam Laboratory	3.00
Hydraulic Laboratory	3.00
Experimental Laboratory	4.50
Electrical Laboratory	6.00
Electric Power	3.00

Senior Year

First semester	
Electrical Laboratory	$3.00
Fuel and Gas analysis	5.00
Electric Power	3.00
Experimental Laboratory	3.00 to 4.50
Second semester	
Electrical Laboratory	$4.50
Electric Power	3.00
Gas Engine Laboratory	6.00
Deposit fee—military department, freshman and sophomore years	5.00
Drill suit	15.00

College of Agriculture

Incidental fee, resident	$10.00
Incidental fee, non-resident	20.00

Laboratory fees same as under College of Science, Literature and the Arts.

College of Law

Matriculation fee	$10.00
Incidental fee (three terms) per term	20.00
Book deposit fee, per year	5.00

College of Medicine and Surgery

	Per semester
Incidental fee	$50.00
Microscope fee, 1st year, 1st sem	4.00
2nd year, 1st sem., $3.00, 2nd sem	4.00
3rd year, 1st semester	4.00
4th year, Clinical Microscopy	2.00
For elective courses	2.00

	Per year
Breakage fee deposit	$5.00
Hospital fee (Jr. and Sr. year)	3.00

College of Homeopathic Medicine and Surgery

Same as for College of Medicine and Surgery

College of Dentistry

	Per semester
Incidental fee	$75.00

	Per year
Breakage deposit	5.00

College of Pharmacy

TWO YEAR COURSE

	Per year
First year	$75.00
Second year	90.00
	$165.00

THREE YEAR COURSE

First year	$45.00
Second year	55.00
Third year	65.00
	$165.00

School of Mines

FRESHMAN YEAR

	Per year
Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00

	Per year
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
	$95.00

SOPHOMORE YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
	$54.00

JUNIOR YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Steam laboratory	3.00
Trip to the mines	$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
	$152.00 to 227.00

SENIOR YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
	$93.00
Deposit fee	3.00

The School of Chemistry

	Per semester
Incidental fee, resident	$15.00
Incidental fee, non-resident	30.00
Shop	4.50
Assaying	15.00
Chemistry courses 1, 2, 3, 10, 14, 18, 19, 23	5.00
Chemistry courses 4, 5	7.00

	Per semester
Chemistry course 6	10.00
Chemistry courses 9, 11, 12, 13, 15, 16, 17, 20, 24	3.00

The College of Education

Incidental fee, resident	$10.00
Incidental fee, non-resident	20.00

Other fees same as for College of Science, Literature and the Arts.

The Graduate School

Incidental fee,	$10.00

Proportionate fees for less than full work.

A fee of 25 cents per day is charged for each day of delayed registration in each of the colleges except the graduate school.

LIVING EXPENSES

The University of Minnesota has no dormitory system, and all students are thrown upon their own responsibility in obtaining boarding and rooming places.

The expense of living at the University varies greatly according to individual habits and tastes. In general the scale of expense is below rather than above that of similar institutions in the middle west and is considerably lower than that of most institutions situated in the eastern states.

Several years ago a number of young men and women, at the request of University officials, kept careful account of their expenses for the University year. The result was that the expenses of the young men ranged from two hundred and seventeen to three hundred and ninety-seven dollars for the University year. The same students earned sums varying from two hundred and thirty-seven to two hundred and seventy-two dollars. The young women reported exepnses varying from one hundred and fifty to three hundred and fifty-five dollars. These figures do not include fees and, as the cost of living has increased decidedly, probably twenty-five per cent should be added to these figures to make them safe.

The students upon whose statements these figures are based were representative students; they were not extravagant nor did they deny themselves unduly to get along. While students can live within the figures given above, they would not, owing to the increased cost of living, be able to live as comfortably nor to have as many privileges as these students had.

Meals can be had at prices ranging from three dollars per week to as high as the student can afford to pay. In private families board ranges from three to five dollars.

Furnished rooms vary in price from eight to twenty dollars per month. Two students rooming together would of course reduce this expense. It

is sometimes possible for a student, rooming alone, to secure a good room at an expense but little higher than when two room together; but such chances are the exception and not the rule. New students will find that they will be more likely to secure comfortable rooms and suitable board if they will consult the general secretary of either the Young Men's or Young Women's Christian Association immediately upon arrival at the University, or if they will correspond with these officers before coming to the University.

The student who learns some trade before coming to the University has a great advantage over the student who has to earn his money by ordinary manual labor. Students have earned their whole expenses while attending the University and have made good records at the same time. Other students have done so much work that they have not been able to keep up their studies, and have thus missed the one thing for which they were attending the University.

If it is possible for the student to have a part of his expenses paid, he should not attempt to earn his way entirely by his own exertions. It is a comparatively easy thing for a young man to earn half his living while attending the University and yet do good work in his classes. Students who want work seldom fail to find it. In coming to the University, the student should bring enough money with him so that he can live comfortably for a few weeks until he can find something to do.

Students who desire advice and assistance in securing a position to help pay their expenses should confer with the Secretary of the Y. M. C. A. at the University.

A pamphlet has been published containing five papers (one by a young woman) relating actual experiences of students who have made their way through the University. Students who contemplate making their own way through college will find here stated some very interesting and encouraging facts. A copy will be sent free to any address upon application.

Degrees Granted in 1908

Total, 553

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

Bachelor of Arts—214

Aneta Agnes Anderson, Maple Hill, Iowa.
Francis F. Anderson, St. Paul.
Theodora Henrietta Anderson, Montevideo.
Tryphena Rebecca Anderson, Montevideo.
Mary E. Armstrong, Minneapolis.
Franz A. Aust, Minneapolis.
Edwin Aygarn, Choice.
Albert Leroy Aylmer, Baltimore, Md.
Marion Louise Barber, Minneapolis.
Emma A. Beckman, Minneapolis
Laura Hall Benz, St. Paul.
Vera Doris Billings, St. Paul.
Naneen Mary Blanchard, St. Paul.
Guy Coe Bland, Anoka.
Nina Mae Blossom, Algona, Iowa.
Rena Claire Brainerd, Blooming Prairie.
Elizabeth Marie Breen, St. Paul.
Emma Lillian Brock, Minneapolis.
Mildred Brown, Minneapolis.
Ellen M. Bruce, St. Paul.
Elizabeth Clapp Bruchholz, Minneapolis.
Margaret McD. Buchanan, Minneapolis.
Raymond Cassius Cannon, Watertown, S. D.
Catherine Casey, St. Paul.
Lee Clough, Minneapolis.
Vivian G. Colgrove, Minneapolis.
Lillian Edith Colter, St. Paul.
Ruth Marian Colter, St. Paul.
Jennie G. Craven, Faribault.
William Howard Crawford, Hampton, Ia.
Helen Sherwood Cummings, St. Paul.
Fay Cuzner, Minneapolis.
Juanita H. Day, St. Paul.
Florence D. Deal, Truman.
Harold C. Deering, Minneapolis.
Robert Lane Deering, Minneapolis.
Margarethe Denfeld, Duluth.
Kathryn Dougherty, Mankato.
Anastasia Doyle, St. Paul.
Lloyd L. Duxbury, Caledonia
Carl T. Ebeltoft, Lake Park.
Marjorie Edwards, Minneapolis.
Edwin G. Eklund, Moorhead
Janet Grace Elliott, Minneapolis.
Elmer W. Elmquist, St. Paul.
Margaret Alden Elwell, Minneapolis.
Cecile Leffingwell Enegren, Minneapolis.
Albert Grant Evans, Duluth.
Minnie Faegre, Flandreau, S. D.
Edith L. Farwell, Zumbrota.
Agnes Esperance Feeny, St. Paul.
Murlen Fellows, Minneapolis.
Alice Maude Finch, Clinton Falls.
Kate Maud Firmin, Minneapolis.
Lou Burrows Fleming, St. Paul.
Marguerite Beryl Fleming, St. Paul.
Ruby Hope Fletcher, Minneapolis.
Victor Wilbert Fletcher, Farmington.
Leah A. Fligelman, Minneapolis.
Grace L. Gaghagen, Minneapolis.
Walter Judson Gessell, Hanley, Sask., Canada.
Albert Nicolay Gilbertson, Willmar.
Bertha Louise Gippe, Watson.
Caroline Joanna Gleason, Minneapolis.
Jessie Celestine Goddard, Minneapolis.
Florence Helen Godley, Minneapolis.
Fannie Elizabeth Gordinier, St. Paul.
Kate Greeley, Stillwater.
Alice Evangeline Green, Minneapolis.
Florence Lavina Grime, Minneapolis.
Ella Josephine Halvorson, Dawson.
Jack Ellis Haynes, St. Paul.
Julie Hille, Fergus Falls.
Emma Mae Hillesheim, Sleepy Eye.
Vinnie Hitchings, Sutherland, Iowa.
Minnie C. Hoffman, St. Paul.
Julia Amanda Holen, Minneapolis.
Lorena Hopkins, Chinook, Mont.
Inez Ianthe Hovey, Minneapolis.
Ida Elizabeth Howe, Racine, Wis.
Lura Claire Hutchinson, Minneapolis.

Rewey Belle Inglis, Minneapolis.
Florence Kimball Jenks, Seattle, Wash.
Anna Josephine Johnson, Minneapolis.
Anna Marie Johnson, Crookston
Edward Whittemore Johnson, Rockford.
Ruth Revere Johnson, Minneapolis.
Thekla Eugenia Johnson, Lake City.
Florence Jones, Gaylord.
William Moore Jones, Yanceyville, N. C.
Monica C. Keating, St. Paul.
Margaret M. E. Kelly, St. Paul.
Anne Kennedy, St. Paul.
Grace Marian Kingsley, Minneapolis.
Ralph Thomas Knight, Minneapolis.
Rudolf F. Koessler, Heron Lake.
Mabel LaDue, Minneapolis.
John D. Lange, St. Paul.
F. Hortense Laybourn, Minneapolis.
Mary Louise Leavenworth, Minneapolis.
Bertha Leck, Owatonna.
Harriet Edith Levin, Aurora.
Margolee Lewis, St. Paul.
Arnold Johnson Lien, Delavan.
Ingebrigt L. Lillehei, Luverne.
Margaret Eleanore Linnan, St .Paul.
Jessie F. Lockman, Minneapolis.
Clara Louise Lougee, Minneapolis.
Mary Amanda Lucas, Minneapolis.
Stella May Lumley, Lanesboro
Joseph E. Lunn, Carlton.
Mabel Esther Lyon, Hastings.
Maud Hester Lyon, Hastings.
Margaret E. McFetridge, St. Paul.
George Albert McGarvey, Minneapolis.
Charles Dana McGrew, Howard Lake.
Dora McGuigan, Millville.
Harriett M. McKenzie, Minneapolis.
Mabel Amelia Mansfield, Minneapolis.
Jessie May Marsh, Claremont.
Sara Thompson Marshall, Minneapolis.
Josephine Agnes Martens, Minneapolis.
Robert Lyon Meech, Minneapolis.
Alice Fowle Melony, Minneapolis.
James Stephen Mikesh, Spillville, Iowa.
Hilda Amelia Miller, St. Paul.
Mabel F. Millie, Minneapolis.
Harriet Dunbar Moore, St. Paul.
Arthur Alfred Morse, Minneapolis.
Frank Wilbur Mottley, Red Wing.
Elmina Nesta, Minneapolis.
Mary Margaret Newton, St. Paul.
Marion Nordbergh, Minneapolis.
Elsa Regina Nordin, St. Paul.
Inez J. F. Norlander, St. Paul.
Emma Flora O'Brien, St. Paul.
Didrick John Olson, Belview.
Matthias Norberg Olson, Belview.
Catherine E. Osia, Humboldt, Iowa.
Hildegard L. E. Ott, Minneapolis.
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Andrew H. Palmer, Minneapolis.
James W. Papez, Hector.
Florence Eula Paul, Minneapolis.
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Paul Willis Peterson, Minneapolis.
Bernard Pettersen, St. Paul.
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Alfred Ault Pickler, Minneapolis.
Lillian Rosabelle Plummer, Minneapolis.
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Alice Elizabeth Putnam, Minneapolis.
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Horace Garner Reed, Chicago.
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Walter Clarence Robb, Minneapolis.
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Honore Veronica Rouse, Minneapolis.
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Olive Madge Runey, Minneapolis.
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Alma Pearle Sawyer, Minneapolis.
Mina L. Schaetzel, Minneapolis.
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Wilbur Duane Shaw, Minneapolis.
Mary Eleanor Shiely, St. Paul.
Helen Mary Simerman, St. Paul.
Florence Alberta Sly, Minneapolis.
Anna Margaret Smith, Minneapolis.
Harriet L. Smith, Minneapolis.
Irma Potter Smith, Minneapolis.
James Russell Smith, Minneapolis.
Winifred R. Smith, Duluth.
Rudolph T. Solenstein, Minneapolis.
Alma L. Stake, Anoka.
Georgina Sterling, Red Wing.
Dorothea Stewart, Minneapolis.
Edna Stewart, Minneapolis.
Thomas Otto Streissguth, Arlington.
P. A. Sveeggen, Minneapolis.
Henry Swanstrom, Lake Park.

Abigail D. Switzer, Minneapolis.
Della Frances Thompson, Minneapolis.
Gertrude May Thompson, Minneapolis.
Ella Bertha Thorson, Winthrop.
Margaret H. Trimble, Minneapolis.
Mamie E. Waddell, St. Louis Park.
Margaret Ellen Walker, Williston, N. D.
Mary Genevieve Walston, Minneapolis.
Ruby Wasser, Minneapolis.
Alice Aurelia Watson, St. Paul.
Freda Weinstein, Helena, Mont.
Helen Whitney, Minneapolis.
Anna Whittle, Minneapolis.
Sadye Whittle, Minneapolis.
Charlotte Amelia Wiggen, Red Wing.
Susan Zenobia Wilder, Minneapolis.
Beatrice Isabelle Williams, Minneapolis.
Mary Louise Williams, St. Louis Park.
Chester Sawyer Wilson, Stillwater
Elizabeth Columbus Wolfe, Minneapolis.
Luella M. Woodke, LeMars, Iowa.
Elizabeth Yerxa, Minneapolis.
Augusta Ziegler, Minneapolis.

BACHELOR OF SCIENCE 9

Leon A. Barney, River Falls, Wis.
Henry Bryan Dorr, Ashbury Park, N. J.
Alf. Hoff, St. Paul.
Carl Lyle Hobson, Hampton, Ia.
Angell S. Hoiland, Benson.
Charles G. Nordin, St. Paul.
Manford O. Oppegaard, Madison.
Jalmar H. Simons, Waseca.
Frederick Joseph Souba, Hopkins.

THE COLLEGE OF EDUCATION

BACHELOR OF ARTS—In Education 11

Carrie Bush, Minneapolis.
Ethel Bush, Minneapolis.
Maude Gertrude Bush, Minneapolis.
Louise Kathleen Catur, Minneapolis.
Nellie Margaret Dunivon, St. Paul.
Lucy Inez Hutchinson, Minneapolis.
V. Russell Manning, Minneapolis.
Willis Twiford Newton, Minneapolis.
Reuben W. Oakes, Worthington.
Gustavus M. Sachs, New Prague.
Alice Winter, Minneapolis.

THE GRADUATE SCHOOL

MASTER OF ARTS 21

Donald C. Babcock, Grand Forks, N. D.
B. A. '07, Minnesota.
Major, Sociology and Anthropology; Minors, Philosophy, Psychology.
Thesis, Origin and Development of Religious Experience.

John M. Brendal, Glenwood,
B. A. '06, Luther College, Iowa.
Major, English; Minors, Comparative Philology, Scandinavian.
Thesis, Scandinavian Influence upon English.

Ernest J. Colberg, St. Peter.
B. A. '06, Gustavus Adolphus
Major, English; Minors, Scandinavian, Latin.
Thesis, The Dramas of August Strindberg; Some Aspects of Their Ideas and Their Technic.

George Rupert Eichholzer, Owatonna.
B. A. '07, Minnesota.
Major, Political Science.
Minors, History, Economics.
Thesis, The Merit System as Applicable to the Various Administrative Departments of Minnesota.

Lucius Arnold Frye, St. Paul.
B. A. '07, Minnesota.
Major, Political Science; Minors, Economics, Sociology.
Thesis, A Suggested Method of Controlling the Public Service Corporations of Minnesota.

Grace Mitchell Groat, Minneapolis
B. L. '99, Minnesota.
Major, English; Minors, French, Philology.
Thesis, The Psychology of English Rhythms.

Howard H. Hare, Minneapolis.
B. A. '07, Minnesota.
Major, History; Minors, Philosophy, Greek.
Thesis, The Transition from a Provincial to a State Government in New Hampshire.

Martin Hegland, St. Anthony Park.
B. A. '04, St. Olaf.
Major, English Philology; Minors, Education, Philosophy.
Thesis, An Historical and Semasiological Study of Some Synonyms, Nouns, Verbs, and Adjectives Denoting Pleasure.

Minnie Louise Hills, St. Paul.
B. A. '07, Minnesota.
Major, English; Minors, Education, Sociology.
Thesis, A Comparison of Milton and Shakspere as Thinkers and Writers.

Albert Eddy Julien, Braham.
A. B. '03, Hamline.
Major, Neurology; Minors, Physiology, Pathology and Bacteriology.
Thesis, The Intrinsic and Efferent Fibers of the Cerebellum.

Homer B. Latimer, Minneapolis.
B. A. '07, Minnesota.
Major, Animal Biology; Minors, Animal Biology, Botany.
Thesis, The Lateral Line of Polydon Spathula.

Edward M. Lehnerts, Minneapolis.
B. S. '02, Pennsylvania.
Major, Education; Minors, Botany, Geology.
Thesis, The Teaching of Geography.

Alice M. Misz, St. Paul.
B. A. '07, Minnesota.
Major, Botany; Minors, Animal Biology, Geology.
Thesis, A Revision of the North American Species of Vaccinium.

Migio Miyazaki, Tokio.
B. A. '02, Waseda University, Japan.
Major, Philosophy; Minors, Sociology, Education.
Thesis, Japanese Morality, a Criticism.

Sedona Fesenbeck Nelson, Minneapolis.
B. A. '04, Michigan.
Major, English; Minors, German, Philosophy.
Thesis, Shakspere in German Literature.

Leonard H. Pryor, Fairmont.
B. A. '02, Minnesota.
Major, Education; Minor, Psychology.
Thesis, A Practical Teaching of Secondary Mathematics.

Rasmus S. Saby, Radcliffe, Iowa.
B. A. '07, Minnesota.
Major, Political Science; Minors, Philosophy, Psychology.
Thesis, Early Railroad Legislation in Minnesota.

Conrad G. Selvig, Rushford.
B. A. '07, Minnesota.
Major, Education; Minors, Psychology, Sociology.
Thesis, Federal Aid to Schools.

Emma White Shellenberger, St. Anthony Park.
Ph. B. '00, Iowa.
Major, English; Minors, French, German.
Thesis, Usage and History of English Idiom.

Theodore T. Stenberg, Ormsby.
B. A. '06, Minnesota.
Major, English; Minors, Psychology, Education.
Thesis, The Function and Value of the Stage.

Mary C. Van Wert, Minneapolis.
B. A. '05, Minnesota.
Major, Animal Biology; Minors, Botany, Geology.
Thesis, A Contribution to the History of Entomology in the United States.

MASTER OF SCIENCE 2

Frank F. Grout, Minneapolis.
B. S. '04, Minnesota.
Major, Geology; Minors, Chemistry, Physics.
Thesis, The Granites and Associated Quartz Basalts of Stearns Co., Minn.

John Wilson, Minneapolis.
B. S. '03, Wisconsin.
Major, Sanitary Engineering; Minors, Bacteriology, Reinforced Concrete.
Thesis, Sewage System and Disposal Plant at the State Agricultural School and Experiment Station.

DOCTOR OF PHILOSOPHY 3

Henry Anton Erikson, Minneapolis.
B. E. E. '96, Minnesota.
Major, Physics.
Minors, Physics, Mathematics.
Thesis, The Ionization of Gases at High Pressures.

Frederick C. Miller, St. Paul.
B. A. '03, M. A. '07, Minnesota.
Major, Political Science; Minors, History, Geology.
Thesis, History and Organization of the Police.

Olaf M. Norlie, Atwater.
B. A. '98, St. Olaf, M. A. '01, Wisconsin.
Major, English; Minors, Education, Scandinavian.
Thesis, The Principles of Expressive Reading, a Study of the Human Voice.

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

CIVIL ENGINEER 29

J. Wesley Ash, Grand Forks, N. D.
Oscar J. Bergoust, Tacoma, Wash.
LeRoy F. Borrowman, Stillwater.
Harry E. Brenchley, Minneapolis.
John Walter Comstock, Minneapolis.
Arthur Norman Dallimore, St. Paul.
William Fred Doeltz, Jr., Minneapolis.
Henry Knox Dougan, Minneapolis.
Douglas R. Fleming, St. Paul.
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Hugh Newton Gage, Winona.
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Herbert Hamilton Knowlton, Minneapolis.
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Fred C. Lang, Austin
Dwight Webster Longfellow, Minneapolis.
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Clarence Ward Mowery, Northfield.
Lewis Magnus Norelius, Luverne.
Day Ira Okes, Minneapolis.
Melvin Samuel Olsen, Spring Valley.
John Quinn, Minneapolis.
Charles N. Robertson, Sleepy Eye.
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George William Walker, Minneapolis.
Gustaf Frederick Widell, Mankato.
Roy Willis, St. Paul.
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MECHANICAL ENGINEER 16

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Halstad Powell Councilman, Minneapolis.
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Harvey Cole Estep, Minneapolis.
Frank R. Fleming, St. Paul.
Hobart Dickinson Frary, Minneapolis.
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Clyde Wood Norton, Lisbon, N. D.
George T. Peterson, New Ulm.
George Walter Priedeman, St. Paul.
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James William Casberg, Minneapolis.
Neil Currie, Jr., Minneapolis.
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Frank Joseph Pancratz, Perham.
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Wm. F. H. Schildt, Hastings.
Alfred Walter Schoepf, Appleton.
Francis George Scobie, Duluth.
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Percy Granville Sturtevant, Detroit.
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Frank Swanstrom, Lake Park.
Oliver Sweningsen, Austin.
William Mathias Weibeler, Belle Plaine.
Louis Peter Zimmerman, Waseca.

BACHELOR OF SCIENCE—In Engineering 6

Charles P. Clarke, Elysian
Arthur Bernard Fruen, Minneapolis.
Robert N. King, Minneapolis
Louis Williams McKeehan, Minneapolis.
Harry Burgess Roe, St. Paul.
Robert John Schmid, Rochester.

THE SCHOOL OF MINES

ENGINEER OF MINES 15

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Christen Frederick Dahl, St. Hilaire.
William Albert Deichen, St. Paul.
Frank Raymond Edwards, Minneapolis.
William Robert Goodwin, Minneapolis.
John Alden Grimes, Minneapolis
Ole G. Hoaas, Fertile.
John Joseph Kennedy, St. Paul.
Arthur Knickerbocker, Staples.
Alfred Monroe Locke, Minneapolis.
John Stanley Olmstead, Brownsville.
Andrew Peterson Red Wing.
Joseph S. Peterson, Minneota.
John Lawrence Strong, St. Paul.

THE SCHOOL OF CHEMISTRY

BACHELOR OF SCIENCE—In Chemistry 7

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Charles Royal Cressy, Minneapolis.
John M. Lowe, Minneapolis.
Russell S. McBride, Minneapolis.
Allen Harold Porter, Minneapolis.
Oric Ogilvie Whited, Jr., Minneapolis.

THE COLLEGE OF AGRICULTURE

BACHELOR OF SCIENCE—In Agriculture 4

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Thomas Poe Cooper, Minneapolis.
Hall B. White, Winnebago.
William White, Camden, N. J.

BACHELOR OF SCIENCE—In Home Economics 2

May Erwin, St. Paul.
Inez Martha Hobart, Minneapolis.

BACHELOR OF SCIENCE—In Forestry 1

Georges de S. Canavarro, Honolulu, Hawaii.

THE COLLEGE OF LAW

MASTER OF LAWS 6

Herman Mathew Feroe, LL. B. Minneapolis.
Elias Johnson Lien, LL. B., St. Paul.
Albert W. Mueller, LL. B., New Ulm.
Anthony J. Praxel, LL. B., Minneapolis.
Josephine Schain, LL. B., Minneapolis.
Wadsworth A. Williams, LL. B., Minneapolis.

BACHELOR OF LAWS 86

Lawrence Russell Allison, Minneapolis.
James Bradford Baker, Brownton,
Reinhold K. Batzer, Royalton.
Herman J. Bott, Minneapolis.
Marcus Edward Brown, St. Paul.
Edward Timothy Burk, Valley City, N.D.
Franz O. G. Jevne, Meridan, Wis.
Robt. E. Johnson, Minneapolis.
Wilbur Birch Joyce, Minneapolis.
Laurel L. Kells, Sauk Centre.
Helon Edwin Leach, Spring Valley.
Charles Emory Lockerby, Mapleton.

Harvey B. Burk, Minneapolis.
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Roy English Campbell, Minneapolis.
Harry Summers Carson, Minneapolis.
Clifford C. Champine, Minneapolis.
Algernon O. Colburn, Minneapolis.
Henry J. Coleman, Minneapolis.
Lester William Crawhall, Minneapolis.
Walter Francis Dacey, Minneapolis.
Murray T. Davenport, Minneapolis.
William Henry Dempsey, Minneapolis.
Francis Marion Dolan, St. Paul.
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David Wilfred Doyle, Great Falls, Mont.
Reuben E. Edquist, Minneapolis.
Abelius Eenkema, Clara City.
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Willie Kerr Foster, Renville.
David Langdon Fulton, Minneapolis.
Leroy A. Gage, Minneapolis.
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Benjamin Feland Groat, Minneapolis.
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Alfred Ulysses Hamrum, Franklin.
George Norman Henderson, Red Wing.
Harry Getchell Higgins, Minneapolis.
Virgil Goodman Hinshaw, Minneapolis.
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Joseph A. Hosp, Hopkins.
Henry N. Jenson, Detroit.
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Mark M. McLaughlin, Minneapolis.
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Karl Adolph Machetanz, St Paul.
Charles E. H. Maloy, St. Cloud.
Edward K. Massee, Minneapolis.
Francis A. Molyneaux, Jr., Winnebago.
Russell L. Moore, St. Paul.
Frank Leonard Morse, Minneapolis.
James Henry Mulally, Danvers, Mass.
Olin Cornell Myron, Vermillion, S. D.
Jared Augustus Perkins Neal, Minneapolis.
Severt Ambrose Nelson, Minneapolis.
Edward Herbert Nicholas, Minneapolis.
Frank E. Norton, Minneapolis.
Joseph A. S. O'Gordon, Minneapolis.
Brynjolf Oyen, Watson.
Edward S. Pattison, Durand, Wis.
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Horace Wills Roberts, Minneapolis.
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Garfield H. Rustad, Moorhead.
John Saari, Sparta.
Louis Benjamin Schwartz, St. Paul.
Spencer Judd Searls, Faribault.
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William Reed Simmons, Minneapolis.
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William C. Smiley, St. Paul.
Niles Madison Sorenson, Hayfield.
Paul D. Stratton, Granite Falls.
George Francis Sullivan, Shakopee.
Ingman Swinland, Halstad.
Derwood Washington, Glendive, Mont.

THE COLLEGE OF MEDICINE AND SURGERY

DOCTOR OF MEDICINE 32

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Roy Newbery Andrews, Mankato.
Charles Joseph Bloom, Whitehall, Mich.
Rolland A. Bock, Pharm. C., St. Paul.
August Edward Bostrom, B. S., Minneapolis.
Leon Morelle Boyd, Alexandria.
John C. Brown, Minneapolis.
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Henry E. Dahleen, Granite Falls.
Frederick Alonzo Engstrom, Cannon Falls.
John Esser, Austin.
George Bysshe Eusterman, Lewiston.
William Sidney Hitchings, Jr., Minneapolis.
Edward James Johnson, St. Cloud.
Edward John Lawrence, Marshall.
Arvid C. Lindberg, Harris
William Francis Maertz, New Prague.
Gustav Alfred Magnusson, Harris.
James Rollin Manley, Duluth.
Melvin Sylvanus Nelson, B. S., Dawson.
Carl M. Roan, Minneapolis.
Dennis E. Ryan, Shakopee.
Clarke Sherwood Smith, Bozeman, Mont.
Eugene Benson Stebbins, Minneapolis.

Edward Louis Fortier, Little Falls.
Henry Oswald Grangaard, Kindred, N.D.
Ernest Eugene Hemingway, Minneapolis.
Charles Norton Hensel, St. Paul.
Arthur Clarence Strachauer, Minneapolis.
George Hamilton Walker, Pawnee City, Nebr.
John Franklin Walker, St. Paul
Tolbert Watson, Cashel, N. D.

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

DOCTOR OF MEDICINE 3

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Justin Thomas Staallwood, Worthington.
K. Ward Wilder, Minneapolis.

THE COLLEGE OF DENTISTRY

DOCTOR OF DENTAL SURGERY 42

William J. Bandelin, Arlington.
Charles John Bergh, St. Paul.
Clarence C. Broderson, Mountain City, Wis.
Elmer W. Bunce, Primghar, Iowa.
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Jesse Francis Conway, Lake City.
Stephen Vincent Conway, Graceville.
Ralph W. Countryman, Minneapolis.
Valentine Adolph Franta, Montgomery.
C. Edwin Grafsland, Lake Park.
Gustave Adolph Hagberg, Minneapolis.
Harry Weston Harmon, Faribault.
Francis Randall Harrison, St. Cloud.
Clifford C. Higgins, Sidney, Ohio.
Isaac Stephenson Hull, St. Paul.
Meredith Jay James, Lake Crystal.
William Henry James, Lake Crystal.
Joseph Johnson, Minneapolis.
Joseph Almon Kjelland, Rushford.
Karl G. Knoche, St. Paul.
Harry Comegys Lawton, St. Paul.
Daniel James Leary, Portage, Wis.
Edorf Menton Lier, Ashby.
Frederick M. Madden, Watertown, Minn.
Peter James Miesen, St. Peter.
Thomas J. Moore, Chatfield.
Herbert A. Munns, Minneapolis.
Charles John Olson, Hastings.
Harley Adolph Rudermacher, Barron, Wis.
Frederick Louverne Rayman, Austin.
Herman C. Remele, Minneapolis.
Carl L. Sandstrom, Cloquet.
John Earl Schapler, Pipestone.
Leroy Christian Schmitz, Jamestown, N. D.
Edwin James Simon, St. Paul.
Lynn R. Snyder, Lake City.
Lee Erwin Spurbeck, Two Harbors.
William Paul Tanner, Cannon Falls.
William M. Trench, Dennison.
Arthur A. Van Dyke, St. Paul.
Abram P. Whitson, Packwaukee, Wis.
Melville Bruce Will, Mapleton.
Louis Bernard Williams, Ashland, Wis.

THE COLLEGE OF PHARMACY

BACHELOR OF PHARMACY 18

Dolph Church Alcott, Lakefield.
Fred Monroe Bowman, Browns Valley.
John Younglove Breckenridge, Jr., Pine City.
Frank A. DeWitz, Rochester.
Arthur W. Eckstein, New Ulm.
Earl S. Erckenbrack, Parkers Prairie.
Alvin LeRoy Dretchko, Winthrop.
Bernt Olaf Gronvold, Kenyon.
Alf. J. Gunderson, Pelican Rapids.
George A. Holmgren, Breckenridge.
Edward Perry Jones, Blue Earth.
Asa Frederick Kurth, Hendricks.
Roy R. Lambert, Royalton.
Arthur E. Loydahl, Park Rapids.
Ingvald S. Pladson, Minneapolis.
Richard H. Puhl, Menomonie, Wis.
Ernest Albert Stoppel, Rochester.
George Claude Weber, Rochester.

Honors and Prizes

Degrees With Distinction 13

IN ECONOMICS

William H. Crawford
Harold C. Deering
Arthur A. Morse
Fay N. Seaton

IN ENGLISH

Mary Alice Winter

IN GEOLOGY

Andrew H. Palmer
Edward W. Johnson

IN HISTORY

Alice G. Pope

IN LATIN

Willis T. Newton
Della F. Thompson

IN PHILOSOPHY

Elmer Elmquist
Ingebrigt Lillehei

IN SOCIOLOGY AND ANTHROPOLOGY

Albert N. Gilbertson

Degree Cum Laude 1

IN LAW

Derwood Washington

Certificate of Proficiency in Music

Awarded to Gertrude R. Hull

The '89 Memorial Prize in History

Awarded to Arnold J. Lien

The Alumni Weekly Gold Medal

Awarded to Stanley B. Houck

The Albert Howard Scholarship

Awarded to Matthias N. Olson

The University of Minnesota Bulletin

College of Pharmacy

1909-1910

Volume XII April 20, 1909 No. 3

Entered at the Postoffice
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 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,

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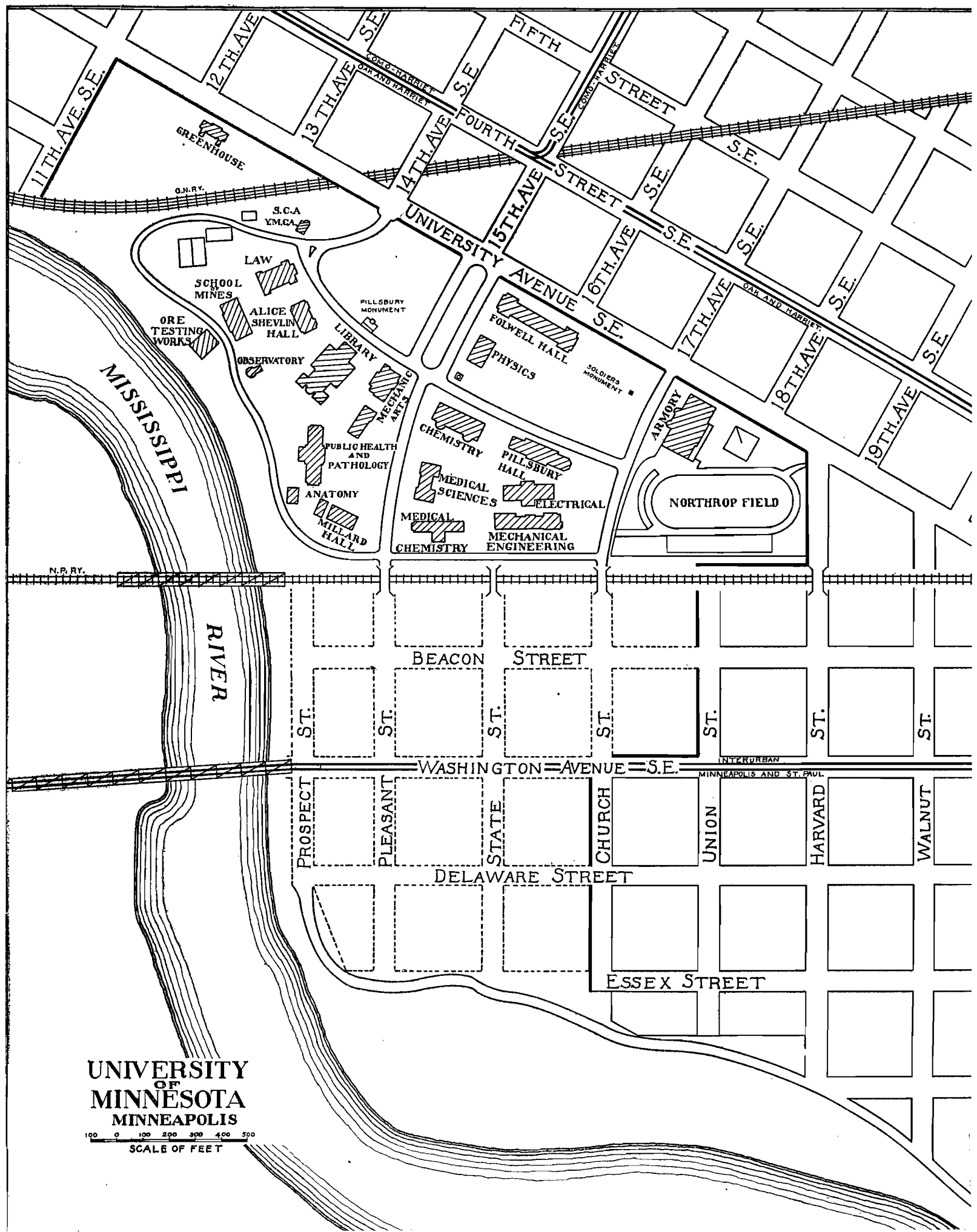
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GREENHOUSE
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ORE TESTING WORKS
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INTERURBAN
MINNEAPOLIS AND ST. PAUL
PROSPECT ST.
PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
WALNUT ST.
DELAWARE STREET
ESSEX STREET
UNIVERSITY OF MINNESOTA
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SCALE OF FEET

CALENDAR FOR 1909-1910

1909

JULY

S.	M.	T.	W.	T.	F.	S.
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DECEMBER

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1910

JANUARY

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FEBRUARY

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

MARCH

S.	M.	T.	W.	T.	F.	S.
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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
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APRIL

S.	M.	T.	W.	T.	F.	S.
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3	4	5	6	7	8	9
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17	18	19	20	21	22	23
24	25	26	27	28	29	30
..	..	..	..	..	..	..

MAY

S.	M.	T.	W.	T.	F.	S.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
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29	30	31	..	..	..	..
..	..	..	..	..	..	..

JUNE

S.	M.	T.	W.	T.	F.	S.
..	..	..	1	2	3	4
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26	27	28	29	30	..	..
..	..	..	..	..	..	..

University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration.
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	25	Friday	Good Friday, recess two days
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

Program—Entrance Examinations

1909–10

When entrance examinations are required this schedule will be followed.

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botony
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The School Year for 1910-11 will begin Tuesday, September 13

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 SCHOOL OF AGRICULTURE
- SHORT COURSE FOR FARMERS
- THE DAIRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL. D., President
ERNEST B. PIERCE, B. A., Registrar
JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C. E., Dean of the College of Science, Literature and the Arts

FREDERICK S. JONES, M.A., Dean of the College of Engineering and the Mechanic Arts

JOHN W. OLSEN, B.S., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

EUGENE L. MANN, B.A., M.D., Dean of the College of Homeopathic Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, 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

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ADA L. COMSTOCK, M.A., Dean of Women

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
President Cyrus Northrop

The College of Science, Literature and the Arts
Dean John F. Downey — Professor John H. Gray
Professor J. C. Hutchinson — Professor H. F. Nachtrieb
Professor Norman Wilde

The College of Engineering and the Mechanic Arts
Dean Frederick S. Jones — Professor George D. Shepardson

The College and School of Agriculture
Dean John W. Olsen — Professor Harry Snyder
Professor Samuel B. Green

The College of Law
Dean William S. Pattee — Professor Henry J. Fletcher

The College of Medicine and Surgery
Dean F. F. Wesbrook — Professor Thomas G. Lee

The College of Homeopathic Medicine and Surgery
Dean Eugene L. Mann

The College of Dentistry
Dean Alfred Owre

The College of Pharmacy
Dean Frederick John Wulling

The School of Mines
Dean William R. Appleby

The School of Chemistry
Dean George B. Frankforter

The College of Education
Dean George F. James

The Graduate School
Dean Henry T. Eddy

The Dean of Women
Ada L. Comstock

The University Library
James T. Gerould

General Alumni Association
David P. Jones

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

The College of Pharmacy

FACULTY

CYRUS NORTHROP, LLD., President.
FREDERICK J. WULLING, Phm.D., LL.M., etc., Dean Professor of Pharmacology, Pharmaceutical Chemistry and Jurisprudence.
RICHARD O. BEARD, M.D., Professor of Physiology.
CHAS. F. SIDENER, B. S., Professor of Quantitative Chemistry.
GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry.
FRANK F. WESBROOK, M.A., M.D., C.M., Professor of Bacteriology.
EVERHART P. HARDING, M. S., Ph. D., Assistant Professor of Chemistry.
M. R. WILCOX, M. D., Assistant Professor of Physiology.
HIBBARD W. HILL, Assistant Professor of Bacteriology.
IRA HARRIS DERBY, B. S., Assistant Professor of Chemistry.
FREDERIC E. CLEMENTS, Ph.D., Professor of Botany.
E. D. BROWN, Pharm. D., M. D., Acting Professor of Materia Medica and Therapeutics.
..... Professor of Pharmacognosy

INSTRUCTORS AND ASSISTANTS

GUSTAV BACHMAN, Ph.C., Ph.M., Instructor in Pharmacy.
OSCAR BLOSMO, Ph. C., Assistant in Pharmacy.
FREDERICK K. BUTTERS, M. S., Instructor in Pharmaceutical Botany and Microscopy and Pharmacognosy.
EDWARD FIDLAR, B. A., M. B., Junior Demonstrator in Bacteriology.
FRANK F. GROUT, B. S., Instructor in Mineralogy.
JOHN A. HANDY, Ph. C., Instructor in Chemistry.
GEORGE D. HEAD, B. S., M. D., Instructor in Clinical Microscopy.
JOHN ELDON HYNES, Ph.C., Assistant in Clinical Microscopy.
ELMER L. HOTVEDT, Ph.B., Pharmacy Laboratory Assistant.
C. N. MCCLOUD, Phm. D., M. D., Lecturer on First Aids to the Injured.
J. P. SEDGWICK, B. S., M. D., Instructor in Physiological Chemistry.
W. D. SHELDON, M.D., Instructor in Therapeutics.
..... Instructor in Pharmaceutical Latin.
..... Assistant in Materia Medica.
..... Assistant in Pharmacognosy.

SPECIAL LECTURERS

W. A. FROST
STEWART GAMBLE
J. W. HARRAH
CHARLES H. HUHN
J. N. KIRBY
A. J. KLINE
C. B. MCCALL
HENRY MCCOLL
A. D. THOMPSON
E. A. TUPPER
THOMAS VOEGELI

ADMISSION

A—TO THE TWO-YEAR COURSE

While nearly all students enrolled in this college are graduates of full four-year high school courses, such a training prior to entrance is not obligatory at the present time. The requirements, however, are being raised gradually in such a way that soon they shall be a full high school preparation or an equivalent.

Applicants may be admitted without examination if they bring certificates of graduation from, or standing in, institutions of the collegiate grade or present other credentials showing that they have successfully completed the branches of study embraced in a full four-year high school course, or an equivalent, provided that among the branches completed are:

English, two years, including the principles of composition and practice in written expression.

Algebra, one year, elementary, up to beginning of higher algebra.

Geometry, one year, elementary.

Physics, one year, elementary.

Latin, two years: grammar, one year; Caesar (four books), one year.

II. Other applicants must pass examinations in the branches above specified, i. e., in English, algebra, geometry, physics and Latin, or present satisfactory evidence of having completed these branches, for which substitutes cannot be accepted.

Students will be allowed to carry not more than two conditions which, however, must be removed before the final examinations in the first year subjects.

In certain cases credit is given for drug store experience.

B—TO THE THREE-YEAR COURSE

The minimum requirements for admission to the three-year course are the same as those for admission to the two-year course II., with the exception that students may carry as conditions not more than three of the entrance subjects among which English cannot be. Students must pursue the branches in which they are conditioned during their first year and pass examinations in them or present evidence of having satisfactorily completed the branches. The subjects are not taught at the college, but may be taken at the academy near by, or at the city high schools or with private tutors. The University Y. M. C. A. usually establishes courses for the benefit of students conditioned in entrance branches.

Applicants whose preparatory course of study has not conformed precisely to the requirements above enumerated will be allowed to offer, in lieu of a portion of these requirements, equivalent preparation in similar branches of study; and if they show, by examination, or by other

evidence, that their preparation has been substantially equivalent, such branches will be accepted as substitutes for those omitted.

The examinations for entrance are conducted by the faculty of the College of Pharmacy, in the pharmacognosy rooms, beginning at 9:00 a.m., on Tuesday, September 14, 1909. Lecture work begins as soon as possible after the examinations, usually the following day.

Every applicant is required to furnish a certificate of good moral character.

Those who do not pass the entrance examinations, may enter and complete their course in three years, provided they pursue the subjects required for admission in addition to the professional work that may be assigned to them, and pass their entrance examinations before the end of the first year.

REGISTRATION

All applicants for admission to the regular courses must present to the Dean not later than September 14, their school or high school certificates, diplomas or such other credentials as they may wish to offer toward meeting in whole or in part the entrance requirements. If these are found satisfactory the applicant will register in the office of the University Registrar, who will issue a card to the University Accountant to whom the applicant will pay the tuition and breakage fees and microscope rental and receive receipts therefor. Registration is completed by depositing these receipts in the office of the Dean. The student is then classified.

ADVANCED STANDING

Applicants for advanced standing must pass the entrance examinations or present the usual equivalents. They must furnish satisfactory evidence of time spent and subjects covered in previous professional studies, and must pass the examinations of all departments in which they wish to be exempt, if such examinations are deemed necessary by the professors in charge. Students will not be permitted to substitute private work in any branch for the regular course work.

UNCLASSED STUDENTS

Unclassed or special students may enter at any time providing there is laboratory room for them. They will not be rated on their work nor examined unless they make special request therefor. Work completed will be credited should the student subsequently enter the regular course.

EXAMINATIONS AND STANDINGS

Examinations are held at the end of the regular school year and during the last week of the first semester, and are supplementary to the written tests and quizzes that are held at frequent intervals during the year, and with them form largely the basis of final determination of fitness

for promotion or graduation. Students are rated throughout the year, and all who have a standing of ninety per cent, or more in certain of the branches, may not be required to take the final examination in those branches.

Students are not required to write graduating theses, but instead they keep complete records of all their laboratory work. The records are to be kept in substantially bound books, to be approved by the faculty. The respective professors call for the records for inspection and rating once a month or oftener. Duplicates of records are to be furnished the college by the students. The college provides the paper.

The standing of students is determined by the results of recitations, written examinations, laboratory work and attendance. It is indicated by the terms "excellent," "passed," "conditioned," "incomplete," or "failed." Conditions may be removed as indicated below. Incomplete work must be made up before the final examinations of the following year.

In order to become eligible for final examinations, students are required to attend at least four-fifths of the lectures in each course. This rule is not intended for the benefit of those who seek admission after the opening of the college year, but is designed to cover cases of sickness or unavoidable absence. It does not apply to laboratory courses which must be taken in full and must be entered during the first week in which they begin.

Students having conditions in more than two major or in more than three minor subjects of the first year, cannot enter upon the second year's work. All entrance conditions must be removed before the next spring examination. Candidates for graduation must have removed all conditions before entering upon the second semester of the graduating year.

Condition examinations are held during the first week of the course in September. The dates are usually posted in June. Conditioned students are required to inform themselves as to these dates as soon as they learn that they are conditioned, as no other notice is given.

All who carry a condition and fail to remove it within one year will be charged an extra examination fee.

Students who carry a condition into a succeeding year may find a conflict of lecture or laboratory hours. In such cases they are to give preference to the lower course.

Absence will not be excused, unless satisfactory reasons are given to the professor in charge. Habitual absence without a satisfactory excuse, continued indifference to study, or persistently poor scholarship may subject the student to temporary or permanent suspension. Students are earnestly requested to be present at the beginning of the school year, but those who cannot enter in the fall may enter at the beginning of the second semester taking any of the subjects beginning then. Any of the facilities for work in the University are open to the students of this college, subject

to the approval of the Dean. Opportunity is afforded to do advanced work in all branches. Text-books may be obtained after coming to the University.

The work of the college, as outlined in the following pages, is conducted by means of lectures, recitations and laboratory exercises. Students find their time fully occupied. Those who feel unable to complete the work in two years may divide it in a manner to complete it in three years. Practising pharmacists who desire to take certain branches of study may avail themselves of any of the college facilities.

GRADUATION REQUIREMENTS

Regular attendance at lectures, recitations and laboratory exercises is required. Students will not be permitted to present themselves for final examination unless they have been in attendance upon at least seven-eighths of the required number of exercises.

Every person upon whom the degree is conferred must be of good moral character, and must be at least twenty-one years old; must have attended two full lecture and laboratory courses, the last at this college, and must have passed a successful examination in the subjects required for graduation.

Drug store experience is not a requirement for graduation.

Those who fail to appear for examination after having paid their diploma fee, or those who do not pass satisfactorily, will be permitted to present themselves at any subsequent examination upon payment of an additional fee of five dollars, and complying with all other requirements.

DEGREES

The college confers the degrees Bachelor of Pharmacy, Master of Pharmacy and Doctor of Pharmacy for the completion of respectively the regular and the two graduate courses.

FEES

TWO YEAR REGULAR COURSE

First year tuition	$75.00	
Second year tuition	90.00	
		$165.00

THREE YEAR REGULAR COURSE

First year tuition	$55.00	
Second year tuition	55.00	
Third year tuition	55.00	
		$165.00

FIRST GRADUATE COURSE

Tuition for the entire course	$75.00	
Final Examination fee	10.00	
		$85.00

There are no other tuition fees. Fees are payable at the time of registration. Those desiring to take special work will be required to pay an average of fifteen dollars a subject for the lecture courses and twenty-five dollars for the laboratory courses.

Students will be charged for laboratory material if used unreasonably. At the end of the laboratory courses students will be required to pay for breakage and damage to utensils in their care. If a student is careful this charge need not amount to more than two or three dollars. Students are to provide themselves with a designated set of metric weights, a set of apothecary's weights and steel spatulas. The expense of these is within three dollars. Students using platinum crucibles are charged for them. Upon the return of the crucible in the original condition the charge is cancelled; if the crucible is in any wise damaged the full value is collected from the student. A rental of two dollars per college year or fraction thereof is collected for use of a microscope. All money is payable to the University Accountant, who will give receipts which must be deposited in the Dean's office.

Fees will not be returned, except in case of discontinuance for sufficient reason before the student has been assigned to a place in the laboratory.

A deposit of ten dollars will be made with the Accountant each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage to or in the college buildings and of breakage and loss of laboratory apparatus and material. It will be returned to the student at the close of each year, minus the cost of articles assigned to him that he fails to return in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give receipt. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him. All apparatus lost or damaged will be charged to him, and must be paid for before he can receive credits for his course, or take his annual examinations.

COLLEGE TRAINING FOR PHARMACISTS

The recognition of the need of substantial college training for pharmacists finds expression in many ways. In New York, Pennsylvania,

Hawaii, Wisconsin, Ohio and Louisiana, such training is obligatory either by law or by rule of the boards of pharmacy. In a number of other states credit is given for college work. In Minnesota graduates from recognized colleges need to have only two years of practical experience, while all others must have had four years of drug store experience before they become eligible for examination by the State Board of Pharmacy for full license to practice in Minnesota. Graduates of the three-year course who have gained practical experience concurrently with their college work need only one additional year of drug store experience before they become eligible for examination for full registration.

At the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties, held at Indianapolis, Ind., in September, 1906, the following resolution was adopted:

"Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory. The rules of the boards of pharmacy are such as to promote and encourage it in all practicable ways. The special pharmaceutical education should include substantial laboratory courses." The training advocated by these two most representative bodies and by the American Pharmaceutical Association can be obtained only at colleges or schools of pharmacy of recognized standing. It is admitted that the State of Minnesota through its University College of Pharmacy is affording instruction of the most approved kind.

In the organization of this college the Board of Regents and the faculty have had the co-operation of the pharmacists of the state. The character of instruction is of high order and every effort is made to comply with the demands of the profession in the Northwest, or elsewhere, in the maintenance of a course of instruction of the highest grade.

POSITIONS FOR GRADUATES

The demand for graduates of this College has always been greater than the supply and is continually growing. The rule is that practically all of the senior class are engaged before graduation. This college is recognized in every state, including those in which standards of efficiency have been established, and its graduates are everywhere admitted to board examinations.

STATE BOARD OF PHARMACY

The State Board of Pharmacy meets at the College four times each year to examine candidates for registration. For information concerning the Board or State examinations address the Secretary of the Board, 502 Bank of Commerce Building, Minneapolis, Minn.

COLLEGE OF PHARMACY ALUMNI ASSOCIATION

The Alumni Association of the College of Pharmacy meets annually in the college building the day before commencement, at 3 p. m., Every member of the association is urgently requested to report change of address to the secretary.

THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

The College of Pharmacy of the University of Minnesota is one of the colleges constituting the membership of the American Conference of Pharmaceutical Faculties.

COMMUNICATIONS

Address communications to the Dean, Professor Frederick J. Wulling, University of Minnesota, Minneapolis, Minn.

PHI DELTA CHI

The Theta chapter of the Phi Delta Chi fraternity was organized at the College of Pharmacy in 1902. Students of the college of high scholarship and character are eligible to membership.

PRIZES

Nominations for membership in the American Pharmaceutical Association and the first year's dues are offered annually by Dean Wulling and Mr. Bachman to each of the two students earning respectively the highest total average of standings and the highest standing in pharmacy.

N. W. Br. A. Ph. A.

The Northwestern Branch of the American Pharmaceutical Association, composed of the representative pharmacists of the Northwest, has its headquarters at the College of Pharmacy. About six meetings are held annually. Pharmacy students are eligible to membership in the Branch, but are privileged to attend the meetings without becoming members.

Courses of Instruction

Three courses are offered, the regular and two graduate courses.

The complete regular course extends over two years of nine full months each. Students may arrange their work so as to take the course in three years. It is quite possible that three years attendance will be required of students in this college in the near future. The sixteenth annual course begins on September 14, 1909, on which day all students in pharmacy should register. The office of the Registrar is open for the purpose of registration as early as September 10th, but students must first report at the Dean's office in the pharmacy building.

In addition to the regular course this college offers two graduate courses, the first continuing through one college year and leading to the degree "Master of Pharmacy," and the second continuing through an additional year or longer, and leading to the degree "Doctor of Pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. The curriculum includes higher pharmaceutical chemistry, pharmaceutical assaying,higher organic chemistry,proximate and ultimate analysis, chemistry of food, water analysis, toxicology, spectroscopic work, therapeutics, clinical microscopy and bacteriology, and a thesis of at least 3,000 words, embodying the results of original work, but this curriculum may be changed by the faculty if occasion or experience require.

The requirements for admission are a diploma from a Minnesota high school of the first grade, or an equivalent; a diploma from a college of pharmacy whose curriculum, extent and kind of work and length of under-graduate course are equal to those of the under-graduate work of this college; an acquaintance with either German or French sufficient to enable the student to read and understand the scientific literature of those languages. The fees for this course are seventy-five dollars, and an additional fee of ten dollars for final examinations. The rules relating to damage, waste and breakage in laboratories are the same as those applying to the undergraduate course.

The course leading to the doctor's degree will begin as soon as there are sufficient applicants.

PROPOSED NEW COURSES

Beginning as soon as the proposed enlarged quarters of the college permit, two additional courses will be instituted: the one a lower and shorter than the regular course to conform to the minimum requirements of the American Conference of Pharmaceutical Faculties; the other, a high-

er than the regular course to lead to the degree Bachelor of Science in Pharmacy, and to include four years of work. The details have not yet been worked out but it is probable that the former will include about two-thirds of the work of the regular course and will cover two years of at least six months each. Possibly opportunity will be offered to complete the work in twelve consecutive months but this is doubtful. The entrance requirements will include the first year in high school or equivalent training or whatever the entrance requirements of the Conference may be at the time.

The higher course will cover four years of nine months each and will include two years of academic and cultural work. The qualifications for entrance to this course will be the same as those required for entrance to the College of Science, Literature and the Arts. Those presenting evidence of having completed the first two years of a collegiate course may complete the course in two years, providing the collegiate work completed includes certain subjects in the sciences and mathematics. Full announcement regarding these courses will be made duly.

Courses of Instruction

COURSES OF INSTRUCTION COMPRISING THE REGULAR PHARMACY COURSE

The complete regular course extends over two years of nine full months each. Students may arrange their work so as to take the course in three years. It is quite possible that three years attendance will be required of students in this college in the near future. The sixteenth annual course begins on September 14, 1909, on which day all students in pharmacy should register. The office of the Registrar is open for the purpose of registration as early as September 10th, but students must first report at the Dean's office in the pharmacy building.

FIRST YEAR

FIRST QUARTER

Botany 1, eleven hours, Mr. Butters and Assistant
Pharmacy 9, five hours, Professor Wulling
Chemistry 1, fifteen hours, Professor Derby and Mr. Handy

SECOND QUARTER

Botany 1, six hours, Mr. Butters and Assistant
Pharmacy 10, three hours, Professor Wulling
Pharmacy 1, 2 and 3, twelve hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Chemistry 2, fifteen hours, Professor Derby and Mr. Handy

THIRD QUARTER

Pharmacy 11, two hours, Professor Wulling
Pharmacy 4, nine hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Pharmacy 7, one hour, Mr. Bachman
Materia Medica 1, three hours, Professor Brown and Assistant
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby and Mr. Handy

FOURTH QUARTER

Pharmacy 11, two hours, Professor Wulling
Materia Medica 2, three hours, Professor Brown and Assistant
Pharmacy 5 and 6, six hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

Pharmacy 7, two hours, Mr. Bachman
Pharmacy 8, one hour, Mr. Bachman
Botany 2 and 3, nine hours, Mr. Butters and Assistant
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby and Mr. Handy

SECOND YEAR

FIRST QUARTER

Pharmacy 12, one hour, Professor Wulling
Pharmacy 13, two hours, Professor Wulling
Pharmacy 14, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Mineralogy and Crystallography 1, one hour, Mr. Grout
Pharmacognosy 1, five hours, Mr. Butters and Assistant
Pharmacy 16 and 17, sixteen hours, Professor Wulling, Mr. Bachman and Assistants
Pharmacy 23, one hour, Mr. Bachman
Physiology 1, two hours, Professor Beard and Wilcox.

SECOND QUARTER

Pharmacy 13, two hours, Professor Wulling
Mineralogy 2, one hour, Mr. Grout
Pharmacognosy 1, nine hours, Mr. Butters and Assistant
Pharmacy 18, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Chemistry 4, nine hours, Professor Frankforter, Assistant Professors Derby and Harding
Pharmacy 23, one hour, Mr. Bachman

THIRD QUARTER

Pharmacognosy 1, six hours, Mr. Butters and Assistant
Chemistry 3, sixteen hours, Professor Sidener and Assistant
Pharmacy 23, one hour, Mr. Bachman
Pharmacy 13, two hours, Professor Wulling
Pharmacy 19, fifteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

FOURTH QUARTER

Pharmacy 15, five hours, Professor Wulling and Mr. Bachman
Pharmacy 13, one hour, Professor Wulling
Pharmacy 23, two hours, Mr. Bachman
Pharmacognosy 2, six hours, Mr. Butters
Pharmacy 20, 21, 22, 24, twenty hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

Therapeutics 3, six hours, Professor Brown and Assistant
Pharmacy Law, one and one-half hours, Professor Wulling
First Aids, one and one-half hours, Dr. McCloud

THIRD YEAR

Students taking three years to do the work of the regular two-year course will divide the work in an equitable way subject to the approval of the Dean. Students are urged to devote three years to the completion of the course.

BACTERIOLOGY

1. General Bacteriology (Post Graduate) Professor Wesbrook
Assistant Professor Hill, Dr. Mullin and Dr. Fidlar

Nine credits (one hundred eight hours lecture and recitation, one hundred eight hours laboratory)

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 the bacteria will be dealt with. The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media will be 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 here.

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, will be thoroughly carried out. Testing of various germicides—chemical and physical—and the use of bacteriological methods in the examination of drinking water will form an important part of the work. Eighteen hours per week during the last eight weeks of the second semester, second year.

Professor Wesbrook, Dr. Chowning

BOTANY AND MICROSCOPY

Frederic E. Clements, Ph.D., Professor of Botany
Frederic K. Butters, M. S., Instructor in Pharmaceutical Botany and Microscopy
..... Assistant

Eight credits (seventy-two hours lecture, one hundred forty-four hours laboratory) First year

1. Comparative Morphology of the Cryptogams Professor Clements, Mr. Butters

The course embraces the comparative morphology of the cryptogams. Especial attention is paid to the green algae, the foundation of the vegetable kingdom. The other groups of algae and the fungi are briefly treated, particular stress being laid on their economic relations to other plants, to animals and to man. Examples of liverworts, mosses, ferns, and their allies are studied in the laboratory, and the line of development which leads from the algae through the archegoniate series to the seed plants is emphasized.

2. THE MORPHOLOGY, ANATOMY AND CLASSIFICATION OF THE HIGHER SEED PLANTS
PROFESSOR CLEMENTS AND MR. BUTTERS

Thirty-six hours lecture, seventy-two hours laboratory

Prerequisite, botany 1

In this course especial attention is paid to vegetable histology. The characteristic plant tissues are examined, and their arrangement is noted in roots, stems, leaves, fruits and seeds. The formation and occurrence of carbo-hydrates, glucosides, alkaloids, organic acids, resins, gums, gum resins and oleo-resins are carefully studied. Considerable time is devoted to a study of the basis of classification of flowering plants and to the identification of plants in the field.

3. MICRO BOTANY MR. BUTTERS

Designed to furnish practical training in the use of the microscope, in the preparation of material for microscopic examination, including the use of micro-chemical reagents, and in the representation by drawings of all structures observed.

The work of this course is co-incident with that of 2 and 3

These courses occupy the equivalent of six hours a week throughout the junior year. They aim to give a comprehensive and scientific view of the vegetable kingdom, to lay a broad foundation for the study of pharmacognosy. Throughout the course attention is frequently directed in the lectures to the wider relations of plants to one another and to animals, and to the discussion of the plant as a living unit, thus bringing before the class the fundamental problems of plant physiology and ecology.

The successful completion of the course in botany is prerequisite to the study of pharmacognosy.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph. D., Dean of the School of Chemistry
Professor of Chemistry
CHAS. F. SIDENER, B.S., Professor of Quantitative Chemistry
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
IRA HARRIS DERBY, B.S., Assistant Professor of Chemistry
JOHN A. HANDY, Ph.C., Instructor in Chemistry

1. GENERAL CHEMISTRY PROFESSOR DERBY AND MR. HANDY

Five credits (forty-five hours lecture, ninety hours laboratory)
First quarter, first year

This course includes a study of the chemical properties of the metallic and non-metallic elements.

2. QUALITATIVE ANALYSIS ASSISTANT PROFESSOR DERBY AND MR. HANDY

Five credits (forty-five hours lecture, ninety hours laboratory)
Second quarter, first year

Prerequisites, chemistry 1

This course covers the common reactions of the metals and acids and their qualitative separation. The ionic theory and the law of mass action are discussed with especial reference to qualitative reactions.

3. QUANTITATIVE ANALYSIS PROFESSOR SIDENER AND ASSISTANT

Four and one-half credits (twenty-seven hours lecture, one hundred eight hours laboratory) Third quarter, second year

Prerequisites, chemistry 1 and 2

A study of the principles of quantitative estimation; gavimetric volumetric and gasometric.

4. TOXICOLOGY, WATER AND FOOD ANALYSIS (POST GRADUATE)
PROFESSORS FRANKFORTER, DERBY AND HARDING

Three and one-half credits (twenty-seven hours lecture, seventy-two hours laboratory) Second quarter, second year

The chemistry of the atmosphere, water, soil, etc.; the sanitary examination of air and water.

5. ORGANIC CHEMISTRY PROFESSORS FRANKFORTER, DERBY and MR. HANDY

Nine and one-half credits (seventy-two hours lecture, one hundred ninety-eight hours laboratory) Third and fourth quarters, first year

This course includes work in both the aliphatic and aromatic series and the preparation of the more important compounds.

CLINICAL MICROSCOPY

1. CLINICAL MICROSCOPY (POST GRADUATE) DR. GEO. D. HEAD AND DR. HYNES

Instruction includes (a) the macroscopical study of urine its colors, sediments, and finer chemical tests; (b) the microscopical study of urinary sediments, including blood, pus, epithelial cells, casts, etc.; (c) the macroscopical and microscopical study of sputum, including the study of sputa from cases of pneumonia, pulmonary tuberculosis, asthma, chronic bronchitis, etc.

Lectures and laboratory work. Eight hours weekly; last third, second semester, second year.

DISPENSARY PRESCRIPTION PRACTICE

The dispensing department of the University College of Medicine and Surgery Free Dispensary at 1810 Washington Avenue South has lately been placed in charge of the College of Pharmacy, Mr G. Bachman having supervision. The senior students are sectioned into classes of three for the purpose of doing practical prescription work at the dispensary under the direction of Mr. Bachman or Mr. Blosmo. The dispensary practice continues throughout the college year.

FIRST AIDS TO THE INJURED

1. EMERGENCY CASES DR. MCCLOUD

Two-thirds credit (twelve hours lecture) Third quarter, second year

A series of lectures designed to qualify the pharmacist to administer upon emergency cases before the arrival of the physician.

MATERIA MEDICA AND THERAPEUTICS

E. D. BROWN, Pharm.D., M.D., Acting Professor of Materia Medica and Therapeutics

W. D. SHELDON, M.D., Instructor in Therapeutics

.....Assistant in Materia Medica

1. INORGANIC MATERIA MEDICA PROFESSOR BROWN AND ASSISTANT

2. ORGANIC MATERIA MEDICA PROFESSOR BROWN AND ASSISTANT

Six credits (one hundred and eight hours lecture and recitation)
Third and fourth quarters, first year

The work in inorganic and organic materia medica is based principally on the U. S. P., but unofficial and synthetic drugs are also studied. The course includes the study of the general characteristics of drugs and of physiological action. Pharmaco-dynamics, including the study of the identity and quality of drugs, shares attention in the course of pharmacognosy.

3. THERAPEUTICS PROFESSOR BROWN AND DR. SHELDON
One credit (eighteen hours lecture and recitation)
Third quarter, second year
Prerequisites, materia medica 1 and 2
In this course drugs are studied in groups, as governed by their physiologic action, and the therapeutic features of such groups are described. Remedial measures other than those depending upon drugs, are fully considered.

PHARMACY

FREDERICK J. WULLING, Phm.D., LL.M., etc., Professor of Pharmacology
GUSTAV BACHMAN, Ph.C., Ph.M., Instructor in Pharmacy
OSCAR BLOSMO, Ph.C., Assistant in Pharmacy
F. A. STEINER, Laboratory Assistant

1. HISTORY OF PHARMACY PROFESSOR WULLING
One-third credit (six hours lecture) First quarter, first year
The history of the U. S. Pharmacopœia through all its revisions.
Dispensatories, text-books, and works of reference.

2. METROLOGY PROFESSOR WULLING, MR. BACHMAN AND MR. BLOSMO
Two-thirds credit (twelve hours lecture) First quarter, first year
Weights and measures, including metric system; balances—construction, varieties, methods of weighing; specific gravity in detail; specific volume, alligation, etc.

3. THE PHYSICS OF PHARMACY
PROFESSOR WULLING, MR. BACHMAN AND MR. BLOSMO
Two and one-half credits (eighteen hours lecture, fifty-four hours laboratory) Second quarter, first year
Prerequisite, pharmacy 2.
Students are required to have had elementary physics before entering. This course covers a review and more extended elucidation of such divisions of physics as apply to pharmaceutical processes. Special attention is paid to heat. Specific heat; thermometers—the various scales, testing and comparing thermometers; combustion of solids, liquids and gases in various kinds of furnaces, stoves and burners; application of heat in drying ovens, steam, hot-air and water ovens; drying closets, desiccators, blow-pipes, crucibles; baths for controlling and equalizing heat; water-salt-oil-glycerine-paraffin-hot-air-baths; evaporation—spontaneous, rapid, slow, in vacuo; ebullition boiling points, fusion; sublimation, calcination, dehydration, torrefaction, roasting, reduction, oxidation; carbonization, deflagration, ignition, etc: solution—pharmaceutical simple, chemical, saturated; circulatory displacement; dialysis—construction of dialyser, osmosis, endosmosis, exosmosis; crystalloids and colloids, etc.

4. PHARMACEUTICAL PROCESSES
PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT
Three and one-half credits (twenty-four hours lecture, seventy-two hours laboratory) Second and third quarters, first year
Prerequisite, pharmacy 3.
The processes not taken up in 3, constitute the subjects of this course. In part they are: drug grinding and powdering; comminution; contusion; trituration; sifting; elutriation; levigation; lixiviation, filtration, filtering medii, filtration of solutions oils, syrups, rapid filtration; filtration in vacuo, hot filtration, colation; washing—displacement, continuous; decantation—the syphon and its uses; precipitation—methods, vessels, separating, drying, weighing; granulation—granular effervescent salts; desiccation; exsiccation; crystallization—water of crystallization, deliquesence,

efflorescence; methods of obtaining crystals, collecting, draining, washing, drying crystals, fractional crystallization; distillation—stills, simple, fractional, destructive; extraction; maceration; expression percolation—history, theories, percolators, exhaustion, repercolation, continuous percolation, fractional percolation; clarification; decolorization.

5. PHARMACOPOEIAL PREPARATIONS
PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT
Five credits (thirty hours lecture, one hundred twenty hours laboratory) third and fourth quarters, first year.

This course includes the study and preparation of official bodies for which the U. S. P. gives formulae and processes, and includes water, solutions, syrups, mucilages, spirits, infusions, decoction, tinctures, fluid extracts, vinegars, wines, liniments, oleates, ointments, cerates, resins, oleo-resins, honeys; glycerites, mixtures, emulsions, elixirs, collodions, pills, capsules, powders, suppositories, bougies, plasters, papers, cachets, etc.,

6. MATHEMATICS OF PHARMACY PROFESSOR WULLING AND MR. BACHMAN
While students are required to have a preparation in arithmetic and algebra before entering, they receive frequent drills at stated hours and as occasion requires or suggests throughout the entire course. Students are required to take a final examination in the subject at the end of the first year, at which examination they must attain a rating of at least eighty per cent.

7. PHARMACY QUIZ MR. BACHMAN
Three credits (fifty-four hours) Second, third and fourth quarters, first year
Prerequisite, pharmacy 2, 3, 4, and 5.
A thorough review of the work covered in 2, 3, 4, and 5.

8. IDENTIFICATION OF INORGANIC OFFICIAL PREPARATIONS MR. BACHMAN
One credit (eighteen hours) Second and third quarters, first year
The study of the physical properties of official preparations.

9. CHEMICAL PHILOSOPHY PROFESSOR WULLING
One and one-half credits (twenty-seven hours lecture) First quarter, first year
Treats of the principles underlying chemistry, and endeavors to elucidate chemical facts and phenomena. The subject is divided into—chemical statics, embracing the study of the theories of atoms and molecules; atomic weights; atomic and molecular volume, quantivalence molecular structure, ions, electric qualities, etc., and—chemical dynamics, the study of reactions and their equations, thermics, chemical properties in general, etc.

10. THE PHARMACEUTICAL CHEMISTRY OF THE NON-METALS AND THEIR PREPARATIONS PROFESSOR WULLING
One and one-half credits (twenty-seven hours lecture)
Second quarter first year
Prerequisite, pharmacy 9.

11. PHARMACOPOEIAL INORGANIC SALTS AND THEIR OFFICIAL PREPARATIONS
PROFESSOR WULLING
Three credits (fifty-four hours lecture)
Third and fourth quarters, first year
Prerequisites, pharmacy 10.
Especial reference to description, properties and manufacture.

12. CLASSIFICATION OF PHARMACEUTICAL ORGANIC COMPOUNDS
PROFESSOR WULLING
One credit (eighteen hours lecture) Third quarter, first year.
A preparation for pharmacy 13.

13. CHEMISTRY OF THE PHARMACOPOEIAL ORGANIC COMPOUNDS AND THEIR PREPARATIONS PROFESSOR WULLING

Three credits (fifty-four hours lecture) First second and third quarters, second year.

Prerequisite, pharmacy 12.

This course includes the critical study of cellulin and its derivatives, destructive distillation products, starches, sugars, fermentation products, organic acids, fixed oils and fats, volatile oils, waxes, and animal fats, alkaloids, glucosides, animal drugs and products, etc.

14. PHARMACOPOEIAL TESTING PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT

Five credits (thirty-six hours lecture, one hundred eight hours laboratory) First quarter, second year

A critical study of the identity, purity, limit and percentage tests of the Pharmacopoeia and their application either wholly or in part to practically every official organic and inorganic salt and compound.

15. QUANTITATIVE ANALYSIS OF U. S. P. SALTS AND PREPARATIONS PROFESSOR WULLING AND MR. BACHMAN

Two credits (eighteen hours lecture, thirty-six hours laboratory) Fourth quarter, second year.

Prerequisites, chemistry 3 and pharmacy 14.

This course includes the gravimetric, volumetric and gasometric determinations of the U. S. Pharmacopoeia, but not pharmaceutical assay work (20).

16. INCOMPATIBILITY PROFESSOR WULLING AND MR BACHMAN

One-half credit (nine hours lecture) Second and third quarter, second year

Therapeutic, pharmaceutical and chemical incompatibility is taken up in lecture and recitation work preliminary to 17.

17. DISPENSING PROFESSOR WULLING AND MR. BACHMAN

Five and one-half credits (twenty-seven hours lecture, on hundred forty-four hours laboratory) Third and fourth quarter, second year

Prerequisite, pharmacy 16.

The study of the prescription and practical work in dispensing upwards of one hundred typical prescriptions.

18. MANUFACTURE OF OFFICIAL ORGANIC AND INORGANIC SALTS AND PREPARATIONS PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT

Four and one-third credits (twenty-four hours lecture, one hundred eight hours laboratory) Second quarter, second year

The preparation of about forty official salts included in the course.

19. NATIONAL FORMULARY PROFESSOR WULLING AND MR BACHMAN

One credit (six hours lecture, twenty-four hours laboratory) Third quarter, second year

This course includes the study of the National Formulary and the making of one or more members of each class of preparations.

2. PHARMACEUTICAL ASSAY PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT

One and one-third credits (six hours lecture, thirty-six hours laboratory) Fourth quarter, second year

Prerequisites, pharmacy 14 and chemistry 3.

The quantitative determination of active constituents of a number of the potent organic drugs and preparations.

21. SYNTHETIC REMEDIES — PROFESSOR WULLING
One-third credit (six hours lecture) Fourth quarter, second year.
Prerequisites, pharmacy 12 and 13 and chemistry 4.
A study of the chemistry of synthetic remedies in medical use.

22. HOMEOPATHIC PHARMACY — PROFESSOR WULLING AND MR. BACHMAN
Fourth quarter, second year.
A brief exposition of the principles underlying homeopathic medication with some laboratory work.

23. IDENTIFICATION OF SALTS — MR. BACHMAN
One and one-half credits (fifty four hours laboratory)
Second semester, first year and entire second year.
The study of the physical identity of the hour important official inorganic and organic salts.

24. MICO-CHEMISTRY — PROFESSOR WULLING
Fourth quarter, second year. (Optional)
A brief course is provided for seniors if time permits.

PHARMACEUTICAL JURISPRUDENCE

1. LAW FOR PHARMACISTS — PROFESSOR WULLIN
Two-thirds credit (twelve hours lecture) Fourth quarter, second year
The lectures introduce the subjects of contracts, agency, commercial paper, insurance, and discuss the liability of retail and manufacturing pharmacists, etc.

PHARMACEUTICAL MINERALOGY AND CRYSTALLOGRAPHY

1. MINERALOGY — MR. GROUT
One credit (eighteen hours lecture) First quarter, second year.
Prerequisite.
A study of the occurrence and properties of minerals of pharmaceutical importance; ores of metals used in pharmacy; non-metallic minerals and mineral waters in their mineralogic and geologic relations.

2. CRYSTALLOGRAPHY — MR. GROUT
One credit (eighteen hours lecture) Second quarter, second year.
Prerequisite, mineralogy 1.
A survey of form and more evident physical characters as a basis for practice in sight recognition of economic minerals and their distinction from common rocks.

PHARMACOGNOSY

..... Professor of Pharmacognosy
FREDERIC K. BUTTERS, M. S., Instructor in Pharmacognosy
..... Assistant

1. CRUDE VEGETABLE DRUGS — MR. BUTTERS
Seven credits (fifty-four hours lecture, one hundred forty-four hours laboratory)
First, second and third quarters, second year.
Prerequisites, Botany 1, 2 and 3.
The vegetable drugs of the United States Pharmacopœia are taken up in the following order: Roots, rhizomes, tubers and bulbs, woods, barks, leaves, herbs, and flowers, fruits, seeds, plant exudations, resins, gum-resins waxes and starches. Each drug is carefully examined, both macroscopically and microscopically. Students are also provided with specimens for home study. The lectures give, in compact

form, the history and important features of each drug, with consideration of its importance to the pharmacist. The quizzes include careful drill on the constituents, action and dose and official preparation of each drug considered. Identification receives careful attention and there are weekly tests of the student's ability. A short course is given in the microscopic examination of some of the more important alkaloids and glucosides, and of certain emulsions and inorganic salts, if time permits.

The drugs are considered in the following order:

Roots. Sarsaparilla (Mexican, Para and Honduras), senega, gentiana, taraxacum, pyrethrum, lappa, stillingia, sumbul, phytolacca, althæ, belladonna, calumba, glycyrrhiza, (Spanish and Russian), ipecacuanha, pareira, krameria.

Rhizomes. Aspidium, zingiber (Jamaican, East Indian and African), calamus, veratum, cypripedium, convallaria, triticum, sanguinaria, geranium, podophyllum valeriana, serpentaria, spigelia, hydrastis, cimicifuga, leptandra, gelsemium, berberis scopola, rheum, apocynum.

Tubers and Bulbs. Jalapa, aconitum, colchicum, scilla.

Woods. Quassia, hæmatoxylon, santalum rubrum,

Barks. Cinchona (Rubra et Flava), prunus virginiana, hamamelis, vilburnum prunifolium, viburnum opulus, rubus, quercus alba, granatum, frangula, rhamnus purshiana, xanthoxylum, mezereum, gossypium, euonymus, quillaja, ulmus, sassafras, cinnamomum (Ceylon, Saigon and cassia).

Leaves and leaflets. Pilocarpus, eucalyptus, uva ursi, senna (Alexandria and India), coca (Bolivian and Truxilla), belladonna, stramonium, hyoscyamus, digitalis, matico, salvia, hamamelis, eriodictyon, chimaphila, buchu (long and short).

Herbs and Flowers. Santonica, caryophyllus, calendula, cusso, arnica, matricaria, anthemis, rosa gallica, zea, chondrus, cannabis indica, scoparious, eupatorium, grindelia, lobelia, mentha piperita, mentha viridis, hedeoma, marrubium, scutellaria, chirata, sabina.

Fruits. Humulus, piper (longum, nigrum et album), cubeba, pimenta, rhus glabra, capsicum, colocynthis, cassia fistula, cardamomum, vanilla, coriandrum, conium, anisum, carum, fœniculum, (Roman and German), aurantii amari cortex, aurantii dulcis cortex, limonis cortex et succes, prunum, tamarindus (East and West Indian), ficus, sabal.

Seeds. Physostigma, amygdala (dulcis et amara), pepo, myristica, sinapis (alba et nigra), nux vomica, staphisagria, ricinus, tiglium,

Miscellaneous. Guarana, lactucarium, alœ (Socotrina, Barbadensis, et Capensis). kino (Malabar et Pallas), gambir, opium, elastica, manna, saccharum, acacia, tragacantha, mastiche, guaiacum, benzoinum, cambogia, asafœtida, scammonium, myrrha, copaiba, terebinthina, terebinthina canadensis, resina, pix liquida, styrax, balsamum peruvianum tolutanum, camphora, thymol, menthol, ergota (Spanish and German), sassafras medulla, galla (Aleppo et Chinensis), gossypium, purificatiom, lupulinum, lycopodium, amylum, maltum.

Besides the foregoing, a number of the more important unofficial drugs and the animal drugs will also be discussed.

2. Powdered Drugs — Mr. Butters and Assistant

One credit (nine hours lecture, twenty-seven hours laboratory)

Fourth quarter, second year.

Prerequisite, pharmacognosy 1.

This course consists of laboratory work and occasional lectures. The more important vegetable drugs are examined microscopically in powdered form. Especial attention is paid to the identification of unknown powders, and to the detection of the various forms of sophistication to which powdered drugs are subject.

PHYSIOLOGY

RICHARD O. BEARD, M.D., Professor of Physiology
M. R. WILCOX, M.D., Professor of Physiology
JULIUS PARKER SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry

1. PHYSIOLOGY, ANATOMY AND HISTOLOGY PROFESSORS BEARD AND WILCOX

One credit (eighteen hours lecture and recitation) First quarter, second year

1. The work covers the study of the physiological properties of the cell, the nutritive media, the nervous mechanisms in general, muscular tissues, connective tissues and epithelial tissues. The subjects of anatomy and histology are touched upon sufficiently to lay the foundation for the proper understanding of physiological functions.

Special attention is directed to the action of drugs and their effects upon the various systems.

2. QUALITATIVE AND QUANTITATIVE URANALYSIS (Post-Graduate)

PROFESSOR BEARD AND DR. SEDGWICK

One credit (nine hours lecture, eighteen hours laboratory)

Seceond semester

Prerequisite, Physiology 1.

Lectures, recitations and laboratory work. The laboratory work includes the qualitative analysis of representative specimens of urine as regards their physical properties, inorganic and organic constituents, as well as the quantitative determination of chlorides, urea, ammonia, total nitrogen, sugar and albumin, together with the preparation of reagents.

3. EXPERIMENTAL PHYSIOLOGY (Post-Graduate) PROFESSORS BEARD AND WILCOX

Four credits (thirty-six hours lecture, seventy-two hours laboratory)

Second semester

Prerequisite, physiology 2.

Laboratory work and demonstrations. A study of physiologic apparatus, electric stimuli and methods of experimentation; the demonstration and performance of experiments which illustrate physiologic function in the muscular, nervous, vascular respiratory and glandular systems; and the study of the cardiac areas, the heart and respiratory sounds, and of pulse tracings including training in the use of sphygmograph the stethoscope, phonendoscope, etc.

4. PHYSIOLOGICAL CHEMISTRY AND MICROSCOPY (Post-Graduate)

PROFESSORS BEARD AND WILCOX AND DR. SEDGWICK

Eight credits (seventy-two hours lecture, one hundred forty-four hours laboratory) First semester

Prerequisite, physiology 3.

Laboratory work and demonstrations. A practical study of the several classes of proteids; of carbohydrates, fats, muscle and bone; of gastric juice, saliva, pancreaatic juice and bile in their respective digestions; of glycogen, and of blood lymph, chyle and milk. Microscopic study of the carbohydrates in vegetable and animal forms; of the physiologic emulsions of fat; of the crystalline waste, products, and of the physiologic conditions of the blood cells and of blood crystals. Practical instruction is given during this course in the enumerations of the blood cells, in the estimation of haemoglobin and of the corpuscles in mass, in the spectroscopic examination of the blood in the determination of blood tests, and in the use of polariscope.

MINNESOTA PHARMACY LAW

Several lectures elucidating the rights,duties, privileges and liabilities of pharmacists under the state law regulating the practice of pharmacy, are given by special ectures near the close of the second year.

SPECIAL LECTURES

From twelve to fifteen special lectures on subjects related to the practice of pharmacy are delivered by well-known pharmacists of the state at intervals during the college year.

LECTURE AND LABORATORY SCHEDULES

The work of the regular course for 1908-'09 will be somewhat augmented, but the herewith schedule of the past year will be adhered to as far as possible. The necessary changes will be posted on the college bulletin in September.

The college year is divided into four quarters, the first and second constituting the first semester, and the third and fourth the second semester. The college year covers nine full months or thirty-eight weeks. Each quarter consists of nine working weeks.

First Semester--Junior and Senior Schedule

		FIRST QUARTER								SECOND QUARTER							
	1909	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
JUNIOR	Mon.	Botany Laboratory			Pharmaceutical Chemistry	General Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
	Tues.	Botany Lecture	Pharm. Chem.			General Chemistry				Botany Laboratory			Pharm. Chem.	Qualitative Chemistry			
	Wed.	Botany Laboratory			Pharmaceutical Chem.	Chem. Recitation				Pharmaceutical Laboratory				Qualitative Chemistry			
	Thurs.	Botany Lecture	Pharm. Chem.			General Chemistry				Botany Laboratory			Pharm. Chem.	Qualitative Chemistry			
	Fri.	Botany Laboratory			Pharmaceutical Chem.	General Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
	Sat.	Make up Laboratory								Make up Laboratory							
SENIOR	Mon.	Materia Medica	U. S. P. Testing			Dispensing				Materia Medica	Pharmacognosy Laboratory			Pharmaceutical Laborat'ry			
	Tues.	U. S. P. Testing			Physiology	Dispensing				Pharmaceutical Laboratory				Mineralogy and crystallography			
	Wed.	Materia Medica	Organic Pharm-	Identification	Pharmacognosy Lecture	Dispensing				Materia Medica	Organic Pharm.	Identification	Pharmacognosy Lecture	Mineralogy and Crystallograhy			
	Thurs.	U. S. P. Testing				Dispensing				Pharmaceutical Laboratory				Pharmaceutical Laborat'ry			
	Fri.	Materia Medica	U. S. P. Testing		Physiology	Dispensing				Materia Medica	Pharmacognosy Laboratory			Pharmaceutical Laborat'ry			
	Sat.	Make up Laboratory								Make up Laboratory							

Second Semester—Junior and Senior Schedule

		THIRD QUARTER								FOURTH QUARTER							
	1910	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	11:30	11:30	1:30	2:30	3:30	4:30
JUNIOR	Mon.	Materia Medica	Botany Laboratory			Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Tues.	Pharm. Chem.	Pharmaceutical Laboratory			Organic Chemistry				Pharm. Chemistry		Pharmaceutical Laboratory		Organic Chemistry			
	Wed.	Materia Medica	Pharm.	Botany Lecture	Pharm. Chem.	Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Thur.	Pharm. Chem.	Pharmaceutical Laboratory			Organic Chemistry				Pharm. Chem.		Pharmaceutical Laboratory		Organic Chemistry			
	Fri.	Materia Medica	Botany Laboratory			Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Sat.	Make up Laboratory								Make up Laboratory							
SENIOR	Mon.	Quantitative Chemistry				Pharmaceutical Laborat'ry				First Aids	Law			Pharmaceutical Laborat'ry			
	Tues.	Pharmacognosy Laboratory			Organic Pharm.	Pharmaceutical Laborat'ry				Organic Phramacy	New Remedies			Pharmaceutical Laborat'ry			
	Wed.	Quantitative Chemistry				Pharmaceutical Laborat'ry				Pharmacognosy Laboratory			Identification	Pharmaceutical Laborat'ry			
	Thurs.	Pharmacognosy Laboratory			Organic Pharm.	Pharmaceutical Laborat'ry				First Aids	Law			Pharmaceutical Laborat'ry			
	Fri.	Quantitative Chemistry				Pharmaceutical Laborat'ry				Pharmacognosy Laboratory			Identification	Pharmaceutical Laborat'y			
	Sat.	Make up Laboratory								Make up Laboratory							

Students

SENIOR PHARMACISTS 1908-9.

—Austin, Alberta J. Millbank, S. D.
Becker, Frank A. Olivia, Minn.
Budde, Emil M., 502 Bryant Av. N., Minneapolis.
Bugbee, Guy C., Paynesville, Minn.
—Carlson, Helma, Erskine, Minn.
Carlson, A. E., Willmar, Minn.
Casey, J. Ambrose, Aitkin, Minn.
—Caton, Charlotte E., 2441 Bloomington Ave., Minneapolis.
Cleveland, Zina, Northfield, Minn.
Colby, Hans C., Jackson, Minn.
Diessner, Chas. O., Waconia, Minn.
Doty, Archie C., Eyota, Minn.
Earle, Fred W., Rochester, Minn.
Errickson, Wm. A., Cashton, Wis.
Fratzke, Theodore, Eyota, Minn.
—Gjerdingen, Nathalia L., Halstad, Minn.
Green, Everard L., Hankinson, N. D.
Hamilton, Horace L., St. Louis Park, Minn.
Hawlish, Jos. E., Hopkins, Minn.
—Heath, M. Grace, Riga, N. D.
Hohn, Walter G., Buffalo, Minn.
Hooper, Archie J., Minneapolis.
Hotveldt, Elmer L., Eau Claire, Wis.
Kelly, John V., 237 St. Albans, St. Paul
Kleinhuizen, Albert E., Raymond, Minn.
Klovstadt, Thomas, Milan, Minn.
Kusterman, Fred G., St. Cloud, Minn.
Leikvold, Albert I., Waterville, Iowa.
—Lyman, Emily L., Graceville, Minn.
—Maxwell, Hazel, 561 Oakland Ave. St. Paul
McMiller, Paul R., Carrington, N. D.
Munro, Will R., Cummings, N. D.
Nesse, Ella H., Mabel, Minn.
Orr, Merton J., Bismarck, N. D.
Parker, Claude H., 408 2nd Ave., S. E., Minneapolis.
Paulson, Carl A., 3602 Central Ave., Minneapolis, Minn.
Peterson, Hugo, O., 1921 9th Avt. South, Minneapolis.
—Peyton, Agnes, Wheaton, Minn.
Reierson, Carl R., Spring Grove, Minn.
Root, Nelson W., Elysian, Minn.
Schreiter, Norman C., Red Lake Falls, Minn.
Sievert, Arthur F., New Richland, Minn.
Speidel, Harry W., Ladysmith, Wis.
Spellman, Clyde A., Montevideo, Minn.
Tyrholm, Harold A., New Richland, Minn.
Van Campen, Harry A., Cannon Falls, Minn.
Welch, Leo S., Glencoe, Minn.
Wolf, George E., Olivia, Minn.
Yamagishi, Kozo, Kobe, Japan.
Zender, Chas. H., Henry, S. D.

JUNIOR PHARMACISTS 1908-9

Adams, Edward M., Wayzata, Minn.
Ash, Benedict S., Delano, Minn.
Bersing, Delbert E., Blair, Wis.
Butterfield, Frederick R., Industry, Ill.
Carman, J. A., Detroit, Minn.
Courtney, John F. Glenwood, Minn.
Doeltz, Otto Paul, 3335 Columbus Ave. Minneapolis.
Doerr, Harry, 327 Oak Grove, Minneapolis
Ebeltoft, William H., Lake Park, Minn.
Emmans, Floyd, Minneapolis.
Errickson, Carl A., Cashton, Wis.
—Meadowcroft, Grace, Ruso, N. D.
Minsky, Alfred, 427 Lyndale Ave., North, Minneapolis.
Monson, Martin J., Delhi, Minn.
Noer, Victor R., Colfax, Wis.
Nordstrom, Burt A., Sacred Heart, Minn.
Olverson, Oscar A., Clark, S. D.
Paine, S. S., Lake City, Minn.
Peters, William M., 1016 13th Ave., South Minneapolis.
Parker, Claude H., 408 2d Ave., S. E. Minneapolis.

Hanson, Harry Rochester, Minn.
Harding, Chester E., Delta, Colorado.
Hare, Joseph, Jr., Bismarck, N. D.
Haynes, Manley H., 703 River Road E., Minneapolis.
Henton, Jay C., Morton, Minn.
Homerberg, Victor, Hopkins, Minn.
Hoppe, William F., Breckenridge, Minn.
Hughes, Stuart, 1369 Spruce Place, Minneapolis.
James, Chas. W., Rochester, Minn.
Janecky, Geo. A.; Hutchinson, Minn.
Jepson, Paul, Nashua, Iowa.
Johnson, Theodore, Parker's Prairie, Minn.
Kellam, A. B., Heron Lake, Minn.
Kelly, Chas. F., Webster, S. D.
Lundberg, Wm. W., Brownton, Minn.
Marsh, Edward M., Pine Island, Minn.
—Mathewson, Vera M., 3617 Blaisdell Ave., Minneapolis.
Paulson, Carl M., 2602 Central Ave., Minneapolis.
—Ponthan, Marie W., St. Paul.
—Remes, Anastasia M., New Prague, Minn.
Reum, Arthur, Minneapolis.
—Skartum, Juanita M., Lake Benton, Minn.
Slawson, Frank W., 511 15th Ave., S.E, Minneapolis.
—Snyder, Bessie E., Hector, Minn.
Souba, Emil Geo., Hopkins, Minn.
Spengler, W. A., 734 Ottawa Av., St. Paul.
Spiegel, Louis, 1523 East 19th St., Minneapolis.
Steiner, F. A., Mankato.
Titus, James L., Berea, Kentucky.
Whittemore, Andrew A., Detroit, Minn.
Yamagishi, Kozo, Kobe, Japan.

The University of Minnesota Bulletin

School of Mines

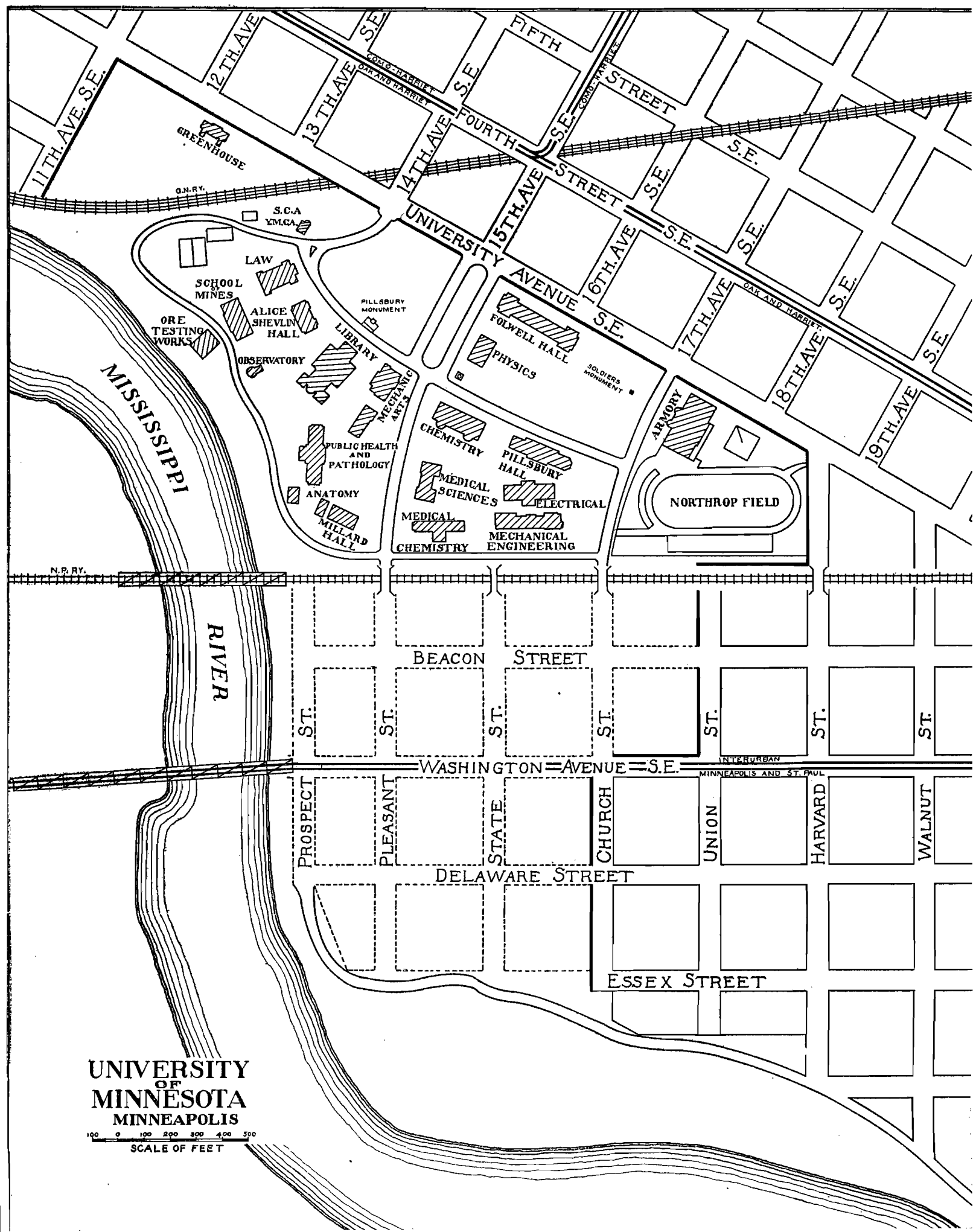
1909-1910

Volume XII May 5, 1909 No. 4

Entered at the Postoffice
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 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.


11TH. AVE. S.E.
12TH. AVE
13TH. AVE
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19TH. AVE
FIFTH STREET S.E.
FOURTH STREET S.E.
UNIVERSITY AVENUE S.E.
COMO-HARRIET
OAK AND HARRIET
GREENHOUSE
G.N.RY.
S.C.A
Y.M.C.A.
LAW
SCHOOL OF MINES
ALICE SHEVLIN HALL
ORE TESTING WORKS
OBSERVATORY
LIBRARY
PILLSBURY MONUMENT
MECHANIC ARTS
PUBLIC HEALTH AND PATHOLOGY
ANATOMY
MILLARD HALL
FOLWELL HALL
PHYSICS
SOLDIERS MONUMENT
CHEMISTRY
PILLSBURY HALL
MEDICAL SCIENCES
ELECTRICAL
MEDICAL CHEMISTRY
MECHANICAL ENGINEERING
ARMORY
NORTHROP FIELD
MISSISSIPPI RIVER
N.P.RY.
BEACON STREET
WASHINGTON AVENUE S.E.
INTERURBAN
MINNEAPOLIS AND ST. PAUL
PROSPECT ST.
PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
WALNUT ST.
DELAWARE STREET
ESSEX STREET
UNIVERSITY OF MINNESOTA
MINNEAPOLIS
100 0 100 200 300 400 500
SCALE OF FEET

CALENDAR FOR 1909-1910

1909

JULY

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

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

SEPTEMBER

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

..	..	..	..	..	1	2
3	4	5	6	7	8	9
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24	25	26	27	28	29	30
31	..	..	..	..	..	..

NOVEMBER

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28	29	30	..	..	..	..
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DECEMBER

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26	27	28	29	30	31	..
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1910

JANUARY

S.	M.	T.	W.	T.	F.	S.
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23	24	25	26	27	28	29
30	31	..	..	..	..	..

FEBRUARY

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

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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
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APRIL

..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
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24	25	26	27	28	29	30
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MAY

1	2	3	4	5	6	7
8	9	10	11	12	13	14
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JUNE

..	..	..	1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	25	Friday	Good Friday, recess two days
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

Program—Entrance Examinations

1909–10

When entrance examinations are required this schedule will be followed.

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

Program—Supplementary Examinations

Sept.	7	Tuesday	9-12	Mathematics and Mechanics
			2-5	Mining Engineering Subjects
Sept.	8	Wednesday	9-12	Chemistry
			2-5	Drawing and Descriptive Geometry
				Mechanical Engineering Subjects
Sept.	9	Thursday	9-12	Metallurgical Subjects
			2-5	Physics
Sept.	10	Friday	9-12	Electrical Engineering Subjects
			2-5	Geology and Mineralogy

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The University Year for 1910-11 will begin Tuesday, September 13

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 SCHOOL OF AGRICULTURE
- SHORT COURSE FOR FARMERS
- THE DAIRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL. D., President
ERNEST B. PIERCE, B. A., Registrar
JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C. E., Dean of the College of Science, Literature and the Arts

FREDERICK S. JONES, M.A., Dean of the College of Engineering and the Mechanic Arts

JOHN W. OLSEN, B.S., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

EUGENE L. MANN, B.A., M.D., Dean of the College of Homeopathic Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, 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

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ADA L. COMSTOCK, M.A., Dean of Women

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
President Cyrus Northrop

The College of Science, Literature and the Arts
Dean John F. Downey — Professor John H. Gray
Professor J. C. Hutchinson — Professor H. F. Nachtrieb
Professor Norman Wilde

The College of Engineering and the Mechanic Arts
Dean Frederick S. Jones — Professor George D. Shepardson

The College and School of Agriculture
Dean John W. Olsen — Professor Harry Snyder
Professor Samuel B. Green

The College of Law
Dean William S. Pattee — Professor Henry J. Fletcher

The College of Medicine and Surgery
Dean F. F. Wesbrook — Professor Thomas G. Lee

The College of Homeopathic Medicine and Surgery
Dean Eugene L. Mann

The College of Dentistry
Dean Alfred Owre

The College of Pharmacy
Dean Frederick John Wulling

The School of Mines
Dean William R. Appleby

The School of Chemistry
Dean George B. Frankforter

The College of Education
Dean George F. James

The Graduate School
Dean Henry T. Eddy

The Dean of Women
Ada L. Comstock

The University Library
James T. Gerould

General Alumni Association
David P. Jones

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

The School of Mines

FACULTY

CYRUS NORTHROP, LL.D., President

WILLIAM R. APPLEBY, M.A., Dean and Professor of Metallurgy

CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., Professor of Mining Engineering

BENJAMIN F. GROAT, B.S., LL.B., Professor of Mechanics and Mathematics

PETER CHRISTIANSON, B.S., E.M., Professor of Metallurgy

ELTING H. COMSTOCK, M.S., Professor of Mechanics and Mathematics

EDWARD P. MCCARTY, E.M., Assistant Professor of Mining

LEVI B. PEASE, M.S., Assistant Professor of Metallurgy

JOHN J. FLATHER, Ph. B., M.E., Professor of Mechanical Engineering

GEORGE B. FRANKFORTER, Ph. D., Professor of Chemistry

CHRISTOPHER W. HALL, M.A., Professor of Mineralogy and Geology

FREDERICK S. JONES, M.A., Professor of Physics

WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering

WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive Geometry

EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry

GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering

CHARLES F. SIDENER, B.S., Professor of Chemistry

INSTRUCTORS AND ASSISTANTS

CHARLES P. CLARKE, B.S., Instructor in Drawing

FRANCIS C. FRARY, M.S., Instructor in Chemistry

FRANK F. GROUT, M.S., Instructor in Mineralogy

ALOIS F. KOVARIK, M.A., Instructor in Physics

NORMAN W. ROSE, M.E., Instructor in Drawing

FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing

WILLIAM T. RYAN, E.E., Instructor in Electrical Engineering

CHARLES F. SHOOP, B.S., Instructor in Mechanical Engineering

ADMISSION

Examinations for admission will be held at the begining of the year. See calendar and program of examinations.

All candidates for admission must take entrance examinations in Algebra and Geometry to the extent indicated in syllabi, pages 14 and 15. These examinations will be held in Room 24, School of Mines Building.

No student will be registered for first semester's work after September 25th, 1909, or for second semester's work after February 12th, 1910.

All applicants should present themselves to the Dean of the School of Mines, Room 25, School of Mines Building, who will furnish them with application blanks and directions covering examinations and registration.

Women will not be admitted to any course offered in the School of Mines.

GENERAL REGULATIONS GOVERNING ADMISSION

I. Students will be admitted to the freshman class on passing the regular entrance examinations.

II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special permission of the Department of Mathematics.

III. Graduates of any Minnesota State high school will be admitted without examination, except in Mathematics, provided—

(1) That the school maintain a full four-year course of high school work.

(2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.

IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to the committee not later than Tuesday of examination week.

V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examination in all subjects, as provided in sections I. and II., unless excused by vote of the faculty;

and persons wishing to present reasons for such excuse should report to the enrollment committee not later than Tuesday of examination week.

VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.

VII. Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four years' 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.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants coming from schools not included in any of the above classes must take the regular entrance examinations or present State High School Board certificates, and take examinations in entrance Mathematics.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing Tuesday, September 7th, in School of Mines Building, room 25 at 9 o'clock, a. m.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS

Required subjects

English	four credits
Elementary Algebra	one credit
Higher Algebra	one half credit
Solid Geometry	one half credit
Plane Geometry	one credit

Electives (Eight credits must be selected from this list)

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

GERMAN
- Grammar, one credit
- Literature, one credit

FRENCH
- Grammar, one credit
- Literature, one credit

SPANISH
- Grammar, one credit
- Literature, one credit

NORWEGIAN-SWEDISH
- Grammar, one credit
- Literature, one credit

HISTORY
- Ancient to Charlemagne, one credit
- Modern, from Charlemagne,tone credit
- English, one half credit
- Senior American, one half credit

AMERICAN GOVERNMENT, one half credit

PHYSICS, one credit

CHEMISTRY, 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

COMMERCIAL GEOGRAPHY, one half or one credit

BUSINESS SUBJECTS
- History of commerce, one half credit
- Economic History of England, one half credit
- Economic History of the United States, one half credit
- Elementary economics, one half credit
- Business law, one half credit
- Elementary bookkeeping, one half credit
- Advanced bookkeeping and business practice, one credit
- Stenography and typewriting, two credits
- Business spelling and correspondence, one half credit

MANUAL SUBJECTS

Freehand drawing, two credits
Mechanical drawing, two credits
Shop work, two credits
Modeling and wood carving, one credit
Domestic art and science, two credits

DESCRIPTION OF REQUIRED SUBJECTS FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth:* Milton's *Paradise Lost*; Carlyle's essay on *Burns*. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year)

The four fundamental operations for rational algebraic expressions; factoring; highest common factor; lowest common multiple; fractions, including complex fractions; linear equations, both numerical and literal, containing one or more unknown quantities; problems involving linear equations; binomial theorem for positive integral exponents; powers and roots of rational algebraic expressions and of numbers.

HIGHER ALGEBRA (one half year)

This course should begin with a thorough review of the work of the previous course, to the end that principles should be learned and theorems and rules rigorously demonstrated. Numerous problems which involve putting questions into equations should be solved, attention being paid to gaining an understanding of the principles involved rather than to mere dexterity in solution.

The additional topics to be treated are:—theory of exponents; surds; quadratic equations, both numerical and literal; equations with one or more unknown quantities that can be solved by the methods of quadratic equations; progressions; graphs.

PLANE GEOMETRY (one year)

The usual theorems and constructions contained in the best text books, including the general properties of plane rectilinear figures; the circle and measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle.

Special emphasis should be placed upon developing the ability to solve original exercises, loci problems, and problems involving the mensuration of lines and surfaces.

SOLID GEOMETRY (one half year)

The usual theorems and constructions contained in the best text books including the relation of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangle.

Original exercises, loci problems and problems involving the mensuration of surfaces and solids should form an important part of the course.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work in this University, subject to the approval of the departments concerned. In bringing records from other institutions, the certificates must be on the official blanks of the institution granting the certificate, and should show:

1. The subjects studied and 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 subjects were creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult the departments concerned in determining the credit to be given.

DAILY ROUTINE

The daily session is divided into eight recitation periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at 8:30 and closes at 12:35 o'clock. A general assembly of the faculty and students is held at 10:25 o'clock, at which there are brief and simple religious exercises. The noon hour extends from 12:35 to 2 o'clock. The afternoon session begins at 2:00 o'clock, and continues until 5:40. Work extends through six days of the week.

EXAMINATIONS

Students failing to receive a semester mark of 75 per cent in any subject shall have the privilege of a supplementary examination before the opening of the following year.

Each student must obtain from the registrar his yearly average in all subjects and present himself for supplementary examinations, according to the program given on page 3.

Students failing to receive a semester mark of 50 per cent in any subject shall not be allowed to pursue any dependent subject.

The faculty will exclude students from attending classes in any subject upon recommendation of the department concerned.

Students failing to pass supplementary examinations must register the next year for those subjects in which they have failed. They may take in addition other subjects appearing in courses of instruction, pages 33 to 40, with the exception of Mining and Metallurgical courses, based upon requirements of the various courses and daily program. They may also take certain electives in other colleges, provided suitable arrangements can be made.

All students must report in time to make suitable arrangements with departments concerned in case of conflicts in program.

No other supplementary examinations will be given. Students failing to report for supplementary examinations will be compelled to take work over in class as in case of failures.

Students failing to present themselves for final examination at the end of the first or second semester will be given zero on the examinations.

Students whose absences in either semester exceed four weeks in the aggregate are not permitted to take examinations without special permission of the faculty.

A fee of five dollars per subject is required for each special examination.

UNCLASSED STUDENTS

No unclassed students will be admitted to the School of Mines.

GRADUATION

Students completing courses of study to the satisfaction of the faculty are entitled to receive the appropriate degrees. Any person may undergo, at suitable times, examinations in any subject. If such person pass in all the studies and exercises of a course, he is entitled to the appropriate degree, provided, that at least one full year 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 member of the senior class is required to prepare a typewritten thesis which must be submitted for approval not later than April 9th. These must be handed in properly bound, together with original drawings, tracings, negatives and one set of clear blue prints therefrom, not later than April 30th.

The subject of the thesis will be the development, exploitation and equipment of a mining property or metallurgical plant. Considerable latitude is allowed in selecting conditions and location, subject, however, to the final approval of the professor in charge of the department.

The selection must be made and work must begin prior to the Christmas vacation. Students are expected to devote at least twelve hours a week to the preparation of their theses during the second semester.

Special Information

In the School of Mines there are two regular courses of study, viz. Mining Engineering, and Metallurgy, leading to the degree of Engineer of Mines (E. M.), and Metallurgical Engineer (Met. E.) respectively.

The degree of Met. E. may be conferred upon a candidate who received the degree of E. M. in four years, and vice versa, provided such candidate completes an additional year's work at the school and presents a suitable thesis.

Students in the College of Science, Literature and Arts, in the College of Engineering and Mechanic Arts, and in the School of Technical and Applied Chemistry, who contemplate taking a degree in this school after completing their course, are recommended to select their electives with reference to as full a preparation as possible for the technical work of the course they propose to enter.

FEES

A registration fee of fifteen dollars is required at the beginning of each semester from residents of the state, and thirty dollars from non-residents.

The various laboratory fees are as follows:

Chemical laboratory (Qualitative)	Per semester	$ 5.00
Chemical laboratory (Quantitative)	"	7.00
Mineralogical laboratory	"	3.00
Assaying laboratory	"	15.00
Experimental laboratory	"	6.00
Steam Laboratory	"	3.00
Electrical laboratory	"	5.00
Ore testing laboratory	"	10.00

The trip to the mines made by the junior class costs the student from one hundred to one hundred and seventy-five dollars.

Books cost about as follows:

Freshman year	$12.00 to $15.00.
Sophomore year	8.00 to 10.00
Junior year	18.00 to 25.00
Senior year	10.00 to 30.00

A number of books are recommended to the student, but the purchase of them is optional. The lower estimates given will cover the cost of books that must be purchased.

Each member of the freshman class must be provided with a set of draughting instruments. The necessary instruments will cost about fifteen dollars.

A number of valuable catalogs and pamphlets are loaned members of the senior class in the study of mechanics. A deposit of $3.00 shall be made with the Accountant by each member, to be refunded upon the return in good condition of all such matter.

SUMMARY OF EXPENSES

FRESHMAN YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
	$ 95.00

SOPHOMORE YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
	$ 54.00

JUNIOR YEAR

*Incidental fee	$ 30.00
Steam laboratory	3.00
Trip to the mines	$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
	$154 to $229.00

SENIOR YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
	$ 93.00

*For non-residents the incidental fee is $60 per year.

Good board can be obtained at a cost varying from $2.50 to $4.00 per week. Room rent varies from $5.00 to $15.00 per month. With two occupying one room, the rent per student would be considerably lower.

ORGANIZATION

The organization of the School of Mines dates back to 1889, when the general faculty of the University recommended to the Board of Regents its establishment. In 1891 the legislature of the State of Minnesota voted an appropriation for establishing and equipping the school. Two annual appropriations have since been made for its support. The legislature of 1901 appropriated $47,500 for a new School of Mines building. In 1903 the legislature appropriated $25,000 for completing and equipping the School of Mines building, and in 1905 an additional sum was provided for equipment.

SCHOOL OF MINES BUILDING

The School of Mines building is designed to accommodate only the technical work of the School of Mines, as adequate building accommodations and equipment have already been furnished for chemistry, geology, mineralogy, drawing, and mechanical and electrical engineering. The building is 150 feet long by 65 feet wide. It is a brick building three stories high. The lower floor is occupied by the assaying and metallurgical laboratories; the second floor contains offices, two large lecture rooms, a department library, and a museum; the third floor provides two quiz rooms, a large, well lighted draughting room, a thesis room, a dark room and a blue print room. This building makes possible the development of the work already begun and offers facilities for more extended work along technical lines.

LOCATION

The University of Minnesota is located in the city of Minneapolis, on the east bank of the Mississippi river. The School of Mines has its buildings and laboratories on the same ground. Students of the School of Mines have, therefore, all the opportunities afforded by a large university.

Minneapolis is surrounded by and is in direct communication with several important mining and smelting districts. As the city is a railroad center, all possible transportation facilities are available.

FIELD WORK

Field work is conducted at the iron mines in the northern part of this state, in the copper and iron regions of Michigan, in the mines and smelters of Montana, Colorado, Utah and California, and in the coal mines of Pennsylvania.

At least one of these districts will be visited by each class, affording splendid opportunities for study and observation.

The field work in mining and metallurgy consists of one trip at the close of the Junior year. For details see pages 24 and 30.

Students must deposit with the **Accountant,** at least **two weeks** before time set for departure of class, a sum sufficient to cover following expense items:

1st. Board and lodging.
2nd. Necessary mine supplies.

Transportation and incidental expenses are not included in the above items and must be met individually.

A statement of expenditures will be rendered at the close of the work and any balance existing will be refunded.

The amount of deposit required will vary, according to the locality visited, and will be announced each year when arrangements for the trip are completed.

THE ELLIOT SCHOLARSHIP LOAN FUND

To fulfill the wish of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of $5,000 was placed in the hands of the Board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his pro-

fession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest, at the earliest convenience of the recipients.

LIBRARY

The library consists of about two thousand five hundred volumes. This number represents only those works that treat directly of mining and metallurgical subjects.

The school has a complete set of the leading mining and metallurgical journals, and other similar books of reference. The leading periodicals are accessible to all. Constant references in lectures compel the student to keep himself well informed as to the latest methods, machinery and changes in practice going on in his special line of work.

In addition to the above, many thousand volumes on chemistry, mineralogy and geology complete a most valuable working and reference library. A card index is kept of all articles of value and interest appearing in the leading periodicals.

PHOTOGRAPHY

Photographs of surface and underground appliances, metallurgical plants, copies of drawings and other photographs are indispensable to the study of mining and metallurgy. With the report of his field work every student is expected to present photographs, as well as sketches, of various objects under consideration. There is also a very complete set of lantern slides illustrating the principal methods of underground workings and metallurgical plants, at home and abroad. Several hundred slides have been made in the department's laboratory which bear directly on the work done in Minnesota and the neighboring northwest. Many valuable photographs are constantly being made. Blue prints of these are given students as illustrations. Much time is thus saved, usually spent in making sketches and diagrams.

CLASSIFICATION OF SUBJECTS

The work falls under the following subdivisions, supplemented by thorough courses in mechanics, mathematics, physics, chemistry, mineralogy and geology:

(A) **Assaying**—to determine if ore has value for treatment. (B) **Mining engineering**—to furnish material for treatment. (C) **Ore testing**—To determine best method of treatment. (D) **Ore dressing**—furnishing products for metallurgical treatment. (E) **Metallurgy**—smelting and refining ores and ore dressing products; reduction to metals.

DEPARTMENT OF MINING ENGINEERING

Mining engineering extends through sophomore, junior and senior years. The subjects given together with the sequence necessary, are treated in the accompanying outline of the course.

Until the first semester of the junior year, the course consists of lectures and recitations only. In the subsequent work, text-books are used in connection with the lectures.

In the senior year, problems in hoisting, hauling, pumping, ventilation and similar subjects become an important part of the work.

DESIGNS AND SPECIFICATIONS

The student makes in connection with his thesis work working drawing of mine cars, skips and other parts of mine equipment that are usually designed and made at the mine.

MINE SURVEYING

The work in surveying is given in the first semester of junior year and is designed solely for mining engineers.

The work begins with the elements of plane surveying with special reference to the computations necessary, followed by the higher theoretical work in plane surveying and its application to the problems met in underground surveying. This is followed by a course in mine mapping during the second semester of junior year and six weeks of field work as follows: Beginning with the first Monday in May the class meets daily for the practice of plane surveying at some readily accessible locality (to be announced each year). The duration of this course is four weeks, eight hours a day.

The students are divided into squads of two or four, and each is required to complete satisfactorily the following exercises and surveys:

1. Chaining
2. Compass reading
3. Adjustment of hand levels and practice in leveling
4. Adjustment and use of wye levels
5. Adjustment of mining transit
6. Reading angles
7. Traverse with steel tape
8. Azimuth traverse with stadia
9. Determination of meridian, latitude and time by solar and stellar observations

10. Survey of mining claim according to the regulations of the U. S. Government
11. Measurement of earthwork
12. Laying out railroad tangents, curves and crossings

Each squad must provide itself with a 6-foot steel tape, graduated to hundredths.

After the completion of this work from ten days to two weeks are spent in the actual underground survey of a mine or part of a mine in some mining district in Minnesota or Michigan.

A full equipment of surveying instruments of the latest and best makes is furnished each squad for this work.

Students who furnish satisfactory evidence of proficiency in this work may be given credit therefor. The department, however, reserves the right in any case to require such students to take a theoretical or a practical examination or both.

FIELD WORK IN MINING

During the second semester arrangements are made by the department with various representative mines in the West to give students an opportunity to gain practical underground mining experience, and at least six weeks of such work is required of the student during the vacation following junior year. This work must be done at a mine selected by the department (the preference of the student will be consulted in so far as possible) subject to the following conditions:

Upon the termination of the metallurgical work about June 20th (this work follows immediately upon completion of the mine surveying) the student will report to the superintendent of the particular mine to which he is assigned. On no account is he to report later than July 1st. For fifteen days he will be given the freedom of the mine for general observation work. For the remainder of the summer he must engage in regular miner's work for which he may be paid current wages.

Four weeks of such work will be REQUIRED. He will be subject to the regular mine discipline. In case he is discharged no attempt will be made by the department to investigate, but the student will be allowed to make up the work at the end of senior year. His degree will be withheld until all work is completed.

In the event of unforseen contingencies, such as accidents, the sudden closing down of a mine, etc., the work must be made up at the first opportunity.

The student must keep a diary and record therein, in minute detail, all work done, his observations, sketches, etc. This diary shall be handed in to the department not later than Sept. 10th of each year, together with an affidavit to the effect that it is authentic and is a true record of the

work done by him. Two weeks prior to the opening of the second semester of senior year the student must submit a typewritten report fully illustrated with sketches drawn to scale, covering all the mining and milling operations together with details of plant and equipment.

ORE DRESSING

The lectures and recitations in ore dressing extend through the second semester of the junior year, and comprise the detailed study of ore dressing and concentrating machinery, together with the study of typical combinations of dressing machines as found in the several mining districts of the United States.

In connection with the theoretical work, the ore dressing and testing plant of the school is utilized for practical illustrations.

Course in Mining Engineering

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Professor Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

Chemistry 2, eight hours, Assistant Professor Nicholson and Mr. Frary
Descriptive Geometry 4, two hours, Professor Kirchner
Drawing 2, four hours, Professor Kirchner and Assistants
Mathematics 2, five hours, Professor Comstock
Metallurgy 1, twelve hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
Mineralogy 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 3, eight hours, Professor Sidener
Drawing 5, eight hours, Professor Kirchner and Assistants
Mathematics 3, five hours, Professor Groat and Professor Comstock
Metallurgy 3, three hours, Professor Christianson
Physics 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER

Chemistry 5, eight hours, Professor Sidener
Drawing 6, four hours, Professor Kirchner and Assistants
Mathematics 4, five hours, Professor Groat and Professor Comstock
Metallurgy 4, three hours, Professor Christianson
Mining 1, four hours, Assistant Professor McCarty
Physics 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

Geology 3, two hours, Professor Hall
Experimental Engineering 1, four hours, Mr. Shoop
Geology 9, four hours, Mr. Grout
Mechanics 5, five hours, Professor Groat

Metallurgy 5, four hours, Assistant Professor Pease
Mining 2, five hours, Professor van Barneveld
Mining 3, five hours, Assistant Professor McCarty

SECOND SEMESTER

Geology 10, four hours, Mr. Grout
Experimental Engineering 2, four hours, Mr. Shoop
Mechanics 6, five hours, Professor Groat
Metallurgy 6, four hours, Assistant Professor Pease
Mining 2, five hours, Professor van Barneveld
Mining 5, five hours, Assistant Professor McCarty
Mining 8, six hours, Assistant Professor McCarty
Mechanical Engineering 18, two hours, Professor Flather
Field work. Months of May, June, July and August

Mine Surveying 7, beginning about May 1st. Six weeks	Professor van Barneveld Assistant Professor McCarty
Metallurgy 8, one week	Professor Appleby Professor Christianson Assistant Professor Pease
Practical Mining 9, six weeks	Professor van Barneveld Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

Chemistry 14, eight hours, Professor Sidener
Electrical Engineering 4, six hours, Mr. Ryan
Geology 12, four hours, Professor Hall
Mechanics 7, five hours, Professor Groat
Metallurgy 2, ten hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
Mining 4, five hours, Professor van Barneveld
Mining (Thesis) 10, two hours, Professor van Barneveld and Assistant

SECOND SEMESTER

Chemistry 18, eight hours, Professor Sidener
Experimental Engineering 9, four hours, Professor Kavanaugh
Geology 13, four hours, Professor Hall
Mechanics 8, three hours, Professor Groat
Mining 4, five hours, Professor van Barneveld
Mining (Designs and Specifications) 6, eight hours, Professor van Barneveld and Assistant
Mining (Thesis) 10, four hours, Professor van Barneveld and Assistant

DEPARTMENT OF METALLURGY

This department is well supplied with representative ores of all the most important metals, drawings of furnaces, models and samples of all the different furnace products. The lectures treat of all the principal methods now in use.

The practical work consists in visits to smelting and refining works which are accessible. The work in metallurgy extends through three years.

ASSAYING

The lectures treat of and describe apparatus, reagents, assay furnaces, fuels, etc., in connection with this subject. The principles of assaying and sampling are fully explained. A collection of representative ores of various metals with a collection of corresponding slags are shown, and instruction is given as to nature and quantity of fluxes. Special and rapid methods of testing slags and metallurgical products as employed in western smelting works are emphasized.

The laboratory course includes preparing and testing reagents, making cupels, etc., and assaying samples of ore, furnace and mill products, and bullion; different charges are tried and practical conclusions drawn.

Great importance is attached to the work in the laboratory. A large well ventilated furnace room in which are located muffle and crucible furnaces, and another room of similar dimension equipped with desks, pulp and bead balances, afford accommodations to a large number of students. Ores of various metals of known value are given the students, who are required to make up the necessary charges and submit their reports in detail. This work is offered to students completing the necessary courses in mineralogy and chemistry.

The Assay Laboratories are located in the School of Mines Building and consist of:

1st. Preparation room. This room is 62 feet long by 36 feet wide and accommodates 66 students. Here samples and reagents are weighed preparatory to assaying. Each student is furnished with a complete set of apparatus, including a pulp balance for individual use. All operations are therefore conducted with the greatest economy of time and entirely apart from the furnace room. The separation of the preparation room from the furnace room is of greatest importance. Nearly all ores are crushed and pulverized by suitable machines run by electric motors. Students are compelled to pulverize by hand a minimum number of samples, thereby saving much time for extended and advanced work in special lines.

2nd. Furnace room. This room is 60 feet long by 42 feet wide. The high ceiling and special ventilation provided for this room make it a most comfortable assay furnace room. It provides for the accommodation of twelve double-decked muffle furnaces, twenty-four crucible furnaces and

twelve gasoline furnaces. After the sample has been placed in a suitable vessel for fusion, it is taken to the furnace room, which communicates directly with the preparation room.

3rd. Balance room. This room is 31 feet long by 16 feet wide. In this room are various types of balances for accurately weighing gold and silver beads and bullion. The room is specially lighted by electric cove lights from the ceiling. The balances are placed on heavy brick piers which are independent of the walls of the building.

ORE TESTING

The lectures treat of the use and purposes of all the machinery connected with the subject, supplemented with detail drawings.

There are complete testing works connected with the department where the student may see the working of, and handle for himself, crushers, rolls, Huntington mill, concentrating machinery, such as vanners, buddles, jigs, pan for amalgamation, settlers, reverberatory furnaces for oxidizing and oxidizing-chloridizing roasts, leaching and chlorination plants, as well as sizing apparatus and hydraulic separators. Sufficiently large amounts of ore are given to make the necessary tests upon the different machines and the students report the best method of treatment. The first semester of the senior year is devoted to instruction and laboratory work, and is required of students both in mining and metallurgy.

The ore testing works meet educational as well as commercial needs.

Educational. The ore testing plant acquaints the student with the construction and manipulation of the principal typical machines used in the leading ore dressing establishments of the country. It is here that students in mining and metallurgical engineering get the requisite practical experience. They handle all machines and operate on sufficiently large amounts of material to determine the methods best suited to a given ore to extract the largest amount of metal with the least possible loss.

Commercial. Ore testing works are an important factor in mining and metallurgical projects. The commercial object is to determine the best method of treating a given ore so as to yield the largest percentage of the metal it contains at the least possible cost. Samples varying from 500 pounds to car load lots can be treated by various methods.

The ore testing works are located on the east bank of the Mississippi between the Great Northern and Northern Pacific railroads. Located at this point on the University campus, it offers the very best facilities for both educational and commercial purposes.

As the funds appropriated for the erection of such a plant were sufficient to purchase only the necessary machinery, the business men of Minneapolis generously provided a suitable building. This building, 94x66 feet, is built of brick and stone.

Machinery. The plant contains all the machinery necessary to illustrate the various processes of ore testing, viz.: A Bridgman mechanical sampler, size B; a link belt bucket elevator; a pulley feeder complete; a pair of 12½x12 geared rolls complete; a four compartment spitzkasten; a three compartment Hartz jig; a Collum jig complete with cone for driving; a three and a half foot Huntington mill complete; a three stamp mill, 275-pound stamps; a five stamp mill, 850-pound stamps; a Challenge automatic feeder for five-stamp battery; a suspended Challenge feeder for three-stamp battery; a Tulloch feeder for Huntington mill; a single deck buddle, twelve feet in diameter; a four-foot plain belt Frue vanner; a Cammett concentrator; a Hooper pneumatic concentrator; a Century drop motion jig; a three-foot amalgamating pan; a five-foot settler; a Bruckner roasting furnace, with fire box on wheels; a chlorination barrel; a battery tightener; a two-horse power vertical boiler; a steam drying pan; three trommels, with, driving arrangement and gears; a one thousand pound Reedy elevator, complete with worm gear; two overhead crawls, each with eighty-foot track; one-ton pulley block; a quarter-ton pulley block; a scoop car, with flat wheels; two twenty-horse power electric motors; three MacDermott automatic samplers, etc.

FIELD WORK IN METALLURGY

At the end of junior year opportunity is given the student to study metallurgical operations at one or more smelting works. This work will begin about June 15th. Not over one week's time will be devoted to this work. The student must keep a diary and note in detail all work done, including sketches, etc. This diary must be submitted to the department not later than Sept. 10th before registering for senior year.

Two weeks prior to the opening of the second semester senior year, the student must submit a type written report fully illustrated with sketches drawn to scale covering work completed in the field.

Course in Metallurgy

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Professor Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

Chemistry 2, eight hours, Assistant Professor Nicholson and Mr. Frary
Descriptive Geometry 4, two hours, Professor Kirchner
Drawing 2, four hours, Professor Kirchner and Assistants
Mathematics 2, five hours, Professor Comstock
Metallurgy 1, twelve hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
Mineralogy 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 3, eight hours, Professor Sidener
Drawing 5, eight hours, Professor Kirchner and Assistants
Mathematics 3, five hours, Professor Groat and Professor Comstock
Metallurgy 3, three hours, Professor Christianson
Physics 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER

Chemistry 5, eight hours, Professor Sidener
Drawing 6, four hours, Professor Kirchner and Assistants
Mathematics 4, five hours, Professor Groat and Professor Comstock
Metallurgy 4, three hours, Professor Christianson
Mining 1, four hours, Assistant Professor McCarty
Physics 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

Geology 3, two hours, Professor Hall
Geology 9, four hours, Mr. Grout
Experimental Engineering 1, four hours, Mr. Shoop
Mechanics 5, five hours, Professor Groat

METALLURGY 5, four hours, Assistant Professor Pease
MINING 2, five hours, Professor van Barneveld
MINING 3, five hours, Assistant Professor McCarty

SECOND SEMESTER

GEOLOGY 10, four hours, Mr. Grout
MECHANICS 6, five hours, Professor Groat
EXPERIMENTAL ENGINEERING 2, four hours, Mr. Shoop
METALLURGY 6, four hours, Assistant Professor Pease
MINING 2, five hours, Professor van Barneveld
MINING 5, five hours, Assistant Professor McCarty
MINING 8, six hours, Assistant Professor McCarty
MECHANICAL ENGINEERING 18, two hours, Professor Flather
FIELD WORK. Months of May, June, July and August.

Mine Surveying 7, Beginning about May 1st. Six weeks	Professor van Barneveld Assistant Professor McCarty
Metallurgy 8, one week	Professor Appleby Professor Christianson Assistant Professor Pease
Practical Mining 9, six weeks	Professor van Barneveld Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

CHEMISTRY 14, eight hours, Professor Sidener
ELECTRICAL POWER, ELECTRICAL ENGINEERING 4, six hours, Mr. Ryan
GEOLOGY 12, four hours, Professor Hall
MECHANICS 7, five hours, Professor Groat
MINING 4, five hours, Professor van Barneveld
METALLURGY 2, ten hours, Professor Appleby, Professor Christianson and Assistant Professor Pease

SECOND SEMESTER

CHEMISTRY 18, eight hours, Professor Sidener
CHEMISTRY 16, six hours, Professor Frankforter and Mr. Frary
EXPERIMENTAL ENGINEERING 9, four hours, Professor Kavanaugh
MECHANICS 8, three hours, Professor Groat
METALLURGY 7, three hours, Professor Christianson
METALLURGY 9, four hours, Professor Appleby and Assistants
MINING 4, five hours, Professor van Barneveld

Departments of Instruction

CHEMISTRY

GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
CHARLES F. SIDENER, B.S., Professor of Chemistry
EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
FRANCIS C. FRARY, M.S., Instructor in Chemistry

1. GENERAL AND QUALITATIVE ANALYSIS — PROFESSOR NICHOLSON AND MR FRARY

Five credits, (two lectures, six laboratory hours per week) First semester
Required of freshmen

The course includes special general chemistry and the reactions of the metals as applied to their separation and identification.

2. QUALITATIVE ANALYSIS — PROFESSOR NICHOLSON AND MR FRARY

Five credits (two lectures, six laboratory hours per week) Second semester
Open to students completing 1. Required of freshmen

The work in this course will include examination of alloys, minerals, slags and other compounds.

QUANTITATIVE ANALYSIS — PROFESSOR SIDENER AND ASSISTANTS

Five credits (two lectures, six laboratory hours per week) First semester
Open to students completing 2. Required of sophomores

The course includes an introduction to quantitative and a beginning of gravimetric analysis.

5. VOLUMETRIC ANALYSIS — PROFESSOR SIDENER AND ASSISTANTS

Five credits (two lectures, six laboratory hours per week) Second semester
Open to students completing 3. Required of sophomores

The course includes an introduction to volumetric determinations with a discussion of standard solutions and the necesary stoicheiometric calculations.

14. SPECIAL PROBLEMS — PROFESSOR SIDENER AND ASSISTANTS

Five credits (two lectures, six laboratory hours per week) First semester
Open to students completing 5. Required of seniors

The course includes the working out of various mineralogical, technological and metallurgical problems, with work on ores of base metals, limestones, slags, etc.

16. ELECTRO-CHEMICAL ANALYSIS — PROFESSOR FRANKFORTER AND MR. FRARY

Four credits (two lectures, four laboratory hours per week) Second semester
Open to students completing 14. Required of seniors in Metallurgy

The course includes the qualitative and quantitative separation of metals by electrolysis.

NOTE. A credit is one recitation or lecture hour per week, per semester. Two laboratory hours are equal to one credit.

18. IRON AND STEEL ANALYSIS — PROFESSOR SIDENER AND ASSISTANTS
Five credits (two lectures, six laboratory hours per week) — Second semester
Open to students completing 14. Required of seniors

The course includes the rapid determination of iron, by the various methods as well as the determination of associated elements, sulphur, phosphorus, silicon, manganese, carbon and others.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, B.S., Professor of Drawing and Descriptive Geometry
FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing
NORMAN W. ROSE, M.E., Instructor in Drawing
CHARLES P. CLARKE, B.S., Instructor in Drawing

1. DRAWING — MR. ROSE, MR. CLARKE AND MR. ROWLEY
Three credits (six laboratory hours per week) — First semester
Required of freshmen

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.

2. DRAWING — MR. ROSE AND MR. ROWLEY
Two credits (four laboratory hours per week) — Second semester
Open to students completing 1. Required of freshmen
Continuation of Course 1 as outlined above.

3. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER
One credit (one recitation per week) — First semester
Required of freshmen

Projection—central and special cases, principles and applications, representation of lines, planes, and solids, and of their relations; tangencies, intersections and developments. Recitations, lectures and solution of problems.

4. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER
Two credits (two recitation hours per week) — Second semester
Open to students completing 3. Required of freshmen
Continuation of Course 3 as outlined above.

5. DRAFTING — PROFESSOR KIRCHNER AND ASSISTANTS
Four credits (eight laboratory hours per week) — First semester
Open to students completing 2 and 4. Required of sophomores

Graphics, machine drafting, structural drafting and topography. Instruction in drafting room methods.

6. DRAFTING — PROFESSOR KIRCHNER AND ASSISTANTS
Two credits (four laboratory hours per week) — Second semester
Open to students completing 5. Required of sophomores.
Continuation of Course 5 as outlined above.

ELECTRICAL ENGINEERING

GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering
WILLIAM T. RYAN, E.E., Instructor in Electrical Engineering

4. ELECTRIC POWER — MR. RYAN
Three credits (one lecture, four laboratory hours per week) — First semester
Open to students completing Physics 1. Required of seniors
Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting.

EXPERIMENTAL ENGINEERING

WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
CHARLES F. SHOOP, B.S., Instructor in Experimental Engineering

1. STRENGTH OF MATERIALS — MR. SHOOP
Two credits (four laboratory hours per week) — First semester
Open to students completing Mechanics 5. Required of juniors
Laboratory work investigating the strength and physical qualities of iron, steel, brass, copper, belting, chains, beams, brick and stone.

2. STEAM LABORATORY — MR. SHOOP
Two credits (four laboratory hours per week) — Second semester
Open to students taking Mechanical Engineering, 18. Required of juniors.
Exercises in valve setting, indicator practice, calibration of steam gauges, efficiency of screws and hoists.

9. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Two credits (four laboratory hours per week) — Second semester
Open to students completing 2. Required of seniors
Hydraulic measurements. Calibration of weirs, nozzles, meters and other hydraulic apparatus, calorimetry; tests of pumps, engines and boilers.

MINERALOGY AND GEOLOGY

CHRISTOPHER W. HALL, M.A., Professor of Mineralogy and Geology
FRANK F. GROUT, M.S., Instructor in Mineralogy

1. GENERAL MINERALOGY — MR. GROUT
Six credits (four lectures, four laboratory hours per week) — First semester
Required of freshmen
The physical and chemical characters of minerals, a study of the native elements and the ores of the common metals; the occurence and association of economic minerals.
Descriptive mineralogy and classification; rock-forming minerals; genetic relationship and distribution.
Laboratory work consists of tests illustrating the range of minerals and the application of chemical and blowpipe analyses to the determination of species; introduction to the methods of quantitative blowpipe analysis; special topics; reference reading and discussions.

2. PHYSICAL MINERALOGY — MR. GROUT

Three credits (two lectures, two laboratory hours per week) Second semester

Open to students completing 1. Required of freshmen

An introduction to crystallography; physical characters of greatest service in rapid determination. Hand specimen practice preparatory to rock study.

3. PHYSICAL GEOLOGY — PROFESSOR HALL

Two credits (two lectures per week) First semester

Open to students completing 2. Required of juniors

(1) Geodynamics, discussing the atmosphere, water, terrestrial heat, plants and animals as geological agents. (2) Structural geology, explaining stratification, displacements, dislocations, fractures, induced rock-structures and mineral veins in their relation to the arrangement of materials in the earth. (3) Physiographic geology, pointing out the more prominent earth features and discussing their origin, significance and the agencies affecting them. Field excursions are required. Scott's Introduction.

9. ELEMENTS OF ROCK STUDY — MR. GROUT

Two credits (four laboratory hours per week) First semester

Open to students completing 3. Required of juniors

Structures, textures, mineral and chemical composition of rocks.

A practical study of rock types, with laboratory and field practice.

A study of their origin, occurrence, variation, and alteration, with view to accurate description. Introduction to the use of the microscope. Kemp's Hand Book of Rocks, and reference reading.

10. PETROGRAPHY — MR. GROUT

Two credits (four laboratory hours per week) Second semester

Open to students completing 9. Required of juniors

The application of optical study of minerals to the description of crystalline rocks. Rock structures as seen with microscope. Alteration of rocks. The stratigraphic relation of rocks, and an examination of some Minnesota groups of crystalline rocks. Preparation of material for microscopic study. Luquer Minerals in Rock Sections, and reference readings.

12. ORE DEPOSITS — PROFESSOR HALL

Four credits (four lectures per week) First semester

Open to students completing 10. Required of seniors

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations. A description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead and zinc. Kemp's Ore Deposits.

13. SPECIAL PROBLEMS — PROFESSOR HALL

Two credits (four laboratory hours per week) Second semester

Open to students completing 12. Required of seniors in mining

The investigation of problems, involving the field and laboratory work of some particular formation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field; keeping of notebook, preparation of geological maps, profiles and sections will be taught.

MECHANICS AND MATHEMATICS

B. F. GROAT, B.S., LL.B., Professor of Mechanics and Mathematics
ELTING H. COMSTOCK, M.S., Professor of Mechanics and Mathematics

1. ALGEBRA AND TRIGONOMETRY — PROFESSOR COMSTOCK
Five credits (five recitation hours per week) — First semester
Required of freshmen
Logarithms, rational integral functions, factors and roots of general quadratic, factor and remainder theorems, factors and values of functions, graphs, progressions and notation, convergence, divergence, equivalence, exponential theorem, logarithmic series, summation of series, determinants; trigonometric ratios, right triangles, general definitions of trigonometric functions, analytic relations, addition formulas, etc., trigonometric equations, oblique triangles, spherical formulas and solution of spherical triangles.

2. ALGEBRA AND ANALYTIC GEOMETRY — PROFESSOR COMSTOCK
Five credits (five recitations per week) — Second semester
Open to students completing 1. Required of freshmen
Development of functions and undetermined coefficients, cube roots of unity, derived functions, theory of equations, permutations and combinations, probabilities; systems of co-ordinates, loci, straight line, transformations, equations of the conics, properties of the conics.

3. ANALYTIC GEOMETRY AND CALCULUS — PROFESSOR COMSTOCK
Five credits (five recitations per week) — First semester
Open to students completing 2. Required of sophomores
General equation of second degree, higher plane curves, co-ordinates in space, point, plane, straight line, quadric surfaces; nature of differentiation, elementary forms, geometric applications, rates, successive differentiation, maxima and minima, elementary integration, expansion of functions, indeterminate forms, partial derivatives, change of variable, applications to analytic geometry.

4. CALCULUS — PROFESSOR COMSTOCK
Five credits (five recitations per week) — Second semester
Open to students completing 3. Required of sophomores
Applications continued, rational fractions, rationalization, formulas of reduction, multiple integration, various systems of co-ordinates, approximate integration, hyperbolic functions, some differential equations of mechanics; least squares; slide rule.

5. STATICS AND MECHANICS OF MATERIALS — PROFESSOR GROAT
Five credits (five recitations and lectures per week) — First semester
Open to students completing 4 and Physics 1. Required of juniors.
Mathematical conditions of equilibrium, frames, theory of elasticity, beams, shafts, columns, boiler plates, etc.

6. KINETICS AND HYDRAULICS — PROFESSOR GROAT
Five credits (five recitations and lectures per week) — Second semester
Open to students completing 5. Required of juniors
Motion of rigid bodies; numerous problems in work, power, energy, friction and hydraulics.

7. WATER POWER — PROFESSOR GROAT
Five credits (five recitations and lectures per week) — First semester
Open to students completing 6. Required of seniors

Estimation of power to be developed at a power site. Dams. Riparian rights. Number and type of units to install. Speed control. Power houses. Appendages. Transmission.

8. THERMODYNAMICS — PROFESSOR GROAT
Three credits (three recitations and lectures per week) — Second semester
Open to students completing 7. Required of seniors
Properties of gases. Steam engine. Gas engine. Steam and gas turbines. Power plants. Pumping.

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.E., Professor of Mechanical Engineering

18. STEAM ENGINE — PROFESSOR FLATHER
Two credits (two lectures per week) — Second semester
Open to students completing Mechanics 5. Required of juniors
Mechanics of the steam engine. Work in cylinder; effect of reciprocating parts; steam distribution. Mechanism of steam engines. A study of the details of modern steam engines. Valve and valve gears. A study of the slide valve, link motions and other reversing gear; automatic cut-off gears and the Zeuner diagrams. The steam engine indicator. Principles and operation of the instruments, indicator riggings indicator cards, compounding.

METALLURGY

WILLIAM R. APPLEBY, M.A., Professor of Metallurgy
PETER CHRISTIANSON, B.S., E.M., Professor of Metallurgy
LEVI B. PEASE, M.S., Assistant Professor of Metallurgy

1. ASSAYING — PROFESSOR APPLEBY AND ASSISTANTS
Eight credits (four lectures and eight laboratory hours per week) — Second semester
Open to students completing Mineralogy 1. Required of freshmen
Determination of values of ores, metallurgical products and bullion.

2. ORE TESTING — PROFESSOR APPLEBY AND ASSISTANTS
Six credits (two lectures and eight laboratory hours per week) — First semester
Open to students completing 1 and Mining 5. Required of seniors
Determination of methods of ore treatment, stamping, concentration, cyanidation, roasting, chlorination, lixiviation and amalgamation.

3. GENERAL METALLURGY AND METALLURGY OF IRON — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — First semester
Open to students completing 1. Required of sophomores
Including the subjects of combustion, fuels, refractory materials and furnaces. Lectures and recitations on metallurgy of iron.

4. METALLURGY OF WROUGHT IRON AND STEEL — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — Second semester
Open to students completing 3. Required of sophomores

Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. METALLURGY OF THE BASE METALS — ASSISTANT PROFESSOR PEASE
Four credits (four lectures per week) — First semester
Open to students completing 4. Required of juniors
Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved in refining methods.

6. METALLURGY OF THE PRECIOUS METALS — ASSISTANT PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 5. Required of juniors
Gold, silver and platinum. Methods and principle of cyanidation, chlorination, amalgamation and lixiviation as applied to the treatment of the above.

7. ELECTRO-METALLURGY — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — Second semester
Open to students completing 6. Required of seniors in Metallurgy
This course considers the treatment of ores by electricity, as well as electrolytic separation and refining of metals.

8. FIELD WORK IN METALLURGY — PROFESSOR APPLEBY AND ASSISTANTS
Two credits (eight hours per day in field for seven days) — June following second semester
Open to students completing 6. Required of juniors
Study of metallurgical operations at smelters and mills. Detail report is required covering plants visited.

9. THESIS AND SPECIFICATIONS — PROFESSOR APPLEBY AND ASSISTANTS
Four credits (four hours, conferences and laboratory) — Second semester
Open to students completing 8. Required of seniors in Metallurgy
Detail investigations of ore treatment, with report including designs and specifications for suitable plants.

MINING ENGINEERING

CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., Professor of Mining Engineering

EDWARD P. MCCARTY, E.M., Assistant Professor of Mining

1. MINING — ASSISTANT PROFESSOR MCCARTY
Four credits (four lectures per week) — Second semester
Open to sophomores in regular standing. Required of sophomores.
Explosives, blasting, air compressors and quarrying.

2. MINING — PROFESSOR VAN BARNEVELD
Five credits (five lectures per week) — First and second semester
Open to those who have completed 1. Required of juniors
Mode of occurrence of ore bodies; prospecting, shaft-sinking, tunneling, drifting, stoping, timbering. Methods of metal mining. Methods of coal mining. Hydraulic mining.

3. MINE SURVEYING — ASSISTANT PROFESSOR MCCARTY
Five credits (five lectures per week) — First semester
Open to those who have taken mathematics 1, 2, 3 and 4, and mining 1.
Required of juniors
Computations, platting and problems with special reference to mine surveying.

4. MINING AND MINING ENGINEERING — PROFESSOR VAN BARNEVELD
Five credits (five lectures per week) — First and second semester
Open to those who have completed mining 2 and 3. Required of seniors
Mine management. The examination of a mining property. Sampling ore reserves, etc. Mine accounts. Mine accidents. Mining law. Mining machinery, underground transportation, hoisting, pumping and ventilation. Electricity applied to mining.

5. ORE DRESSING — ASSISTANT PROFESSOR MCCARTY
Five credits (five lectures per week) — Second semester
Open to those having completed sophomore work. Required of juniors
Mechanical preparation of ore for the market, for metallurgical treatment, etc.

6. DESIGNS AND SPECIFICATIONS — PROFESSOR VAN BARNEVELD AND ASSISTANT
Four credits (eight laboratory hours per week) — Second semester
Open only to seniors in regular standing. Required of seniors
Designs of mine cars, skips, head-frames, etc., in connection with thesis work.

7. FIELD WORK — PROFESSOR VAN BARNEVELD AND ASSISTANT
Eight credits (eight hours a day for six weeks) — Second semester
Open to those who have completed mining 3. Required of juniors
Practice in plane surveying during month of May. Practice in underground mine surveying during first two weeks of June.

8. MINE-MAPPING — ASSISTANT PROFESSOR MCCARTY
Three credits (six laboratory hours per week) — Second semester
Open to those who have completed 3. Required of juniors

9. PRACTICAL MINING — PROFESSOR VAN BARNEVELD AND ASSISTANT
Eight credits (eight hours per day, six weeks) — Summer vacation
Open to those who have completed 1, 2, 3, 7 and 8. Required of juniors
Study of mining operations. Mine plant and equipment and practical mining work at a mine to be selected by department during months of July and August.

10. THESIS — PROFESSOR VAN BARNEVELD AND ASSISTANT
Two and four credits (two and four hours conferences) — First and second semester
Open only to seniors in regular standing. Required of seniors.
Conference with individual students. This work is based upon a review of the preceding technical work and field work.

PHYSICS

FREDERICK S. JONES, M.A., Professor of Physics
ALOIS F. KOVARIK, M.A., Instructor in Physics

1. GENERAL PHYSICS — PROFESSOR JONES AND MR. KOVARIK
Four credits (four lectures and recitations per week) — First and second semester
Open to students completing mathematics 2. Required of sophomores
Recitations and experimental lectures.

School of Mines

SENIORS—12

Cole, Willard, Lisbon, N. D.
Conkey, Charles R., Minneapolis.
Crowley, Jay, Stillwater.
Gavin, Lawrence T., Staples.
Grant, Royal C., Duluth.
Hognason, Guy B., Minneota.
Hoyt, Samuel, Minneapolis.
Rood, Lynn, St. Paul.
Santo, Julius H., Janesville.
Swanson, Axel, Monticello.
Taylor, Harold G., Minneapolis.
Williams, Homer A., Minneapolis.

JUNIORS—28

Bills, E. L., Minneapolis.
Chesley, J. G., Minneapolis.
Devereux, Lawrence, Minneapolis.
Duncan, Kenneth J., Fergus Falls.
Farnam, Henry E., Minneapolis.
Giltinan, George M., St. Paul.
Goodrich, Norman P., Minneapolis.
Harmon, Benjamin G., St. Paul.
Heath, Clarence L., Janesville.
Heidel, Charles S., Minneapolis.
Herring, William E., Blue Earth.
Holler, Fred W., St. Paul.
Jacobsen, Harry, Fergus Falls.
Johnson, Algot F., Cannon Falls.
Jones, Ernest, Red Wing.
Kennedy, Arthur T., Duluth.
Larson, Clarence L., Waseca.
Leonard, Forest M., Minneapolis.
McKenzie, James R., Adrian.
Moody, R. G., Minneapolis.
Newell, John, Shakopee.
Ostrand, Peter M., Atwater.
Quade, Edward H., Janesville.
Simpson, William F., Minneapolis.
Stewart, Gordon, Monticello.
Strane, Archie, St. Paul.
Sundness, Odin A., Fergus Falls.
Thomas, Clarence J., Minneapolis.

SOPHOMORES—49

Abbott, Le Roy, St. Peter.
Abbott, Theodore S., St. Paul.
Anderson, Joseph, Florence.
Anderson, Walter C., Hopkins.
Bailey, Paul T.. Minneapolis.
Baker, Emory P., Minneapolis.
Beck, Chas. S., Lewiston.
Borgeson, Anshelm C., Minneapolis.
Burgess, Robert J., Minneapolis.
Carson, Clark J., Glenwood.
Cooke, Hamilton, St. Louis, Mo.
Crouse, Stevens, Minneapolis.
Dickinson, Roy E., Minneapolis.
Drake, George M., Madelia.
Ekloff, Victor E., Cokato.
Elliott, Jay R., Minneapolis.
Fixen, Victor L., Minneapolis.
Flanner, Edwin T., Minneapolis.
Fosness, Arthur W., Lakefield.
Hill, Arthur S., Minneapolis.
Hurley, John J., Pine City.
Hyatt, Frank L., Minneapolis.
Jahn, William F., Winona.
Kingsley, Neil S., Minneapolis.
Kleinschmidt, Clarence, St. Paul.
Lawton, J. Edward, Worthington.
Lewis, John W., Minneapolis.
Lindholm, Milton, Ortonville.
McCullough, Erwin, Minneapolis.
Martin, Dean W., Minneapolis.
Martin, Lynn, Grand Meadow.
Maves, Theodore W., St. Peter.

Melchior, Claude B., Hutchinson.
Meyer, William, Minneapolis.
Miller, Emil J., Hopkins.
Milnor, Walter S., Minneapolis.
O'Brien, Charles, St. Paul.
Perry, Joe B., Minneapolis.
Rahilly, Harold, Minneapolis.
Schuster, Carl H., Rochester.
Snyder, Leslie, Minneapolis.
Snyder, S. O., Minneapolis.
Tetlie, John R., Canton, S. D.
Turner, H. Milton, Crookston.
Victor, Albin F., Lindstrom.
Walker, E. Harold, Minneapolis.
Walters, Chas. W., St. Paul.
Wehr, Arthur J., St. Paul.
Whitson, Lloyd R., Fergus Falls.

FRESHMEN—61

Awrey, Bruce, Hawley.
Bentley, Frank, Minneapolis.
Bjorge, Guy, Duluth.
Bohland, Carl P., St. Paul.
Brosius, Ernest, Minneapolis.
Burns, Donald S., South St. Paul.
Burris, William W., Duluth.
Case, Leland I., Minneapolis.
Christie, David R., Minneapolis.
Cirkel, Scott, Minneapolis.
Claypool, J. Verner, Duluth.
Cohen, Julius, Minneapolis.
Coventry, Edward D., Duluth.
Danish, Samuel, Minneapolis.
d'Autremont, Charles M., Duluth.
Deringer, Walter O., St. Paul.
Dickson, Robert, Minneapolis.
Edwards, Junius D., Minneapolis.
Englund, Arthur, Starbuck.
Fabian, John H., Campbell.
Hagstrom, Leonard J., Minneapolis.
Halloran, Joseph E., Langdon, N. D.
Harrington, George L., Langdon.
Haskill, Isom W., Pipestone.
Hawley, R. W., Minneapolis.
Hayward, Josiah, St. Cloud.
Hewitt, Ezra A., Minneapolis
Jenswold, John D., Duluth.
Johnson, Roy, Casselton, N. D.
Kennedy, Charles T., Eau Claire, Wis.
Klossner, Howard J., New Ulm.
Knox, Lafayette, Grand Rapids.
Kremer, Edward G., Grand Rapids.
Larrabee, Orin, Minneapolis.
Lea, John, Minneapolis.
Lee, Theodore L., Ellendale, N. D.
Lyon, Chalmer, Minneapolis.
McAdams, Howard R., Duluth.
McClintock, Thomas, Rugby, N. D.
Michie, Roy G., Montevideo.
Murray, Emmett, London, O.
Olson, Alfred W., Argyle.
Olson, Walter S., St. Paul
†Packard, William D., Jr., St. Paul.
Patterson, William, Minneapolis.
Prouty, Roswell W., St. Paul.
Quinn, Max F., Spokane, Wash.
Schapler, Harry F., Pipestone.
Schultz, Max F., New Salem, N. D.
Simons, Leighton, Virginia.
Smith, C. C., St. Paul.
Spicer, Raymond, Willmar.
Stevens, Howard, Stillwater.
Taylor, W. L., Dundas.
Teasdale William M., St. Paul
Underhill, Russell, Stillwater
Wallinder, Arthur, Duluth.
Walter, Rollie B., Delano.
Williams, James, Ely.
Woodis, Clarke M., Amboy
Youell, Harold, Minneapolis.

†Died Jan. 1909.

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The University of Minnesota Bulletin

The College of Science, Literature, and the Arts

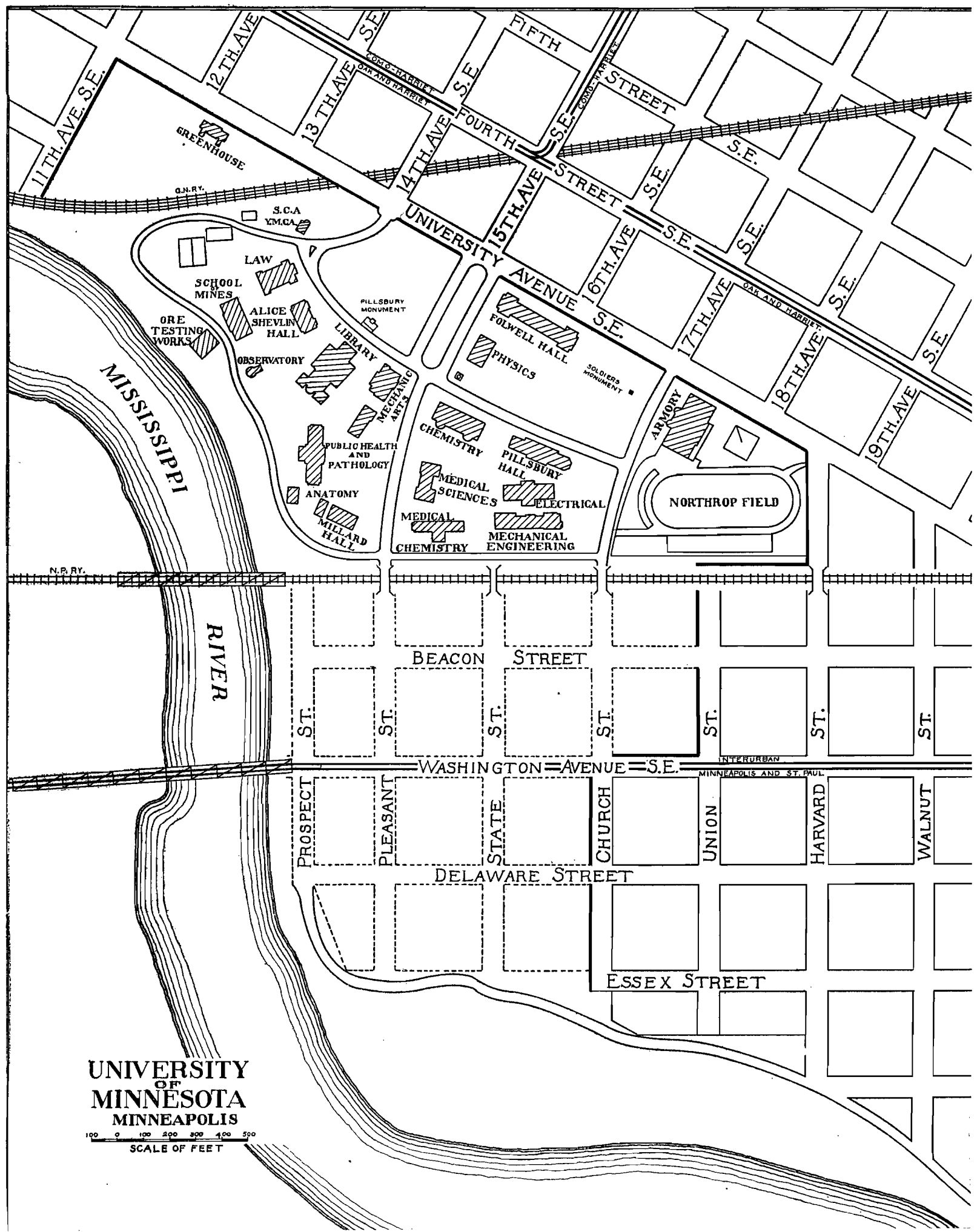
1909-1910

Volume XII July 15, 1909 No. 5

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 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


UNIVERSITY OF MINNESOTA
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University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	19	Saturday	Easter recess of one week, begins 5:40 P. M.
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

The School Year for 1910-11 will begin Tuesday, September 13

Program of Entrance Examinations

1909–10

When entrance examinations are required, this schedule will be followed

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

PROGRAM OF CONDITION EXAMINATIONS

TUESDAY,	September 7,	9 A. M.	English, Rhetoric, Sociology
		2 P. M.	Mathematics, Philosophy, Psychology
WEDNESDAY,	September 8,	9 A. M.	Animal Biology, Botany, Geology, Physics
		2 P. M.	Astronomy, Chemistry, Economics, Drawing
THURSDAY,	September 9,	9 A. M.	French, German, Greek, Scandinavian
		2 P. M.	Histrry, Latin, Education, Politics

The school year for 1909-10 will begin Tuesday, Sept. 14.

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 SCHOOL OF AGRICULTURE
- THE DAIRY SCHOOL
- THE SHORT COURSE FOR FARMERS
- THE SHORE COURSE FOR TEACHERS
- THE SCHOOL OF TRACTION ENGINEERING
- THE FORESTRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

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CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

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JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

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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

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ADA L. COMSTOCK, M.A., Dean of Women

*Resigned.

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
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The College of Science, Literature and the Arts
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PROFESSOR J. C. HUTCHINSON — PROFESSOR CARL SCHLENKER
PROFESSOR NORMAN WILDE

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The College and School of Agriculture
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PROFESSOR SAMUEL B. GREEN

The College of Law
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The College of Medicine and Surgery
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The College of Homeopathic Medicine and Surgery
DEAN EUGENE L. MANN

The College of Dentistry
DEAN ALFRED OWRE

The College of Pharmacy
DEAN FREDERICK JOHN WULLING

The School of Mines
DEAN WILLIAM R. APPLEBY

The School of Chemistry
DEAN GEORGE B. FRANKFORTER

The College of Education
DEAN GEORGE F. JAMES

The Graduate School
DEAN HENRY T. EDDY

The Dean of Women
ADA L. COMSTOCK

The University Library
JAMES T. GEROULD

General Alumni Association
DAVID P. JONES

The University Library
JAMES T. GEROULD

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

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PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

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PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

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PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

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The Committee on the Library

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The College of Science, Literature and the Arts

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ANNA H. PHELAN, Ph.D., Instructor in Rhetoric
BERT A. ROSE, Instructor of Band
ROYAL R. SHUMWAY, B.A., Instructor in Mathematics
NELLIE A. WHITNEY, B.L., Instructor in Rhetoric
RICHARD WISCHKAEMPER, M.A., Instructor in German
HURBERT H. WOODROW, Ph. D., Instructor in Psychology
JAMES ZIMMERMAN, Instructor in Chemistry
FRANZ AUST, B.A., Assistant in Physics
EDWARD ANDERSON, B.S., in Chem., Assistant in Chemistry
WALTER BADGER, B.A., B.S., Assistant in Chemistry
THOMAS CAHILL, Assistant in Rhetoric
CHARLES R. CRESSY, B.S., Assistant in Chemistry
JAMES DAVIES, Ph. D., Assistant in German
RENE M. DELAMARE, Assistant in French
RUPERT EICHHOLZER, M.A., Assistant in German
HELEN GRIFFITH, B.A., Assistant in Rhetoric
DAISY HONE, M.A., Assistant in Botany
A. ALFRED JOHNSTON, B.A., Laboratory Assistant in Geology
CHARLES E. JOHNSON, M.A., Assistant in Animal Biology
ALFRED E. KOENIG, Assistant in German
LOUIS W. MCKEEHAN, B.S. in Engr., Assistant in Physics
JESSIE A. MATSON, Assistant in Physical Culture
LEON METZINGER, B.A., Assistant in German
ALICE M. MISZ, M.A., Assistant in Botany
PETER OKKELBERG, B.A., Assistant in Animal Biology
ELENOR SHELDON, B.A., Assistant in English
FRIEDA L. STAMM, B.A., Assistant in German

MAUDE STEWARD, Assistant in Drawing
EDITH VON KUSTER, Assistant in Chemistry
† Resigned

STUDENT HELPERS

For 1908-9

EDLA BERGER, B.A., Scholar in Mathematics
KEIVIN BURNS, B.A., Scholar in Astronomy
ARTHUR R. GRAVES, Scholar in Economics and Political Science
ALBERT N. GILBERTSON, B.A., Scholar in Sociology and Anthropology
INGEBRIGHT LILLIHI, B.A., Scholar in Philosophy
ALLISON MCMANIGAL, B.A., LL.B., Scholar in Sociology and Anthropology
WILLIAM W. NORTON, Scholar in Philosophy
ALICE POPE, B.A., Scholar in History
CHARLES PHILIPS, Scholar in Animal Biology
RASMUS S. SABY, M.A., Scholar in Economics and Political Science
DOROTHEA STEWART, B.A., Scholar in Geology
PETER A. SVEEGGAN, B.A., Scholar in Rhetoric
VICTOR N. VALGREN, B.A., Scholar in Economics and Political Science
TOSCA VON SCHULTEN, Scholar in German
ANNALEE WEISKOPF, B.A., Scholar in German

Faculty Committees

For 1909-10

Enrollment—HUTCHINSON, BAUER, SAVAGE, SWENSON, ZELENY, A.

Curriculum—MOORE, WEST, SIGERFOOS, RANKIN, ERIKSON, PIKE, ROBINSON.

Graduate Studies and Degrees—EDDY, GRAY, BROOKS, NACHTRIEB, SCHLENKER, GEROULD, HUTCHINSON (ex-officio).

Program—LEAVENWORTH, TILDEN, MINER

Students' Work—NICHOLSON, '09; WHITE, '10; COMSTOCK, '11; Wilde, '12; BUSSEY, '13

Relation of the University to the Public Schools—JAMES, BENTON, HALL, BOTHNE, ANDRIST

Public Lectures and University Functions—JENKS, POTTER, SIDENER, JUERGENSON, KLAEBER

Debate and Oratory—RARIG, SANFORD, WILLIS, SARDESON, SCHAPER

University Extension—JAMES, BURTON, FRANKFORTER, GRANRUD, ROSENDAHL, PECK

Catalogue—DOWNEY, ZELENY J., CLEMENTS, CLARK. ANDERSON STOMBERG, THE REGISTRAR

Admission

Every applicant for admission to this college must take an examination in writing, spelling, and English composition. (For details see page .)

Aside from this test, admission is either by certificate or by examination.

No student is admitted with more than three half-year conditions and all such conditions must be removed by examination within one year.

No student will be admitted to the work of the second semester unless he bring a certificate of advanced standing from another college showing his qualifications to continue the second semester's work. This is because all freshmen subjects begin in the fall and are continued throughout the year.

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:

1. That they have credits for four years of English and one year each of Algebra and Plane Geometry (all who do not present credits for both First Part Higher Algebra and Solid Geometry are required to take mathematics five times per week through the freshman year);

2. That they have nine additional year-credits for subjects selected from B below;

3. That they have records of "passed with credit" or "passed with honor" in all subjects presented.

This certificate privelege is further limited by the proviso that each school so accredited shall keep its records of standings in the following grades: "passed," "passed with credit," and "passed with honor, "or else shall 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 three grades.

The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted towards graduation.

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

Each mark below "passed with credit" shall count as a condition, unless a state high school board certificate shall be presented for the same subject.

Beginning in September, 1909, this rule for admission shall be applied to all work completed after June, 1908. Until it goes into effect for the full four years' work, applicants will be admitted provided they have not, on the average, more than one semester mark below "passed with credit" for each year subject to the rule.

(b) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state.

(c) Graduates of the advanced Latin course of the Minnesota state normal schools.

*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.

SUBJECTS ACCEPTED FOR ADMISSION

In all cases the character of the work and the time given to the respective subjects should be according to the following schedule:

A. SUBJECTS REQUIRED OF ALL

ENGLISH, four years, including

(a) Classics
(b) Principles of Composition
(c) Practice in Written Expression

MATHEMATICS

(a) Elementary Algebra, one year
(b) Plane Geometry, one year

B. ELECTIVES, NINE YEAR-CREDITS REQUIRED

MATHEMATICS

Higher Algebra, one-half year
Solid Geometry, one-half year

All who do not present credits for both of the above subjects are required to take mathematics five times per week through the freshman year.

LATIN

Grammar, one year
Caesar, four books, one year
Cicero, six orations, one year
Virgil, six books, one year

GREEK
Grammar, one year
Anabasis, four books, one year

GERMAN
Grammar, one year
Literature, one year

FRENCH
Grammar, one year
Literature, one year

SPANISH
Grammar, one year
Literature, one year

SWEDISH, DANISH-NORWEGIAN, ICELANDIC
Grammar, one year
Literature, one year

HISTORY
Ancient to Charlemagne, one year
Modern from Charlemagne, one year
England, one-half year
Senior American, one-half year

AMERICAN GOVERNMENT, one-half year

PHYSICS, one year

CHEMISTRY, one year

BOTANY, one-half or one year

ZOOLOGY, one-half or one year

ASTRONOMY, one-half year

GEOLOGY, one-half year

PHYSIOGRAPHY, one-half year

BUSINESS SUBJECTS, as parts of a business course
History of Commerce, one-half year
Commercial Geography, one-half year or one year
Elementary Economics, one-half year
Business Law, one-half year
Business Arithmetic, one-half year
Elementary Bookkeeping, one-half year
Advanced Bookkeeping and Business Practice, one year
Stenography and Typewriting, two years
Business Spelling and Correspondence, one-half year

MANUAL SUBJECTS, as parts of a Manual Training Course
Freehand Drawing, two credits[1]
Mechanical Drawing, two credits[1]
Shop Work, two credits[1]
Modeling and Wood Carving, one credit[1]
Domestic Art and Science, two credits[1]

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English classics should include a critical reading, in class of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth:* Milton's *Paradise Lost*, books one and two; Burke's *Conciliation with America;* Carlyle's essay on *Burns*. In the study of these works the s udent should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standnrd or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to experss himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year). Addition, subtraction, multiplication division, factoring, highest common divisor, lowest common multiple, fractions, equations, with one, two, and several unknown quantities followed by problems, theor of exponents, involution (including the binomial theorem for positive integral ex-

[1] For explanation of the term *credit*, as here used, see the syllabi for manual subjects given on page 27.

ponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

HIGHER ALGEBRA, FIRST PART (one-half year). While this subject does not include any topics not named under Elementary Algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processess hould be learned, theorms and sules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below they are not prepaired to pursue successfully at the University the Second Part of Higher Algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

PLANE GEOMETRY (one year). Any of the standard texts on this subject will furnish the necessary preparation. Isoperimetry, symmetry and maxima and minima of figures are not required. The exercises requiring solutions and demonstrations should not be ommitted.

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

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

CEASAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Ceasar and an account of his wars.

CICERO (one year). Any six orations from the following list: *Against Cataline, Poet Archias, Ligarius, Marcellus, Manilian Law* (to count as two orations), the fourteenth *Phillipic*. The student should also be fameliar with the life of Cicero.

VIRGIL (one year). Six books of the *Aeneid* and the *Eclogues* or one book of the *Metamorphoses* of Ovid. The student should be familiar with the life of Vergil and an account of his times and writings. A correct rythmical reading of th text is to be encouraged.

GREEK GRAMMAR (one year

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

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

(2) A vocabulary of a thousand words of every day use; facility in combining these words into simple sentences. As it means to this, 100 to150 pages of easy narrative prose and poetry should be read, from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.

(3) From two to three hundred German idioms.

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

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

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

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

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

FRENCH (two years) The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate easy English sentences into French and simple French prose into English.

SPANISH (two years) First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

ANCIENT HISTORY (one year).

(a) This study should hegin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting he early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charemangne's empire. This will bring together all the chief lines of influence which were afterwards to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intelectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industries.

It is desirable to give at east half of the year to this last period from 1789.

ENGLISH HISTORY (one-half year). The Saxon perion should be passed over rapidly. In the remainder of he work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

SENIOR AMERICAN HISTORY (one-half year). No attempt should be made to cover he whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

AMERICAN GOVERNMENT (one-half year). This should be a study of our government, national, state and local, as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence. Articles of Confederation, the constitution of the United States, the constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments,

their organization and function; he mehods of naminoting, electing, and appointing men to office; of framing and amending constitutions, city charters and statues; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil, and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

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

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

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

Botany (one or one-half year). Schools which give one-half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxanomy should be the aim of the course.

Zoology (one or one-half year). The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environ ment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents the their offspring, etc.—in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpertation and his judgments.

The animals for directiobservation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out olang the line indicated above.

It will be no iced tha tsuch a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under he best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand leus or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

Astronomy (one-half year). An elementary course in general astronomy as presented in any good modern text-book.

Geology (one-half year). These subdivisions should receive special attention: physiographic geology, which treats of the building of the land and the evolution of

its existing contours; geo-dynamics, the study of th forces, atmosphere, water, terrestriai heat, plants and animals modifying the earth; and a brief survey of historical geology.

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

BUSINESS SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A BUSINESS COURSE

The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to the University on the same footing an the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent chould embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no husiness course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: first, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business, law; second, courses dealing with the technique o business. The later may be further subdivided into the mathematics of business, including business arithmetic bookkeeping and business practice; and th language of business, including stenography, typewriting and business correspondence.

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

COMMERCIAL GEOGRAPHY (one-half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of menas of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemented by map work and assigned readings.

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

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

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

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

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

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

Spelling and Business Correspondence (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalizeation, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to most prominent industries of the locality.

MANUAL SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A MANUAL COURSE

In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school, should offer all of the subjects indicated. Not to exceed twenty-five per cent of the units for admision to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, business subjects, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

Owing to the facts that drawing and shop work do not require outside preparation, it is not fair that they should be credited by the schools on the same basis as the

academic subjects. It is therefore suggested that half the credits be allowed: that is to say, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject.

Freehand Drawing (two credits)
Mechanical Drawing (two credits)
Joinery (one-half credit)
Wood Turning and Cabinet Making (one-half credit)
Pattern Making and Forge Shop (one-half credit)
Machine Shop, including Chipping
Filing and Work on the Iron Lathe (one-half credit)
Drill Press and Iron Planer
Clay Modelling (one-half credit)
Wood Carving (one-half credit)
Wood Carving (one-half credit)

Domestic Art, including Carefully Graded Exercises in Sewing (one credit)

Domestic Science, including Practical Cookery, and Household Economy (one credit)

2. ADMISSION TO THE FRESHMAN CLASS BY EXAMINATION

Students who enter by examination, besides the entrance examination in English must pass examinations in secondary school subjects as follows:

(1) The six year-credits under "A" above and

(2) Nine year-credits selected from the list of electives under "B," provided that, if the total of entrance conditions does not exceed three half-year credits, the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions.

The character of the preparation needed to pass the examinations is indicated in the descriptions of subjects above.

Entrance examinations are offered at the University during the opening week of the University year. The program for the year 1909-10 is printed in this bulletin on page 5. Certificates of Minnesota state high school board examinations will be accepted in place of University entrance examinations in whole or in part.

3. ADMISSION TO THE SIX-YEAR COURSE IN SCIENCE AND MEDICINE

The requirements are the same as under 1 and 2 above, except that the First Part Higher Algebra, Solid Geometry and two years of Latin are required.

4. ADMISSION TO THE TWO-YEAR COURSE WHICH PREPARES FOR THE COLLEGE OF MEDICINE AND SURGERY.

The requirements are the same as under 1 and 2 above, except that two years of Latin are required.

5. ADMISSION TO THE SOPHOMORE CLASS FROM MINNESOTA STATE NORMAL SCHOOLS

Graduates of the advanced graduate course of a Minnesota state normal school are admitted with advanced standing equivalent to one year's credit, and receive the degree of Bachelor of Arts upon completing in this college ninety-six credits including freshman mathematics, courses 3 and 4, provided the usual requirements regarding majors and minors on page 43 be complied with. Such students will not be permitted to elect education 5 or 7, mathematics 1 or 2, rhetoric 1, or history 1,

and upon registering for mathematics 3 and 4 will be required to make good any deficiency in preparatory mathematics.

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.

6. ADMISSION TO ADVANCED STANDING

This college accepts records from all reputable colleges and universities for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this college. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show:

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

(b) The time spent upon each subject.

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

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

Candidates wishing to gain credits for advanced standing by examination are allowed examinations without additional charge, providing they be taken within six weeks after matriculating.

7. ADMISSION AS UNCLASSED STUDENTS

Whenever in the judgment of the enrollment committee an applicant presents satisfactory reasons for not taking the regular course, such applicant may be admitted as an unclassed student. He must take the same examinations or present the same credentials as are required of those who enter the freshman class. (See classes 1 and 2.) Exceptions can be made only upon vote of the faculty. A new application must be made each semester to the enrollment committee.

8. ADMISSION TO STUDY MUSIC

Students who enter the University for the express purpose of studying music must take the same examinations or present the same credits that are required by those who apply for admission to the freshman class (See classes 1 and 2.) No student is admitted for the purpose of studying music, unless he presents a certificate from the department of music showing that he is qualified to pursue the courses offered.

ENTRANCE EXAMINATION IN ENGLISH

All applicants for admission to the College of Science, Literature, and the Arts, except those belonging to classes 4 and 5 above, must be examined in writing, spelling, and English composition. The examination will be given in two parts.

Part I. Elementary.—Those who fail to pass this examination satisfactorily are required to take a special three-hour preparatory course in composition through their first year or longer if necessary. This work is not credited toward a degree. Students pursuing it are not allowed to take more than a maximum of seventeen hours of work per week, including this course. These students must take Rhetoric 1, but not until the preparatory work has been completed. At any time during the first half of the first semester the Department of Rhetoric may transfer promising students from the preparatory class to the class in Rhetoric 1.

Part II. Advanced.

Those who pass both parts of the examination with a grade of good or excellent take English 1 and 2, during their freshman year. Those who do not obtain one of these required grades register for Rhetoric 1.

The entrance examination will be given at the University in the chapel of the Library Building, Wednesday, Sept. 9, at 9:00 a. m.

The examination will be sent, upon application, to the principals of state high and other accredited schools in the state to be offered in each school at the option of the principal to members of the senior class who expect to enter the University. The examination, if given, must be held on Saturday, May 22, under the general rules which govern state high school board examinations. All papers must be sent immediately after examination to the Registrar of the University and will be marked by the proper University authority.

Students who enter the freshman class after the regular September examination without having taken the test in English may be given a special test if the Department of Rhetoric sees fit, or shall be registered for preparatory rhetoric with the provision that, if found proficient during the first six weeks, they may be promoted to the freshman rhetoric class. Such students must be prepared to suffer any furthur change in registration necessitated by the program and rules of the college.

LIST OF ACCREDITED SCHOOLS

The following high schools are accredited:

Ada
Adrian
Aitkin
Akeley
Albert Lea
Alden
Alexandria
Amboy
Annandale
Anoka
Appleton
Argyle
Arlington
Atwater
Austin
Bagley
Barnesville
Belle Plaine
Bemidji
Benson
Bird Island
Biwabik
Blooming Prairie
Blue Eerth City
Brainerd
Breckensidge
Browns Valley
Boffalo
Caledonia
Cambridge
Canby
Cannon Falls
Cass Lake
Chaska
Chatfield
Chisholm
Clarkfield
Cloquet
Cokato
Cottonwood
Crookston
Dawson
Delano
Detroit
Dodge Center
Duluth
  Central
  Industrial
Egale Bend
E. Grand Forks
Elbow Lake
Elgin
Elk River
Ely
Elmore
Eveleth
Excelsior
Fairfax
Fairmont
Fairbault
Farmington
Fergus Falls
Fertile
Fosston
Frazee
Fulda
Gaylord
Glencoe
Glenwood
Graceville
Grand Meadow
Grand Rapids
Granite Falls
Hallock
Halstad
Harmony
Hastings
Hawley
Hector
Henderson
Herman
Heron Lake
Hibbing
Hinckley
Hopkins
Houston
Howard Lake
Hutchinson
Jackson
Janesville
Jordan
Kasota
Kasson
Kenyon
Kerkhoven
Lake Benton
Lake City
Lake Crystal
Lakefield
Lake Park
Lamberton
Lanesboro
Le Roy
Le Sueur
Le Sueur Center
Litchfield
Little Falls
Long Prairie
Luverne
Lyle
McIntosh
Mabel
Madelia
Madison
Mankato
Mantorville
Mapleton
Marshall
Mazeppa
Milaca
Minneapolis—
  Central
  East Side
  North Side
  West Side
  South Side
Minneota
Montevideo
Montgomery
Monticello
Moorhead
Mora
Morris
Morton
Mountian Lake
New Prague
New Richland
New Ulm
Northfield
North St. Paul
Olivia
Ortonville
Osakis
Owatonna
Park Rapids
Panyesville
Pelican Rapids
Perham
Pine City
Pine Island
Pipestone
Planiview
Preston
Princeton
Red Lake Lalls
Red Wing
Redwood Falls
Royalton
Renville
Rochester

Rush City
Rushford
St. Charles
St. Cloud
St. Louis Park
St. James
St. Paul—
  Central
  Cleveland
  Humboldt
  Mechanic Arts
St. Petes
Sandstone
Sauk Centre
Sauk Rapids
Shakopee
Sherburn
Slayton
Sleepy Eye
South St. Paul
Springfield
Spring Grove
Spring Valley
Staples
Stephen
Stewartville
Stillwater
Thief River Falls
Tracy
Two Harburs
Tyler
Virginia
Wabasha
Wadena
Warren
Waseca
Waterville
Welcome
Wells
West Concord
Wheaton
White Bear
Willow River
Willmar
Windom
Winnebago
Winona

The following private schools are also accredited to the University:

St. Mary's Hall, Faribault
St. Paul Academy
Shattuck Military Academy, Faribault
Stanley Hall, Minneapolis
Windom Institute, Montevideo
Concordia College, Moorhead
Pillsbury Academy, Owatonna
St. Joseph's Academy, St. Paul
St. Paul's College, St. Paul Park
The Loomis School, St. Paul
The Backus School for Girls, St. Paul
The College of St. Catherine, St. Paul
St. Margaret's Academy, Minneapolis
The Winona Seminary, Winona
St. John's College, Collegeville
St. Thomas College, St. Paul

Equipment

GROUNDS AND BUILDINGS

The buildings of the College of Science, Literature, and the Arts, along with those used by all departments of instruction save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University Avenue and the river and between Eleventh and Nineteenth Avenues Southeast. The campus is well wooded with a fine growth of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement.

Ten of the twenty-three buildings on the campus are used largely or exclusively for the work of the College of Science, Literature and the Arts. They include Folwell Hall, a building three hundred and twenty-two feet in length and three stories in height above the basement, in which offices, class and seminar rooms are provided for the mathematical, linguistic, philosophical and pedagogical departments; the Library Building, with provision for the social science and English departments; Pillsbury Hall for Animal Biology, Botany and Geology; Physics Building; the Chemistry Building; the Observatory; a plant house; the Armory, for military purposes and physical training; Shevlin Hall, devoted to the exclusive use of women students; and the Y. M. C. A. Building.

LIBRARIES

Besides the General Library, the College of Science, Literature and the Arts has the following department libraries: viz., those of Astromomy, Animal Biology, Botany, Chemistry, Economics and Politics, French, Geology, German, Greek, History, Latin, Mathematics, Military Science, Philology, Philosophy, Physics, Rhetoric, Scandinavian, and Spanish.

The departmental libraries are designed especially for the work of their respective departments and consist mainly of books of reference and current periodicals relating to technical subjects.

The whole number of bound volumes owned by the University is about one hundred and twenty thousand, unbound books and pamphlets about twenty thousand. About seven hundred and thirty current periodicals are received.

MUSEUMS AND COLLECTIONS

The museums of the University contain material obtained from various sources, arranged with special reference to its use for illustration. Among the more notable collections are the following:

GEOLOGY AND MINERALOGY: The Kunz collection of minerals, purchased of George F. Kunz; several suites of crystalline rocks secured from various sources; the Ward collection of casts, contributed in part by citizens of Minneapolis; collections of the rocks, fossils,minerals and economic products of Minnesota; upwards of 9,000 entries gathered by the gegoloical survey of the State; the Sardeson collection of paleozoic fossils of Minnesota, Wisconsin, Iowa and neighboring states, comprising 30,000 specimens; a series of 3,000 thin sections of typical rocks and minerals largely representing Minnesota localities; purchased material comprising a fine collection of crystals; 5,000 minerals and 3,000 specimens of economic minerals and crystalline rocks, and a collection of over 4,000 photographs and lantern slides.

Mr. Arus S. Williams of Minneapolis has given to the University his extensive collection of negatives and photographs. During many years of active work as a photographer, he has collected a series of several thousand plates representing geologic and geographic subjects, commercial views and historic scenes. These will prove of great value in illustrating the physical, commerical and political history of the State. They are to be recognised as the A. S. Williams Collection of Photographs and Photographic Negatives.

ZOOLOGY: All the material collected by the zoological survey; a collection of mounted Minnesota birds representing about one-third of the species found in the state; a number of the mammals of the state and a few from the more western states; a collection of fishes, molluscan shells, Philippine Island corals and other foreign material.

The ornithological reference collection contains the excellent Thomas S. Roberts and Franklin Benner collection of skins, nests and eggs of Minnesota birds The entomological collection contains over 3000 named Minnesota insects, is particularly rich in aphidæ and contains the Guthrie collection of collembola.

BOTANY: The general herbarium, numbering about 400,000 specimens and comprising the series of plants collected by the state botanist; an alcoholic collection of material for dissection; a collection of woods of Minnesota; a limited series of carboniferous and cretaceous fossil plants, including the Lesquereaux collection from the Minnesota River localities.

SOCIOLOGY AND ANTHROPOLOGY: Wall-charts and maps which present graphically a large number of sociological facts, from various parts of the United States; a collection of plaster-caste crania and skulls howing man's ancestors, fossil man from western Europe, typical mem-

bers of the various living races and subraces, both normal and artificially deformed; a collection of face-masks in color, presenting well the Oceanic peoples; a series of busts in white, presenting facial and cranial characteristics of a considerable number of different peoples; natural cranial, skull and skeletal materials from some dozen different continental and insular geographic areas; and the Guthrie collection of ethnologic specimens from the Bulu tribe of Kamerun province, Africa, presenting the material culture of a savage people in the Tropics.

CLASSICS: Some material illustrating classical geography, topography, chronology, mythology, archaeology, and art, consisting mainly of plans and charts, casts, pictorial illustrations, fac-similes of manuscripts and inscriptions.

ENGLISH: A few fac-similes of manuscripts, plates that may serve for the purpose of archaeological instruction, reprints of blackletter books and of original editions, photographs and portraits.

MATHEMATICS: The Schroeder wooden and the Schilling gypsum, string and paper models for Solid Analytical Geometry, many of the Schilling models for illustrating the Theory of Surfaces, several of the Schilling mechanical devices for describing various loci, the Keufel and Esser models for Solid Geometry, and large slated globes, suitably mounted, for use in Spherical Geometry and Spherical Trigonometry.

STUDENT ORGANIZATIONS AND PUBLICATIONS

For information regarding the Young Men's Christian Association, the Young Women's Christian Association, the University Catholic Association, the Athletic Association, and student publications, see Bulletin of General Information.

LITERARY, SCIENTIFIC, AND MUSICAL ORGANIZATIONS

PHI BETA KAPPA.—A chapter of the honorary society of *Phi Beta Kappa* was established at the University in 1892. A small proportion of the graduates of the College of Science, Literature, and the Arts are elected to membership each year. Election is based upon high scholarship and character.

SIGMA XI.—A chapter of the honorary scientific society of *Sigma Xi* was established at the University in 1896. A small proportion of the graduates of the scientific and technical departments are elected to membership each year. Election is based upon high scholarship and character.

THE GRADUATE CLUB is a club organized for the purpose of fostering a greater interest in graduate work, for mutual help, and for the discussion of topics under investigation.

THE MINNESOTA LITERARY UNION is a federation of the members of

the following societies: Shakopean, Forum, Castalian, Minerva, and Arena. Four meetings are held each year.

LITERARY SOCIETIES.—The above named literary societies are mainly debating clubs. Every student is welcome to attend the literary sessions, but the business sessions are usually held behing closed doors. Students desiring to join should make early application to some member of the society he prefers, as the membership is limited. Membership limit: *Shakopean*, 35, men; *Forum*, 30, men; *Minerva*, 30, women; *Law Literary*, unlimited, law students; *Castalian*, 35, men; *Theta Epsilon*, 30, women; *Thalian*, 25, women; *Acanthus*, 30, women.

THE DEBATING BOARD has charge of home and inter-collegiate oratorical contests.

THE NORTHERN ORATORICAL LEAGUE is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, Oberlin College, the State University of Iowa, the University of Illinois and the University of Minnesota. Its purpose is to foster an interest in public speaking and to elevate the standard of oratory by holding annual contests. The contests are open only to undergraduates.

THE EUTERPEAN CLUB.—Is a regularly organized body of singers, composed of forty of the women students of the University. The selection of voices is made at the beginning of each school year. The club is under the direction of Prof. Scott.

General Information

FEES

Incidental fee			
Residents of Minnesota,	$10.00	per	semester
Non-residents,	20.00	"	"
Laboratory fees			
Animal Biology, couress 1, 2, 3, 4, 8, 9 and 15, each	3.00	"	"
Botany, all undergraduate courses, each	3.00	"	"
Chemistry, all undergraduate courses, each	5.00	"	"
Except course 4,	7.00	"	"
and course 5,	10.00	"	"
Geology, course 11,	1.00	"	"
Mineralogy, courses 1 and 2, each	3.00	"	"
Course 3,	15.00	"	"
Music, courses 1, 2, 3 and 8, each	4.00	"	"
Courses 4 and 5 (1½ hours per week),	32.00	"	"
Courses 4 and 5 (3 hours per week),	64.00	"	"
Course 6,	2.00	"	"
Physics, courses 2, 4, 6, 7, 8, 9, 10, 12. 15 and 17, each	3.00	"	"
Course 5,	2.00	"	"
Courses 13 and 18, each	5.00	"	"
Change of registration,	2.00	per	subject
Delay in registration, beginning with first day of recitations (except for first registration),	.25 per day		
Examination for removal of condition, at set time,	1.00		
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.

ASSISTANTS, SCHOLARS, SCHOLARSHIPS, LOANS AND PRIZES

ASSISTANTS AND SCHOLARS

It is the policy of the University to encourage graduate study and to provide for assistance in laboratories, reading of test and examination papers, supervision of note books, and similar services by the appointment of assistants and scholars in departments where such services are required. The general principles which now control the making of such appointments are: (1) the appointments are made by the Board of Regents, upon the nomination of the Head of the department concerned and its ratification by the Dean of the College; (2) appointments are for one year only, but may be renewed; (3) the appointees must be graduate students, who are taking work along the lines of their appointments; (4) they are not regularly placed in charge of classes, and when exceptions are made to meet emergencies, the arrangement is regarded as a temporary one.

SCHOLARSHIPS

The Moses Marston Scholarship in English

Friends and pupils of the late Professor Moses Marston have given one thousand dollars as a memorial fund. The annual income of the fund is to be used to help some student in the English course. The award of the income is made on the basis of pecuniary need and of deserving scholarship.

The Albert Howard Scholarship Fund

Under the last will and testament of Mr. James T. Howard, of the town of St. Johnsbury, Vermont, $4,166.81 was left to the University to establish a scholarship to be known as the Albert Howard Scholarship.

The College Women's Club Scholarship

The College Women's Club of Minneapolis has established a scholarship for the benefit of women students in this University. For the year 1909-10 this scholarship amounts to $150. In awarding it the preference will be given to students in the junior and senior classes and to graduate students. Application for this scholarship may be made to Miss Comstock, Dean of Women.

STUDENT LOAN FUNDS

The Gilfillan Trust Fund

The Hon. John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the Board of Regents to assist worthy students, needing such aid, to secure an education. The regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the Regents for the administration of the fund may be learned by addressing the President of the University.

The Puritan Colony Scholarship Loan

The Puritan Colony of the National Society of New England Women has established a loan fund for women students in the University. For the year 190)–10 this scholarship loan amounts to one hundred dollars. It is available for women students of New England birth or ancestry. In awarding it the preference will be given to young women in the junior and senior classes. Application for it may be made to Miss Comstock, Dean of Women.

PRIZES

The John S. Pillsbury Prize

Three prizes of one hundred, fifty, and twenty-five dollars each, offered by the heirs of the late John S. Pillsbury, are awarded for the best work in the Department of Rhetoric, as evidenced finally by an oration in public.

The '89 Memorial Prize in History

he class of 1889, at graduation, established a prize of twenty-five dollars each year, to be known as the '89 Memorial Prize, and to be given for the best thesis in history by a member of the graduating class. The award is made by a professor in history in some other institution.

The William H. Dunwoody Prize

Mr. William H. Dunwoody has provided a cash prize of seventy-five dollars for the members of the team winning the inter-sophomore debate, and another prize of twenty-five dollars for the student in the sophomore class writing and delivering the best oration.

The Frank H. Peavey Prize

Mrs. Frank T. Heffelfinger continues the prize of one hundred dollars, established by her father, the late Frank H. Peavey. This prize consists of seventy-five dollars for the members of the team winning the freshman-sophomore debate, and another prize of twenty-five dollars to the student in the freshman or sophomore class writing and delivering the best oration.

The James T. Wyman Prize

A prize of twenty-five dollars is offered by the Hon. James T. Wyman, of Minneapolis, through the Department of Economics and Politics, for the best essay of three to five thousand words by an undergraduate student, on the subject of "The Influence of Immigration upon the Development of the Northwest."

The William Jennings Bryan Prize

The Hon. William Jennings Bryan has given the University the sum of two hundred dollars for the encouragement of studies in political science. The annual income will be given as a prize to the writer of the best essay upon a topic to be announced each year. The competition is open to all students of the College of Science, Literature, and the Arts.

The Frank O. Lowden Prize

The Hon. Frank O. Lowden, of Chicago, offers as a prize to be competed for by the Northern Oratorical League, an endowment of three thousand dollars, which will yield an annual income of about one hundred and seventy-five dollars. A prize of one hundred dollars will be given to the orator winning first place, fifty dollars to the orator winning second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

CLASS ROUTINE AND SCHOLASTIC REQUIREMENTS

Class work extends through six days of the week, except Satuday afternoon. The daily session is divided into eight class periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at eight thirty and closes at twelve thirty-five; the afternoon session extends from two o'clock until five forty. A general assembly of the faculty and students is held at ten thirty a. m.

Most of the courses of instruction are given in three periods per week. One series is scheduled for Monday, Wednesday, and Friday, another series for Tuesday, Thursday, and Saturday. Students are advised to try to arrange their programs so as to secure as even a distri-

bution as possible between the two series, and also, if possible, in such a manner that they may have half of each day free for study at their rooms, some laboratory, or in the University library. This arrangement can usually be secured without restricting the choice of subjects by careful study of the program and bulletin.

Examinations are held at the close of each semester. Students are graded upon the bases of their class work and examinations for each subject which they pursue as excellent, good, passed, incomplete, conditioned, or failed. For graduation an average of good must be secured in at least fifty per cent of the courses pursued. In computing the averages an excellent balances a pass, making an average of good for each of the two courses. An incomplete must be removed within one month after the opening of the following semester or it becomes a condition. A condition can be removed by passing an examination in the subject before the opening of the corresponding semester of the following year; if not so removed, it becomes a failure and is subject to the rules governing failures. A failure must be pursued again in class.

A student who at any time becomes deficient in more than the work of one half year loses his class rank and is regarded as a member of the next lower class. Students whose absences exceed four weeks in the aggregate during a semester are not permitted to take the semester examinations without special permission of the faculty. Any student receiving conditions or failures in sixty per cent of the work of the first semester is dropped from the rolls and not allowed to re-enter the University until the opening of the following year.

MILITARY DRILL

The act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in military science and tactics at all institutions that are its beneficiaries. The armory is located on the University compus and has all the facilities usually provided in a modern armory. The United States government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

THE UNIVERSITY STATE TEACHER'S CERTIFICATE

Graduates of the College of Science, Literature, and the Arts may apply for and receive upon vote of the faculty the University state teacher's certificate under the following conditions:

First. They must have maintained a good average of scholarship throughout the four years of college study.

Second. They must have the recommendation of at least one department concerned with high school studies.

Third. They must have completed one semester of Psychology and three semesters of Education, including courses 1 and 2.

This certificate by state law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of success, the certificate may be made permanent by the endorsement of the State Superintendent of Public Instruction and the President of the University.

WOMEN STUDENTS

After June first,1909,the Registrar will supply a list of recommended boarding and rooming places to any women requesting such information. Young women who wish to earn a part of their expenses may generally learn of opportunities by communicating with Miss Ada Comstock, Dean of Women. During the college year Miss Comstock holds office hours every week day in the council room in Alice Shevlin Hall. At such times she welcomes any women student who cares to come to her whether for advice, information, or an informal talk.

During the summer Miss Comstock's address in Moorhead, Minnesota. She will be glad to correspond with young women who are planning to enter the University, or with their parents.

SHEVLIN HALL. Through the generosity of Hon. Thomas H. Shevlin, the University now possesses in Alice Shevlin Hall a building admirably designed and equipped for the use of its women students. The purpose of this building is to furnish suitable rest and study rooms for the women attending the University. It contains besides several society rooms, a large lunch room, and a general reception hall.

THE STUDENT GOVERNMENT ASSOCIATION FOR WOMEN. This organization was formed for the purpose of aiding in the care and conduct of Alice Shevlin Hall. Every woman student in the University is regarded as a member. There are no dues. The association makes rules for the guidance of those using Alice Shevlin Hall; it provides committees to enforce the rules; it gives permission for the holding of social functions in the building; and it controls the expenditure of any surplus in the receipts from the lunch room.

THE WOMAN'S LEAGUE. This organization is open to all women who are students in the University. It is governed by a council made up of student members from the four college classes. It makes its headquarters in the council room in Alice Shevlin hall. The aim of the organization is to promote fellowship and sociability among the women of the University. For this purpose it gives receptions and parties for girls at regular intervals throughout the year. It also endeavors to aid in any project which may be of benefit to the University, and particularly to the women students.

Courses of Study

I. FOUR-YEAR COURSE IN SCIENCE, LITERATURE AND THE ARTS, LEADING TO THE DEGREE OF BACHELOR OF ARTS

The degree of Bachelor of Arts will be conferred upon any student who fulfills the conditions as to amount, grade and distribution of work stated under A, B, and C below:

A. AMOUNT OF WORK.—The student must earn from the courses offered in the college one hundred and twenty-six credits, in addition to the required exercises in drill, gymnasium, and physical culture.

A credit is one hour per week through one semester.

Juniors and seniors pursuing beginning language courses (not including Spanish, Greek, and Hebrew), English 1 and 2, mathematics 1 and 2, chemistry 1 (a), rhetoric 1, or history 1, shall receive only half credits.

No student shall receive credit for more than two beginning modern language courses, save by special permission.

A double period in laboratory subjects counts as one credit hour.

B. GRADE.—In at least one-half his work (sixty-three credits), the student must secure a grade of "good." For the system of grades see page 41. For the purpose of this count each "excellent" shall balance one "pass," making an average of "good" for both records.

C. DISTRIBUTION OF WORK.—

1. The student must complete a major and four minors. A major is not less than eighteen credits and a minor is not less than twelve credits in one department. Two minors, or a major and a minor, may be combined in one department, but at least one of the five subjects shall be chosen from each of the following groups:
   (a) English, French, German, Greek, Latin, Rhetoric
   (b) Animal biology, astronomy, botany, chemistry, geology and mineralogy, physics
   (c) Economics and political science, history, mathematics, philosophy, sociology and anthropology.

   Majors are not offered in the Departments of Drawing, Music and Semitic.

In the statement of courses, departments may indicate any courses which shall not count toward a major or minor, and in no case shall the following courses be so counted: the first year of beginning languages (excepting Spanish, Greek, and Hebrew), English 1 and 2, mathematics 1 and 2, rhetoric 1, and history 1.

2. Each student must choose his major subject before the end of the sophomore year, and report to the Registrar his choice.
3. Upon the choice of his major subject, the department in which the student has made his selection shall assign him to an adviser in that department.
4. The student shall choose, under the advice and approval of his adviser, a sufficient amount of work to make with his major, a total of forty-eight credits, the additional subjects being such as to reinforce the major.

This rule applies for graduates of 1908-9 only to work in the junior and senior years, and for graduates of the year 1909-10 to work of the sophomore, junior, and senior years.

FRESHMAN YEAR

The subjects for which freshmen register must be continued through the year.

The amount of work must not be less than fifteen hours nor more than seventeen hours, exclusive of Military Drill and Gymnasium or Physical Culture.

REQUIRED

I.

ENGLISH, three hours, for those who have passed part 2 of the entrance examination in English with a grade of good or excellent; or

RHETORIC, three hours, for those who have not so passed.

II.

MATHEMATICS 1 and 2, five hours, for those who do not present entrance credits in both First Part Higher Algebra and Solid Geometry.

III.

MILITARY DRILL, three hours, and GYMNASIUM, one hour in two periods, for men; or

PHYSICAL CULTURE, three hours, for women.

ELECTIVE BY GROUPS

Each freshman must take at least one subject and not more than two subjects from each of the following groups; except that those who take mathematics 1 and 2, five hours, are not required, but are at lib rty (if the maximum number of hours will permit), to take another subject from Group III.

I.

FRENCH 1, five hours; or French 3, three hours, with or without French 4 (conversation), two hours.
GERMAN 1, five hours; or German 4, three hours, with or without German 5 (conversation), two hours.
LATIN 1, three hours.
SCANDINAVIAN 1, five hours, or 3, three hours; or Scandinavian 2, five hours, or 4, three hours.

II.

ANIMAL BIOLOGY 1, three hours.
BOTANY 1, three hours.
CHEMISTRY 1 or 2, three hours.

III.

GREEK 1, five hours; or Greek 3, three hours.
HISTORY 1 or 2, three hours.
MATHEMATICS 3 and 4, three hours each.

SOPHOMORE YEAR

REQUIRED

MILITARY DRILL, for men.

Not less than fifteen nor more than eighteen credit-hours of work from the following groups, selecting at least one from each group and not more than six credit hours from any one department.

Sophomores, so long as they conform to the above requirements, may elect courses in Comparative Philology, Scandinavian, Semitic, Drawing and any subjects of the freshman year which they have not already taken, except Rhetoric 1 by those who have taken English 1 and 2.

ELECTIVE BY GROUPS

I.

ENGLISH, courses 1, 2, 3, 4, 5, 6, 7, 9.
FRENCH AND SPANISH, courses 2, 3, 4, 5, 6, 7, 8, 11, 12.
GERMAN, courses 2, 3a, 4, 5, 6, 7, 8.
GREEK, courses 1, 2, 3, 4, 5, 13.
LATIN, courses 3, 4, 5.
RHETORIC AND PUBLIC SPEAKING, courses 2, 10.

II.

ANIMAL BIOLOGY, courses 2, 3, 4, 5, 7, 8, 9, 15, 16.
BOTANY, courses 2, 3, 14, 15.
CHEMISTRY, course 3.
MINERALOGY, courses 1, 2, 3.
PHYSICS, courses 1, 2, 3, 4, 5, 6.

III.

ECONOMICS, courses 1, 2, 3a, 3b, 4, 5a, 6, POLITICAL SCIENCE, course 1.
HISTORY, courses 1, 2, 3, 4, 5.
MATHEMATICS, courses 6, 7.
PHILOSOPHY AND PSYCHOLOGY, courses 1, 2, 3.

JUNIOR AND SENIOR YEARS

The work of these two years is elective, subject to the restrictions imposed by the requirement for a major course and four minor courses (see page 43), and the regulation that certain courses of the two preceding years count, when taken by juniors and seniors, for only half credit.

The number of credit-hours in any semester must be not less than fifteen nor more than eighteen, except by permission of the Committee on Students' Work.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS WITH DISTINCTION

Students may receive the degree of Bachelor of Arts with distinction in accordance with the following plan:

1. The degree with distinction shall be granted upon the basis of special excellence in the major subject, and shall be granted in only one department,.

2. To become a candidate for the degree of B. A. with distinction, the student must signify his intention by registration, upon the proper

blank, at some time between the close of the freshman year and the beginning of the senior year. Students wishing to become candidates for the degree are advised to register as such as early in the course as possible.

3. At the time of registration for such degree the applicant must have an average of *good* in all his previous work. (For the purpose of this count, each excellent shall balance one *pass*, making an average of *good* for both records).

4. To receive the degree with distinction at graduation, the student must fulfill the following requirements:

a. Comply with all the regulations applying to the ordinary degree of Bachelor of Arts.

b. Secure a record at graduation, higher than pass in four-fifths of all his work (provided that an excellent shall balance a pass as in B, page 43.)

c. By May 1st of his senior year, present a satisfactory thesis upon a subject approved by the adviser in charge of this work.

d. Comply with the special requirements of the department in which he takes his major work.

e. Be recommended by the department to the faculty for special excellence in his work; and

f. Be approved by vote of the faculty.

5. A student registered for the degree with distinction may withdraw his name at any time from such registration, or the registration may be cancelled by the department concerned, or by the Dean after consultation with the department; but students whose registration for the degree with distinction has been withdrawn or cancelled shall still receive the degree of Bachelor of Arts upon completion of the requirements therefor.

6. The degree shall be given in the diploma thus: Bachelor of Arts, with distinction.

7. The names of students recommended by the faculty for the degree with distinction shall appear in the commencement program, with the statement that distinction has been acquired in a certain department. A certificate signed by the head of the department and the Registrar shall be presented to the student who has attained the degree with distinction.

8. The special requirements of the departments in which distinction may be gained shall be authorized by the faculty, after recommendation by the Curriculum Committee.

COMBINATION COURSES

For the benefit of those who wish to begin a professional course before completing the four-year course in Science, Literature and the Arts, the following combination courses and short courses are offered.

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

Seniors who intend to enter the College of Medicine and Surgery are permitted to take in that college anatomy, chemistry, histology and physiology (it being understood that no repetition of work is allowed,) and the work is credited as senior work, thirty-two credits, in the College of Science, Literature and the Arts and first-year work in the College of Medicine and Surgery. This privilege is conditioned upon their having credits for two years of Latin and for one year (three credit-hours per week) of each of the following: physics, general inorganic chemistry, qualitative analysis, zoology or botany, and German or French. They are required to complete a major and two minors, one in each of the groups (a), (b) and (c).

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

For requirements for admission see page 28. The first two years of this course are given in the College of Science, Literature and the Arts, and the last four years are given in the College of Medicine and Surgery. It leads to the degree of Bachelor of Science at the end of four years, and to the degree of Doctor of Medicine at the end of six years.

Students who enter without French or German are required to take German 1, ten credits, and German 3 (scientific), six credits.

Students entering with two years of German may take French 1, ten credits, in either first or second year, and German 3, six credits, in the other year.

Descriptions of the following courses, which are all required, are given in the respective departmental statements.

FIRST YEAR

ZOOLOGY, course 1, three hours.
BOTANY, course 1, three hours.
CHEMISTRY, course 1 or course 2, three hours.
GERMAN OR FRENCH (see note above).
SECOND PART HIGHER ALGEBRA AND TRIGONOMETRY, three hours.
MILITARY DRILL AND GYMNASIUM, for men; PHYSICAL CULTURE, for women.

SECOND YEAR

Comparative Anatomy of Vertebrates, three hours.
Qualitative Analysis, three hours.
Elements of Economics, three hours, first semester.
Economic Conditions in American Cities, three hours, second semester.
German or French (see note above).
Physics with Laboratory Practice, four hours.
Rhetoric, course 1, three hours.
Military Drill, for men.

The remaining years of the course are given in the College of Medicine and Surgery and the subjects may be found in the bulletin of that college.

4. TWO-YEAR COURSE FOR ADMISSION TO THE COLLEGE OF MEDICINE AND SURGERY

For admission to the College of Medicine and Surgery an entrance credit in two years of Latin and two years of work in the College of Science, Literature and the Arts are required. The subjects are the same as prescribed, under 1, for other freshmen and sophomores, but the following courses are required:

FIRST YEAR

Mathematics, courses 1 and 2, or 3 and 4.
Chemistry, course 1 or 2.
Animal Biology, course 1, or Botany, course 1.
German or French.

SECOND YEAR

Physics, courses 1, 2, 3, 4.
Chemistry, courses 3.

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

Seniors who intend to enter the College of Law are permitted to take in that college elements of contracts, domestic relations, commercial paper, torts and criminal law, and the work is credited as senior work, twelve credits, in the College of Science, Literature and the Arts and first-

year work in the College of Law, thus enabling students, by some extra work, to finish the law course in two more years.

6. ONE-YEAR COURSE FOR ADMISSION TO THE COLLEGE OF LAW

For admission to the College of Law one year of work is required in the College of Science, Literature and the Arts. The subjects are the same as prescribed, under 1, for other freshmen.

7. COURSE FOR MUSIC STUDENTS

Students who have entered the University for the express purpose of studying music are required to register for courses 1 and 4 in music and at least six credits in other courses outside the Department of Music, preferably modern languages, to be selected with the approval of the Enrollment Committee.

8. UNCLASSED STUDENTS

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 subjects offered to freshmen. A new application must be made each semester to the Enrollment Committee.

Any unclassed student who has satisfied the regular entrance requirements may classify at the beginning of either semester as a regular student, and become a candidate for the Bachelor of Arts degree by registering in accordance with the regulations governing amount and distribution of work as indicated on page 43.

RELATED DEPARTMENTS

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

I. English Language and Literature
   (a) English, (b) Comparative Philology, (c) Rhetoric
II. Ancient Languages and Literatures
   (a) Greek, (b) Latin, (c) Semitic Languages
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) Astromony, (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 and Anthropology

IX. FINE ARTS

(a) Drawing, (b) Music

X. MILITARY SCIENCE AND PHYSICAL CULTURE

Departmental Statements

ANIMAL BIOLOGY

HENRY F. NACHTRIEB, Professor, Head of Department of Animal Biology
CHARLES P. SIGERFOOS, Professor
OSCAR W. OESTLUND, Assistant Professor
HAL DOWNEY, Assistant Professor
JOHN C. BROWN, Assistant Professor
CHARLES E. JOHNSON, Assistant
PETER OKKELBERG, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from botany, geology, chemistry, physics, advanced modern language and additional animal biology.

FOR B.A., WITH DISTINCTION, the general requirements (page 46) and six credits in the department in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 1 and 15 and 2 or 3 or 4 or 5 and twelve additional credits in the biological sciences, six of which must be in botany. Course 13 in zoology is recommended.

JOURNAL CLUB.

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

The laboratory fee for each of the courses 1, 2, 3, 4, 8, 9, 15 and 16 is three dollars per semester.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Zoology	1, 2	6	All	None
2.	Morphol. Invertebrates	1, 2	6*	Soph,. Jr., Sr.	1
3.	Histol.-Embryol.	1, 2	6	Soph., Jr., Sr.	1
4.	Comp. Anat. Vertebrates	1, 2	6	Soph., Jr., Sr.	1
5.	Gen. Physiol.	1, 2	6*	Soph., Jr., Sr.	1
6.	Experimental Zoology	1, 2	6	Jr., Sr.	1 and 3
7	Entomology	1, 2	3	Soph., Jr., Sr.	1
8.	Ichthyology	1	6*	Soph., Jr., Sr.	1
9.	Ornithology	2	3	Soph., Jr., Sr.	1
10.	History of Zoology	1	2	Jr., Sr.,	1
11.	Animal Habits—Intel.	2	2	Jr., Sr.	See statement
12.	Economic Zoology	2	2	Jr., Sr.	1
13.	Teacher's Course	1	1	Jr,. Sr.	Eighteen credits
14.	Problems & Research	1, 2	6 or 12*	Jr., Sr.	See statement
15.	Entomol. & Ornith.	1, 2	6*	Soph., Jr., Sr.	1
16.	Histol. & Embryol Technique	2	3	Soph., Jr., Sr.	1

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

1. General Zoology Messrs. Sigerfoos, Oestlund, Brown, Downey, Johnson and Okkelberg

Six credits (six hours per week) Both semesters

Open to all.

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 or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's *Manual of Zoology*.

2. Morphology of Invertebrates Messrs. Sigerfoos and Johnson

Six credits (six hours per week) Both semesters

Open to those who have completed course one; both semesters must be completed before credit is given for the first semester.

The object of this course is to familiarize the students with the methods and principles of zoology thru an intensive study of two or three groups of animals and to aquaint him with the minor phyla not considered in course one. During the year 1908-9 the Protozoa and Crustacea will be the groups especially taken up.

3. Essentials of Histology and Embryology, Messrs. Nachtrieb and Downey

Six credits (six hours per week) Both semesters

Open to those who have completed course 1.

In this course are taken up the development and minute structue of the animal as an organism built up of tissues 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. Comparative Anatomy of Vertebrates Messrs. Brown and Johnson

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.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to the 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*.

5. General Physiology Mr. Nachtrieb

Six credits (three hours per week) Both semesters

Open to those who have completed course one; both semesters must be completed before credit is given for the first semester.

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 relations to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

6. Experimental Zoology

Six credits (six hours per week) Both semesters

Open to those who have completed courses 1 and 3; both semesters must be completed before credit is given for the first semester.

7. Entomology Mr. Oestlund

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.

The course covers, in general, the elements of entomology, structure, functions

development, and economics, leading up to a discusion of the principles of taxonomy and their application to the classification of insects. Folsom's *Entomology*, and Hertwig's *Zoology* are used as text-books and general guides.

8. ICHTHYOLOGY — MR. BROWN
Six credits (six hours per week) — First semester
Open to those who have completed course 1.

This course includes lectures, quizzes, and laboratory work in the structure, classification life history, and culture of fishes, with special reference to the fishes of our inland waters which are of economic importance.

9. ORNITHOLOGY — MR. BROWN
Six credits (six hours per week) — Second semester
Open to those who have completed course 1.

This course includes lectures, quizzes, laboratory and field work in the structure, classification, nest building, food, habits, and distinction of birds. The lectures consider the subjects of migration, coloration, flight, etc. Practical demonstrations are given of the preparation of birds and eggs for scientific purposes. Required: Chapman's *Hand-Book of Birds of Eastern North America.*

10. HISTORY OF ZOOLOGY — MR. NACHTRIEB
Two credits (two hours per week) — First semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course.

A course of lectures on the history of zoology from ancient times to the present including a brief history of our domestic animals and those that have become extinct within historic times, and a discussion of the modern theories and problems of heredity and evolution.

11. ANIMAL HABITS AND INTELLIGENCE — MR. NACHTRIEB
Two credits (two hours per week) — Second semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; alternates with course twelve. Not offered in 1909-10.

The course consists of lectures and discussions on animal habits and intelligence, and concludes with a consideration of the development of mental power in animals.

12. ECONOMIC ZOOLOGY — MR. NACHTRIEB
Two credits (two hours per week) — Second semester
Open to juniors and seniors; alternates with course 11.

Lectures on the uses made of animals and their products, the production and protection of those animals of special economic importance, and the methods of protection against some of the disease-producing animals.

13. TEACHERS' COURSE — MR. NACHTRIEB AND ASSISTANTS
One credit (one hour per week) — First semester
Open to those who have completed a minor in zoology; given in alternate years.

Lectures and discussions on the ends to be attained through courses in general zoology and the methods and means by which such ends may be gained.

14. PROBLEMS AND RESEARCH — MR. NACHTRIEB AND ASSISTANTS
Six or twelve credits (six or twelve hours per week) — Both semesters
Open to those who have completed courses 1 and 3 or 1 and such other work as may be required by the instructor in charge; both semesters must be completed before credit is given for the first semester.

The course consists of advanced or essentially independent work carried on in some specific line under the direction of the professor in charge of that work. The lines of work open at present are:—

(a) Morphology of vertebrates under — Mr. Brown
(b) Blood and connective tissue of vertebrates under — Mr. Downey
(c) Entomology under — Mr. Oestlund
(d) Experimental zoology
(e) General physiology under — Mr. Nachtrieb

(f) Invertebrate embryology under — Mr. Sigerfoos
(g) Invertebrate morfology under — Mr. Sigerfoos
(h) Vertebrate embryology or morfology under — Mr. Nachtrieb

15. Elements of Entomology and Ornithology, Messrs. Oestlund and Brown
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.

This course is planned with special reference to candidates for the teacher's certificate. During the first semester the class meets with Mr. Oestlund during the third and fourth hours on Monday, Wednesday and Friday. During the second semester the class meets with Mr. Brown on Monday, Wednesday and Friday at the hours arranged with him.

16. Essentials of Histological and Embryological Technique, Messrs. Nachtrieb and Downey
Three credits (six hours per week) — Second semester

Open to juniors and seniors who have completed course 1 and the first semester of course 3.

This course consists essentially of practical work in the preparation and preservation of histological and embryological material, and in the methods of reconstruction.

ASTRONOMY

Francis P. Leavenworth, Professor, Head of the Department of Astronomy

REQUIREMENTS OF THE DEPARTMENT

For a Minor, courses 1 and 3 (the latter taken as a three hour course).

For a Major, courses 1 and 3 (the latter taken as a six hour course) together with five additional courses and reinforcing subjects, (thirty credits,) selected from mathematics, physics, mechanics, chemistry, geology and additional astronomy.

For B. A. with Distinction, the general requirements (page 46) course 1, course 2 (as a six hour course) and six credits in physics.

ASTRONOMICAL OBSERVATORY

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

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Astronomy	1, 2	6	Jr., Sr.	Math. 4 or 2
2.	Observatory Practice	1, 2	6	Jr., Sr.	Math. 4 or 2
3.	Practical Astronomy	1, 2	6 or 12	Jr., Sr.	1 and Math. 7, 9 and 10
4.	Adv. Practical Astronomy	1, 2	6	Grad.	1 and 2
5.	Celestial Mechanics	1, 2	6	Grad.	1 and 2
6.	Astrophotography	1, 2	6	Grad.	1 and 2

1. General Astronomy — Mr. Leavenworth
Six credits (three hours per week) — Both semesters

Open to juniors and seniors who have completed mathematics 4 or 2 (trigonometry).

A 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
Six credits (three hours per week) — Both semesters
Open to those who have completed or are taking course 1.
Work at the observatory in connection with course one.

3. 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, 9, and 10.
Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares.

4. Advanced Practical Astronomy — Mr. Leavenworth
Six credits (three hours per week) — Both semesters
Open to graduate students who have completed courses 1 and 3.

5. Celestial Mechanics — Mr. Leavenworth
Six credits (three hours per week) — Both semesters
Open to graduate students who have completed courses 1 and 3.

6. Astrophotography — Mr. Leavenworth
Both semesters
Open to graduate students who have completed courses 1 and 3.
Photography of the heavenly bodies, measurement of plates, determination of positions, parallax, etc.

BOTANY

Frederic E. Clements, Professor, Head of Department of Botany
Josephine E. Tilden, Assistant Professor
Carl Otto Rosendahl, Assistant Professor
Frederic K. Butters, Instructor
Ned L. Huff, Instructor
Alice Misz, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, courses 1 and 2.

For a Major, courses 1 and 2, together with one advanced course covering two semesters, and reinforcing subjects (thirty credits) selected from zoology, chemistry, physics, geology, advanced modern languages, Greek, Latin, and additional botany.

For B. A. with Distinction, the general requirements (page), courses 1, 2 and any two advanced courses, each covering both semesters.

For a Teacher's Certificate, an average of at least good in courses 1, 2 and twelve additional credits in biological sciences, of which six shall be in zoology.

Courses 11 and 16 are recommended.

Students entering the department for the first time must take course 1, or present a satisfactory equivalent. Courses 1 and 2 are required for entrance to all advanced courses, with the exception of 11 to 15. Students are requested to confer with the head of the department before electing an advanced course.

The Botanical Seminar consists of advanced students in botany, together with the staff of the department. It meets every two weeks for the presentation of the results of investigation, and for the discussion of current problems.

The laboratory fee for each undergraduate course is three dollars per semester.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Botany	1, 2	6*	All	None
2.	Adv. Botany	1, 2	6	Soph., Jr., Sr.	1
3.	Plant Phys. and Ecology	1, 2	6	Soph,. Jr., Sr.	See statement
4.	Algae	1, 2	6	Jr., Sr.	1 and 2
5.	Fungi	1, 2	6	Jr., Sr.	1 and 2
6.	Mosses and Ferns	1, 2	6	Jr., Sr.	1 and 2
7.	Flowering Plants	1, 2	6	Jr., Sr	1 and 2
8.	Ecology	1, 2	6	Jr., Sr.	1, 2 and 3
9.	Plant Physiology	1, 2	6	Jr., Sr.	1, 2 and 3
10.	Cytology	1, 2	6	Jr. Sr.	1 and 2
11.	Industrial Botany	1, 2	6	Jr., Sr.	1 and 2
13.	Water Supply Botany	2	3	Jr., Sr.	1
14.	Timber and Timber Diseases	1	3	Soph., Jr., Sr.	1
15.	Bot. Microchemistry	1, 2	3	Soph., Jr., Sr.	1
16.	Plant Studies	1, 2	3	Jr., Sr.	1 and 2
17.	Morph. and Taxonomy	1, 2	..	Grad.	See statement
18.	Problems in Algology	1, 2	..	Grad.	See statement
19.	Problems in Phys. and Ecology	1, 2	..	Grad.	See statement
20.	Problems in Cytology	1, 2	..	Grad.	See statement

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

GENERAL COURSES

Required for entrance to any special course, except those in technical botany 11 to 15 inclusive.

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 is given for the first semester.

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 MR. CLEMENTS AND MR. ROSENDAHL
Six credits (six hours per week) Both semesters

Open to those who have completed course 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 adaptions of root, stem and leaf, and in the field of the principles of plant distribution, migration and grouping; cell study of growth, production of pollen and egg-cells, fertilization hybridization and seed formation; one practical paper each semester, cytology of plant breeding, plant adaptations, the life history of a forest, etc.

SPECIAL COURSES

3. PLANT PHYSIOLOGY AND ECOLOGY MESSRS. CLEMENTS AND HUFF
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.

Study of the factors which make the plant's home, viz., water, light, soil, heat, 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.

4. Algae — Miss Tilden
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

A detailed comparative study of the structure and classification of the algae; the blue-green and yellow-green algae, together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. Fungi — Mr. Clements
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

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

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.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lectures, laboratory and field work.

7. Flowering Plants — Mr. Rosendahl
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 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 those who have completed courses 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 those who have completed courses 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.

10. Cytology — Mr. Rosendahl
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis, together with a review of the history of cytologic investigation. Methods of cytological research indicated in the laboratory. Laboratory work and collateral reading.

11. INDUSTRIAL BOTANY — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to technical students who have completed courses 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.

13. WATER SUPPLY BOTANY — MISS TILDEN
Three credits (six hours per week) — Second semester

Open to those who have completed course 1.

A technical course for municipal, sanitary and reclamation engineers, involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.

14. TIMBER AND TIMBER DISEASES — MR. HUFF
Three credits (six hours per week) — First semester

Open to those who have completed course 1.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work and references.

15. BOTANICAL MICROCHEMISTRY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed course 1.

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.

16. 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 to be 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 elementary school of the College of Education.

GRADUATE COURSES

17. MORPHOLOGY AND TAXONOMY — MR. ROSENDAHL
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Important literature and necessary material will be provided for whatever research is entered upon, and the results of the investigations will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it.

18. PROBLEMS IN ALGOLOGY — MISS TILDEN
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be done on special groups or along any of the following lines: The freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-depositing algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island, which is open during the summer vacation.

19. Problems in Physiology and Ecology — Mr. Clements
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Opportunity for research work in ecology and physiology is offered along the following lines: Critical investigation of the physical factors of the habitat by means of instruments; studies in plant functions and adaptations; the experimental production of new forms; investigations in the development and structure of vegetation, and especially in migration, competition, etc.

20. Problems in Cytology and Embryology — Mr. Clements
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be taken along any of the following lines: The minute structure of the cell; microchemistry of the cell; development of sporangia and spores; fecundation; development of the embryo; origan and development of the primary tissues; development of organs; correlation, etc.

CHEMISTRY

George B. Frankforter, Professor, Head of Department of Chemistry
Charles F. Sidener, Professor
Edward E. Nicholson, Assistant Professor
Everhart P. Harding, Assistant Professor
Ira H. Derby, Assistant Professor
Lillian Cohen, Instructor
Francis C. Frary, Instructor
John A. Handy, Instructor
James Zimmerman, Instructor
Walter Badger, Assistant
Charles R. Cressy, Assistant
Edward Anderson, Assistant
Edith Von Kuster, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, eighteen credits, together with supporting subjects (thirty credits) selected from physics, mathematics, geology, botany, zoology, advanced modern language and additional chemistry.

For B. A. with Distinction, the general requirements (page 46) and six credits in addition to the requirements for a major.

For a Teacher's Certificate, an average of at least good in courses 1, 2, 3, 4 or 5, and 26.

The laboratory fee for each undergraduate course is five dollars per semester, except for course 4, which is seven dollars, for course 5, which is ten dollars, for course 26, which is three dollars, and for courses 6, 24 and 25, having no fee.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Chem.	1, 2	6*†	Those who enter without chemistry	
2.	Adv. Gen. Chem.	1, 2	6*	Those who enter with chemistry?	Entrance credit in chemistry
3.	Qual. Anal.	1, 2	6	Soph., Jr., Sr.	1 and 2
4.	Quant. Anal.	1, 2	6	Jr. Sr	3
5.	Organic Chem.	2	6	Jr., Sr.	3
6.	Theoretical Chemistry	2	2	Jr., Sr.	5
18.	Physical Chemistry	1, 2	3	Jr., Sr.	Chemistry 5 Physics 3 and 4
24.	Theoretical Electrochemistry	1	3	Sr., Jr.	Same as for Physical Chem.
25.	Radiochemistry	2	3	Jr., Sr.	24
26.	Teachers	2	1	Sr.	3
27.	Household and Sanitary Science	1, 2	6*	Jr., Sr.	1 or 2
28.	Spec. Inorganic			Grad.	
29.	Electrochemistry			Grad.	
30.	Organic Chemistry			Grad.	
31.	Alkaloids			Grad.	
32.	Analytical Chemistry			Grad.	

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

†Juniors and seniors are allowed only half credit.

1. GENERAL CHEMISTRY — MISS COHEN AND MR. BADGER

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 cerdit is given for the first semester.

Recitation 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 AND MR. BADGER

Six credits (six hours per week) — Both semesters

Open to all who have completed a satisfactory 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 AND FRARY

Six credits (six hours per week) — Both semesters

Open to those who have completed course 2

Lectures and laboratory work, with recitations and collateral reading. 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 — MR. SIDENER AND ASSISTANTS

Six credits (six hours per week) — First and Second semesters

Prerequisite, Course 3.

The laboratory fee is seven dollars per semester.

The course includes a general discussion of quantitative method,s with laboratory work in gravimetric analysis, first semester; followed by a discussion of standard solutions and the necessary stoechiometric calculations with laboratory work in volumetric analysis, second semester

5. Organic Chemistry, Messrs. Frankforter, Derby, Handy and Assistants
Six credits (three lectures and twelve hours of laboratory work per week) Second semester

Prerequisite, Course 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.

This course involves a study of the most important theories which coordinate and unify chemical and physico-chemical phenomena.

18. Physical Chemistry Mr. Derby
Three credits. First and second semesters

Prerequisites, 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.

24. Theoretical Electrochemistry Mr. Derby
Three credits. First semester

Prerequisites, Same as for Physical Chemistry.

This course includes the development of the most modern ideas relative to electrochemical principles and phenomena, involving therewith the electron theory and electrical nature of matter.

25. Radiochemistry Mr. Derby
Three credits. Second semester

This course is intended to follow the one in Theoretical Electrochemistry and has to do with the phenomena associated with the various radioactive elements including the chemical change which these elements undergo and the chemical reactions which may be induced while the changes are in progress.

26. Teacher's Course Miss Cohen
Two credits (two hours per week) Second semester

Prerequisites, 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.

27. Household and Sanitary Science Mr. Frankforter
Six credits Both semesters

To obtain credit both semesters must be taken.

Open to women of the junior and senior classes.

Sanitation: Causes and control of germ diseases, disinfection, pests, etc.

Foodstuffs: origin, preparation, purity, analysis and adulteration, selection, preparation, preservation.

Personal Hygiene: dietetics, food values, clothing, exercise, etc.

The following professors will cooperate in giving the course; Messrs. Westbrook, Beard, Clements, Flather, Nachtrieb and Bass.

GRADUATE COURSES

The following are open to graduate students. Arrangements may be made upon application to the department.

28. Special Inorganic Chemistry.

29. Electrochemistry.

30. Organic Chemistry.

31. Alkaloids.

32. Analytical Chemistry.

COMPARATIVE PHILOLOGY

FREDERICK KLAEBER, Professor, Head of Department of Comparative Philology

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, courses 1, 2, 3, 4, 6.

FOR A MAJOR, courses 1, 2, 3, 4, 5, 6, together with two additional courses and reinforcing subjects (thirty credits) selected from English, ancient languages and advanced modern languages.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and English 3, 4 and 22 or English 3 and German 14 in addition to the requirements for a major.

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

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Sc. of Lang.	1	2	Soph, Jr., Sr.,	None
2.	Life of Words	2	2	Soph., Jr., Sr.	None
3.	Teuton. Philol.	2	2	Soph., Jr., Sr.	None
4.	Esperanto	1	2	Jr., Sr.	None
5.	Seminar	2	2	Jr., Sr.	1
6.	Comp. Phonology	2	2	Jr., Sr.	See statement
7.	Comp. Grammar	..	..	Grad.	
8.	Gothic	..	..	Grad.	
9.	Urgerm. Gram.	..	..	Grad.	
10.	Old Saxon	..	..	Grad.	
11.	Old High German	..	..	Grad.	

1. GENERAL INTRODUCTION TO THE SCIENCE OF LANGUAGE — MR. KLAEBER
Two credits (two hours per week) — First semester
Open to sophomores, juniors, and seniors.
This course will be sufficiently general in its nature to be of use to all students who wish to obtain an insight into the life of language.

2. THE LIFE OF WORDS — MR. KLAEBER
Two credits (two hours per week) — Second semester
Open to sophomores, juniors, and seniors; alternates with course 3.
Etymology and semasiology. Growth of vocabulary; change of words in form aud meaning. Lectures and exercises with special reference to English and other Germanic languages.

3. INTRODUCTION TO TEUTONIC PHILOLOGY — MR. KLAEBER
Two credits (two hours per week) — Second semester
Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 2.
History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the Germanic languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German)

4. ESPERANTO AND THE IDEA OF AN INTERNATIONAL LANGUAGE — MR. KLAEBER
Two credits (two hours per week) — First semester
Open to juniors and seniors.

Comparison of the principal families of languages in grammatical and lexical respects. History of the movement for the creation of an international language. Consideration of the merits of Volapuk, Esperanto, and other artificial languages. Exercises in Esperanto.

5. PHILOLOGICAL SEMINAR MR. KLAEBER
Two credits (two hours per week) Second semester
Open to juniors and seniors who have completed course 1; alternates with course 6
Investigation of linguistic problems. Study of standard works (Paul, Delbrueck Wundt, Jespersen, etc.). Reports on recent publications.

6. COMPARATIVE PHONOLOGY OF ENGLISH AND GERMAN MR. KLAEBER
Two credits (two hours per week) Second semester
Open to juniors and seniors who have a fair knowledge of German. Alternates with course 5.
Elements of phonetics; history of English and German sounds; orthography. The lectures will be supplemented by practical exercises.

7. COMPARATIVE GRAMMAR OF THE GREEK, LATIN, AND GERMANIC LANGUAGES MR. KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
A general survey of the field of Indo-Germanic philology will be included.

8. GOTHIC MR. KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
The relation of Gothic to other Germanic dialects will be particularly emphasized. Study of the grammar (Braune, J. Wright, Streitberg) and reading of the gospels (Heyne's *Ulfilas*, 10th edition).

9. URGERMANISCHE GRAMMATIK MR. KLAEBER
Open to graduate students who have completed couse 8; other arrangements may be ascertained upon application to the department.
Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, et al.).

10. OLD SAXON MR. KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
Old Saxon Grammar and interpretation of the *Heliand*.

11. OLD HIGH GERMAN MR. KLAEBER
Open to graduates who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
Braune's *Althochdeutsche Grammatik*; Braune's *Althochdeutsches Lesebuch*.
This course is identical with German 14.

DRAWING

HENRIETTE CLOPATH, Instructor
MAUDE STEWARD, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.
A MAJOR is not offered.
FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 1, 2, 3, 5 and 6.

COURSES

No.	Title	Semester	Credit	Offered to	Prereq. courses
1.	Drawing and Painting in Representation	1, 2	6*	Soph., Jr., Sr.	None
2.	Adv. Drawing and Painting	1, 2	6	Jr. Sr.,	1
3.	Design	1, 2	6	Jr., Sr.	1 or 2
4.	2nd year Design	1, 2	6	Sr.	3
5.	Drawing and Education	1	3	Sr.	1 and 3
6.	Teaching of Drawing	1	1	Sr.	5

1. DRAWING AND PAINTING IN REPRESENTATION, MISS CLOPATH AND MISS STEWARD
Six credits (six hours per week) Both semesters
Open to sophomores (with the permission of the instructor), juniors and seniors.
The course consists of drawing of plant-form and landscape in pencil, in water color and in charcoal; the study of perspective and drawing of still life; drawing from the cast and sketching from life. Not credited toward a minor.
After having completed course 1 students may elect either course 2 or course 3.

2. ADVANCED DRAWING AND PAINTING MISS CLOPATH
Six credits (six hours per week) Both semesters
Open to juniors and seniors who have completed course 1.
More advanced work in cast drawing. Still life studies and figure poses in black and white and in color.

3. DESIGN MISS STEWARD
Six credits (six hours per week) Both semesters
Open to juniors and seniors who have completed course 1 or its equivalent.
The course includes the study of pure design and design in representation. Pure design: arrangement of lines, tones,and colors, in accordance with the principles of harmony, balance and rhythm. Historic ornament is introduced to show the application of these principles. Design in representation: 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.

4. DESIGN MISS STEWARD
Six credits (six hours per week) Both semesters
Open to seniors who have completed course 3.
This course includes advanced composition, book-decoration with especial attention to lettering, designs for stained glass, and design applied to leather, pottery, metal, and embroidery.

5. DRAWING AS RELATED TO EDUCATION MISS CLOPATH
Six credits (six hours per week) First semester
Open to seniors who have completed courses 1 and 3.
Exercises in all of the different kinds of work used in the schools; advanced work in black and white and in color.

6. THE TEACHING OF DRAWING MISS CLOPATH
One credit (two hours per week) Second semester
This course in conducted by lectures and collateral reading. Study of the methods that have proved most successful in public school teaching; the planning of work appropriate for each grade; the value and relation of art work in education as revealed through a study of the instincts and mental processes of the child.

ECONOMICS AND POLITICAL SCIENCE

JOHN H. GRAY, Professor, Head of Department of Economics and Political Science
EDWARD V. ROBINSON, Professor
WILLIAM A. SCHAPER, Professor
THOMAS WARNER MITCHELL, Assistant Professor
RAYMOND V. PHELAN, Instructor
CEPHAS D. ALLIN, Instructor
JOHN L. COULTER, Instructor
EUGENE T. LIES, Lecturer
JEREMIAH S. YOUNG, Ph.D., Assistant Professor, Extension Work
RALPH H. HESS, P .D., Assistant Professor, Extension Work

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, all in Economics or all in Political Science.

FOR A MAJOR, eighteen credits, all in Economics or all in Political Science, together with reinforcing subjects (thirty credits) selected from the other line of work in the department (twelve credits of which are required), history and sociology (six credits in case of an ordinary major and twelve credits in case of B. A. with distinction being required), and additional economics and political science.

FOR B. A. WITH DISTINCTION, the general requirements (page 46), six credits in addition to the requirements for a major and in the same line, and the filing of a typewritten copy of the thesis in the department.

FOR A TEACHER'S CERTIFICATE, the following: in business subjects, including commercial geography, a major in economics, with an average of at least good; in government, a major in political science, with an average of at least good.

The departments of economics and political science, history, and sociology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one of the departments of the social science group ought to be familiar at least with the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others. To students who are interested in the work of these departments, but who do not care to elect their major before the end of the sophomore year, the departmenes unite in the following recommendations for the freshmen and sophomore years:

GENERAL RECOMMENDATIONS

I. Freshman and Sophomore Years:
   1. The student should take the elementary work of each department within the group as early as possible. Accordingly the following courses are recommended:

Freshman year: history 2 (English constitutional): sophomore year: history 5 (American); economics 1, first or second semester; political science 1, first or second semester.

2. The student is advised to take in these years his required minor in science from the departments of botany or animal biology, and his required minor in language from the French or German beginning courses, unless he has a reading knowledge of both these languages at entrance.

II. Junior and Senior Years:

Elective under the direction of advisor selected from the department in which tne major subject is taken.

SUGGESTIONS TO STUDENTS

The work in economics and political science bears very directly on preparation for professional or business life and citizenship, no matter what occupation is finally chosen. But in order to aid students who have some idea as to their intended profession or calling to make a wise choice of courses, the following tabulated statement has been prepared.

Students intending to enter the law, for example, will find in the left-hand column the numbers of certain courses which are recommended to form a minor in economics; and in the next column, some additional courses which are suggested for those taking a major in economics. At the right, in like manner, are given the recommendations for a minor and a major in political science.

It should be noted: (1) that these recommendations are merely suggestive, not binding; (2) that more courses are sometimes recommended than suffice to make up a technical minor or major with the understanding that the student will consult the instructors and choose those courses which interest him the most.

Economics 1 and political science 1 are not included in these recommendations, as they must in any case precede the advanced courses; nor is economics 4 included, as it is required of all taking a major in economics.

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

ECONOMICS			POLITICAL SCIENCE	
Courses advised for a minor	Additional advised for a major	In Preparation for	Courses advised for a minor	Additional advised for a major
6, 7, 11, 10, 15	5a, 5b, 8, 9, 30a	Law	2, 3, 7, 8, 15, 17	4, 5, 10, 9, 12, 14, 20, 19, 18
3a, 3b, 6, 7, 11,10	29, 14, 15	Public Service	2, 3, 7, 15, 14, 9, 18, 20	8, 4, 5, 10, 12, 19, 17
2, 3a, 3b, 22, 12, 13, 29	5a, 5b, 19, 20a, 8, 9	Consular and Diplomatic Service	2, 3, 5, 10, 14, 20, 19, 18	4, 8, 12, 17
5a, 5b, 6, 7, 11,10	29, 30a, 16, 14	Journalism	2, 3, 7, 8, 9, 10, 17 20	4, 5, 12, 18, 19
8, 9, 11, 10	16, 20a, 20b, 21, 19	Engineering or Railway Service	6, 7, 14, 15	4, 8, 20
2, 12, 13, 11, 16, 22	20a, 21, 19, 29	Chemistry or Manufactures	2, 3, 7, 9	8, 12, 14, 18, 20
8, 9, 11, 16, 22	2, 12, 13, 21	Mining	2, 3, 7, 15, 9	8, 12, 14, 20
5a, 5b, 26a, 26b 29	20a, 20b, 20c, 21 25a	Insurance or Banking	2, 3, 7, 14, 15, 17	4, 8, 10, 12, 20
2, 3a, 3b, 5a, 5b, 12, 13	20a, 21, 19, 25, 27, 28	General Business	2, 3, 7, 15, 9, 17	8, 12, 19, 20
24a, 24b, 22, 2, 23, 12, 13	8, 9, 5a, 20a, 21	Forestry or Agriculture	2, 3, 15, 14	9, 12, 8, 20
2, 3a, 3b, 5a, 5b, 30a	20a, 21, 19, 30b	Teaching Business Subjects or American Government	2, 3, 7, 9, 15, 17, 18, 20	4, 5, 12, 10, 8, 14, 19
1, 3a, 3b, 5a, 18	6, 7, 11, 10	Medicine	2, 3, 7, 9	8, 12, 15, 20
3a, 3b, 16, 17, 18	14, 15, 30a or 30b	Charity Work or the Ministry	2, 3, 7, 8, 17	9, 12, 15, 18, 20

ECONOMICS

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
	Introductory Courses:				
1.	Elements of Economics	1 or 2	3	Soph., Jr., Sr.	None
2a.	Economic Geography of United States	1	3	Soph., Jr., Sr.	None
2b.	Economic Geography of Foreign Countries	2	3	Soph., Jr., Sr.	2a
3a.	Industrial History of Europe	1	3	Soph., Jr., Sr.	None
3b.	Industrial History of the United States	2	3	Soph., Jr., Sr.	3a
	General Courses:				
4.	Advanced Economics	2	3	Soph., Jr., Sr.	1
5a.	Money and Banking	2	3	Soph., Jr., Sr.	1
5b.	Financ. Hist of the U. S.	2	3	Jr., Sr.	1 and 5a
6.	Public Finance	1	3	Jr., Sr.	1
7.	Problems in Taxation	2	3	Jr., Sr.	6
8.	Econs. of Transportation	2	3	Jr., Sr.	1
9	*Railway Problems	1	3	Jr., Sr.	1
10.	Municipal Industries	2	3	Jr., Sr.	1
11.	The Modern Bus. Corporation	1	3	Jr., Sr.	1
12.	*Economics of Commerce	1	3	Jr., Sr.	1, 2 or 3a
13.	*Econ. of Colonization	2	3	Soph., Jr., Sr.	1, 2 or 3a
14.	*Economic Reforms	1	3	Jr., Sr.	1
15.	*The State in Relation to Industry	2	3	Jr., Sr.	14
16.	Labor Problems, Part I	1	3	Jr., Sr.	1
17.	Labor Problems, Part II	2	3	Jr., Sr.	1 and 16
18.	Economic Conditions in American Cities	1 or 2	3	Jr., Sr.	1 or 3b, or Soc. 1
	Business Courses:				
19.	Business Organization	2	3	Soph., Jr., Sr.	1
20a.	The Principles of Accounting	1	3	Jr., Sr.	1
20b.	Corporation Accounting	2	3	Jr., Sr.	20a
20c.	*Problems in Accounting	1	3	Sr.	1, 20a, 20b
20d.	*Auditing	1	3	Sr.	1, 20a, 20b
21.	Business Law	2	3	Soph., Jr., Sr.	1
22.	Materials of Commerce	2	3	Soph., Jr., Sr.	2
23.	Economics of Forestry and Irrigation	1	3	Jr., Sr.	1 or 2
24a.	History of Agriculture	1	3	Jr., Sr.	1 or 2
24b.	Economics of Agriculture	2	3	Jr., Sr.	24a
25a.	*Economics of Investment and Speculation	1	3	Jr., Sr.	1 and 5a
25b.	*Mathematics of Investment	1	3	Jr., Sr.	Math. 3 and Econ. 1
26a.	*Personal Insurance	2	3	Jr., Sr.	1
26b.	*Property Insurance	2	3	Jr., Sr.	1
27.	*Commercial Credit	2	3	Jr., Sr.	1 and 19
28.	*Advertising	2	3	Jr., Sr.	1 and 19

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
	ADVANCED AND GRADUATE COURSES:				
29.	*Theory and Practice of Statistics.....	1	2	Jr., Sr.	Six credits in Econ.
30a.	*Hist. of Econ. Thought.....	1	2	Jr., Sr.	Six credits in Econ.
30b.	*Methods of Investigation and Instruction.....	2	2	Jr., Sr.	Six credits in Econ.
31.	Seminar in Economics.....	1, 2,	6	Sr.	Twelve credits in Ec.

*Starred courses are not given every year.

INTRODUCTORY COURSES

1. ELEMENTS OF ECONOMICS MESSRS. ROBINSON, PHELAN AND COULTER
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. Required of all taking the six year medical course.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems. McVey's *Outline* and a text-book, supplemented by lectures and problems, with a weekly quiz.

2a. ECONOMIC GEOGRAPHY OF THE UNITED STATES MR. ROBINSON
Three credits (three hours per week) First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces: (1) a brief survey of the stages of economic development; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a study of the United States and its outlying possessions with referense to: (a) natural controls and resources; (b), labor and capital goods as factors in production; (c), localization and commercial importance of the principal extractive industries, viz., fishing, forestry, grazing, farming and mining; (d), ditto, of the principal manufacturing and distributive industries, including especially foreign commerce.

2b. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES MR. ROBINSON
Three credits (three hours per week) Second semester

Open to those who have completed course 2a

(4) A study of the natural resources, chief industries, commercial products, and commercial relations of the leading foreign countries. Special attention is given to international competition for foreign markets, to international trade routes, both by land and sea, and to countries, such as Canada, Latin America and the Orient, which have a large prospective value as markets for American manufactures and as fields for the investment of American capital.

Text book supplemented by lectures and reports.

3a. MODERN INDUSTRIAL AND COMMERCIAL HISTORY OF EUROPE, MR. GRAY
Three credits (three hours per week) First semester

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 2. (see course 3b)

3b. THE INDUSTRIAL AND COMMERCIAL HISTORY OF THE UNITED STATES MR. GRAY
Three credits (three hours per week) Second semester

Open to those who have had 3a.

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.

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 to a study of recent theories of distribution.
Assigned readings, reports, and discussions.

5a. MONEY AND BANKING — MR. PHELAN
Three credits (three hours per week) — Each semester
Open to those who have completed course 1.
The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

5b. FINANCIAL HISTORY OF THE UNITED STATES — MR. PHELAN
Three credits (three hours per week) — Second semester
Open to those who have completed courses 1 and 5a.
The main lines of our financial development, that is our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, topics, and discussions.

6. PUBLIC FINANCE — MR. ROBINSON
Three credits (three hours per week) — First semester
Open to those who have completed course 1.
The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION — MR. ROBINSON
Three credits (three hours per week) — Second semester
Open to those who have completed course 6.
Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, income and inheritance taxes. Based on Seligman, and reports of state tax commissions, with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION — MR. ROBINSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 and to students in the technical colleges. Offered especially for students of engineering.
A general course on the history and theory of transportation and communication with special reference to the Uuited 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; parcel post and express service; economic functions and relations of highways, interurban electric lines, steam railways, inland waterways, and ocean transportation; the organization of ocean commerce. Lectures, assigned readings, and discussions.

9. RAILWAY PROBLEMS — MR. ROBINSON
Three credits (three hours per week) — First semester
Open to those who have completed course 1

A course devoted to the study of railway problems and administration, including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5) the great railway systems of the United States; (6) regulation by the states and the federal government; (7) government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings, and special topics.

10. MUNICIPAL INDUSTRIES — MR. GRAY
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1; if possible, should be preceded by course 11.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership. Text-books, lectures, and quizzes.

11. THE MODERN BUSINESS CORPORATION — MR. GRAY
Three credits (three hours per week.) — First semester

Open to those who have completed 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 various phases. Text-books; Ripley, *Trusts, Pools, and Corporations*, Meade's *Trust Finance*, Wyman's *Cases*. Lectures, class discussions, and reports.

12. ECONOMICS OF COMMERCE — MR. ROBINSON
Three credits (three hours per week) — First semester

Open to those who have completed course 1, 2, or 3a.

Causes and characteristics of commercial crises; history, theory and mechanism of international commerce; free trade, reciprocity and protection, with special emphasis on the tariff history and policy of the United States; the balance of trade; economic causes of the contest for foreign markets; 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.

13. ECONOMICS OF COLONIZATION — MR. ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 1, 2, or 3a. Forms with course 12 in Political Science, a year course on colonization.

The economic causes of human migration; historical survey of colonization and classification of colonies with reference to their economic bases; existing colonial systems, with special attention to the outlying possessions of the United States; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings, and reports on special topics.

14. ECONOMIC REFORMS — MR. PHELAN
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

A study of Utopias and economic reforms from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform. Lectures, assigned readings, reports, and discussions.

15. THE STATE IN RELATION TO INDUSTRY — MR. PHELAN
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed courses 1 and 14.

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; the results of economic legislation designed to limit the freedom,

or raise the plane, of competition. General survey of the relation of the state to industry. Lectures, assigned readings, and reports.

16. LABOR PROBLEMS: Part I — MR. PHELAN
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1.

Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social wellbeing through improvements in the working and living conditions of the laboring classes. Lectures' text-book, assigned readings, and discussions.

17. LABOR PROBLEMS: Part II — MR. PHELAN
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1, but should also be preceded by course 16.

A study of immigrants in America, with reference to their economic contributions; the economic conditions in foreign countries that lead to emigration; the general problem of immigration; the special economic problems of the Slav, the Italian, the negro, the Chinese and the Japanese. Lectures, text-book, topics and discussions.

18. ECONOMIC CONDITIONS IN AMERICAN CITIES, — MR. LIES
Open to juniors and seniors who have completed course 1, course 3a, or sociology 1; required in the six year medical course.

A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment. Given by lectures with assigned readings and visits of inspection in the Twin Cities.

BUSINESS COURSES

19. BUSINESS ORGANIZATION — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

General organization of the business field for productive efficiency. Competitive vs monopolistic industry. Division of industry as a problem before the entrepreneur. The importance of division and organization of production processes within the individual plant. Mismanagement and waste. The internal organization and management of large scale industry disclosing the elements of its technical advantages. Typical manufacturing and mercantile concerns in success and failure. Based on Sparling's *Introduction to Business Organization* with lectures, assigned reading, and discussions.

20a. THE PRINCIPLES OF ACCOUNTING — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1.

Fundamentals in the theory and practice of accounting with a view to general business efficiency. The accountant, his essential qualities and work. Aims and essentials of a desirable system of accounts. The mathematical philosophy underlying all accountancy developing the demonstration of the principal specific fields of accounting. Practical application of all points of theory through numerous accounting sets taken from those in actual use in the business field.

Largely a laboratory course, with text and lectures.

20b. CORPORATION ACCOUNTING — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 20a.

The theory and general practice of modern systems of expert accounting. The general corporation and its financial accounts. The operating accounts, general office accounts, and reports, of manufactures, telegraph and express companies, banks, insurance companies, and transportation companies. Special studies in cost,

voucher, and loose leaf systems. Economical accounts. Examination of typical published reports from the standpoint of accountancy and interpretation. Inspection of the systems of running corporations.

20c. PROBLEMS IN EXPERT ACCOUNTING — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed courses 1, 20a and 20b.

Lectures on concrete problems of the type confronting the general public eccountant and class exercises taken largely from examinations for chartered public accountants, the aim being to give such information as shall be most suggestive and useful in preparing for C. P. A. examinations. Given alternate years with course 20d.

20d. AUDITING — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed courses 1, 20a and 20b.

The principal duties and qualifications of the auditor. The nature of his work and the problems that confront him. Auditing in the various types of industries. Numerous practical problems and audits of books of going concerns. Lectures and laboratory. Given alternate years with course 20c.

21. ELEMENTS OF BUSINESS LAW
Three credits (three hours per week) — Second semester
Open to those who have completed 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 every day business affairs. Assigned readings, lectures, and quizzes.

22. MATERIALS OF COMMERCE — MR. COULTER
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 2a.

A study of the principal wares of commerce with reference to sources, uses and industrial processes. Text with collateral reading, lectures and visits of inspection.

23. ECONOMICS OF FORESTRY AND IRRIGATION — MR. COULTER
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection, special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering: (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

24a. HISTORY AND LITERATURE OF AGRICULTURAL INDUSTRIES — MR. COULTER
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1 or 2.

Historic development of, and attitude toward, agriculture in ancient, mediaeval and modern times, and comparison of systems with reference to stage of economic development and geographic conditions. A more detailed study of the history of agriculture in the United States. Lectures, assigned readings, reports on special topics, quiz.

24b. ECONOMICS OF AGRICULTURAL INDUSTRIES — MR. COULTER
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 24a, and others by special permission.

Economic principles which underlie farm and estate management, land values, and prices of farm produce; preparations of produce for market, market and transportation problems. The size, ownership, organization and labor system of farms

as bearing on economic efficiency and social and political conditions. Farm organizations and co-operation. Lectures, assigned readings, reports on special topics, quiz.

25a. INVESTMENT AND SPECULATION — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 5a.

The social significance of the processes of saving and investing. Private property as the basis of investment. Funds, credit instruments and other machinery of investment. Investment markets. Historic investment opportunities, transition periods, and effect of economic progress. Laws of investment values and causes affecting values. Special studies in the various classes of investments, real estate, loans, general business, stocks and bonds. Organization and working of stock and produce exchanges. Wall Street. Investment vs. Speculation vs. Gambling.

Lectures, assigned readings and exercises in the interpretation of quotations, financial articles and market reports.

Given alternate years with course 25b.

25b. THE MATHEMATICS AND ACCOUNTANCY OF INVESTMENT — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed Mathematics 3 and Economics 1.

A study of the mathematical principles underlying computations in foreign exchange, banking, statistical investigation, insurance, building and loan associations, trust company business, bond issues, sinking funds etc. The development of the formulas and tables used in such computations and numerous practical problems. The accountancy of earnings, interest, depreciation and fluctuating values as under the above. The use of short cuts, tables and mechanical aids. Lectures, laboratory practice and problems. Given alternate years with course 25a.

26a. PERSONAL INSURANCE (Life and Accident) — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

The general theory and practice of life and accident insurance. History and evolution of life insurance and the modern life policy. The social functions of insurance and its importance in the business world. Development of the science of insurance explaining the different types of policy and the technical meaning of premium, reserve, dividend, surplus, expectation of life, annuities, surrender values, extentions, loans, paid up insurance etc. The personal insurance problem and its solution. Types of insurance organizations and companies. Public regulation. Lectures and assigned readings. Given alternate years with course 26b.

26b. PROPERTY INSURANCE — MR. MITCHELL
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 storm, boiler, marine, fire and miscellaneous. A technical study of an insurance company of each type. Critical examination of policy contracts, exemptions, forfeitures, abandonments, co-insurance, adjustments, and other questions of procedure under insurance contracts. Lectures and assigned readings. Given alternate years with course 26a.

27. COMMERCIAL CREDIT — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 22

The forms and uses of credit. Its importance in the business world and its dangers. The work of the credit man. Commercial agencies and other safeguards. Credit institutions in their relation to business. Credit in individual success and failure, in social prosperity and crises. Given alternate years with course 28.

28. ADVERTISING — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 19.

The use of advertising in modern business. Various types of advertising and of advertising methods. Advertisement writing. Methods of following up and checking results. Examples of advertising campaigns and their results. Given alternate years with course 27.

ADVANCED AND GRADUATE COURSES

29. THEORY AND PRACTICE OF STATISTICS — MR. MITCHELL
Two credits (two hours per week) — First semester
Open to those who have completed six credits in economics.

A study of statistical method and the work of the statistician. General critical survey of present day statistical information. Correct principles of collection, tabulation, classification and interpretation of statistical material. A first hand investigation into some practical problem by the class. Lectures, assigned readings and seminary work on the special problem.

30a. HISTORY OF ECONOMIC THOUGHT — MR. ROBINSON
Two credits (two hours per week) — First semester
Open to those who have completed six credits in economics.

A survey of economic thought covering ancient, medieval and modern times, with emphasis on the period since 1850. Assigned readings, and reports on special topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

30b. METHODS OF INVESTIGATION AND INSTRUCTION IN ECONOMICS — MR. ROBINSON
Two credits (two hours per week) — Second semester
Open to those who have six credits in economics.

The scope and logical methods of economics; relation of economics to the other social sciences and to ethics; methods of carrying on investigations and of giving instruction in economics.

Assigned readings and reports on special topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

31. SEMINAR IN ECONOMICS, — MESSRS. GRAY, ROBINSON, MITCHELL, GEROULD, PHELAN AND COULTER
Six credits (three hours per week) — Both semesters

Open to graduate students and to seniors who have completed at least twelve credits in economics and are capable of making original investigations; both semesters must be completed before credit is given for the first semester.

A course in research and in methods of investigation. The course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests.

POLITICAL SCIENCE

Courses

Introductory Course

No.	Title	Semester	Credits	Offered to	Prerequisites
1.	Am. Govt.	1 or 2	3	Soph., Jr., Sr.,	None

General Courses.

2.	Comp. Govt.	1	3	Jr., Sr.	course 1
3.	El. of Jurisprudence	1	3	Jr., Sr.	" 1
7.	Mun. Administration	2	3	Soph., Jr., Sr.	" 8
9.	Political Parties	1	2	Jr., Sr.	" 1 and 2
10.	*Diplomacy	2	2	Soph,. Jr., Sr.	" 1
12.	Colonial Administration	1	3	Jr., Sr.	" 1 and 15
15.	State and Local Admin.	2	3	Soph., Jr., Sr.	" 1
17.	Modern Pol. Thought	1	2	Jr., Sr.	" 1
18.	*Comp. Fed. Govt.	2	3	Jr., Sr.	" 1 & 2 or 12
20.	*Comp. Latin Am. Govt.	1	3	Jr., Sr.	" 1

Special Courses.

6.	(Engineers) Com. Law	1	2	Sr.	None
13.	Teacher's Govt.	2	1	Jr., Sr.	" 1 and 2
16.	(Engineers) Am. Govt.	2	2	Jr.	None

Advanced and Graduate Courses.

4.	*Const. Law	1, 2	6	Jr., Sr.	" 1, 2 & 8 or 17
5.	*Inter. Law	1, 2	6	Jr., Sr.	" 1 and 2
8.	Theory of the State	2	3	Jr., Sr.	" 1& 2 or 15
11.	Seminar	1, 2	6	Sr., Grads	" 1 and 2
14.	Adm. Law	2	2	Jr., Sr.	" 1 & 2 or 15
19.	*Roman Law	1	3	Jr., Sr.	" 1 and 2

*Starred courses are not given every year.

1. American Government — Messrs. Schaper and Allin

Three credits (three hours per week) — Each semester

Open to sophomores, juniors and seniors.

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.

2. Comparative Government — Mr. Allin

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A comparative study of the organization and working of the governments of the great European powers of today, especially of France, Germany, Great Britain, and Italy. 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.

A study of those human relations requiring legal regulation considered from the American point of view; the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is intended for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.

4. AMERICAN CONSTITUTIONAL LAW — MR. SCHAPER
Six credits (three hours per week) — Both semesters
Open to those who have completed courses 1, 2, and 8 or 17; both semesters must be completed before credit is given for the first semester; given in alternate years; offered in 1909-10.

This is an advanced course in the study of the principles of our constitutional law based on important Supreme Court decisions and standard works.

5. INTERNATIONAL LAW — MR. ALLIN
Six credits (three hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

This course treats of the nature, sources, and sanction of international law; of the general principles as developed by positive agreement, common usage, and judicial decisions, in particular of the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. Text, lectures, and supplementary reading. Given in alternate years. Not offered in 1909-10.

6. COMMERCIAL LAW — MR. ALLIN
Two credits (two hours per week) — First semester
Intended primarily for seniors in the College of Engineering.

7. MUNICIPAL ADMINISTRATION — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

A comparative study of 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.

8. THEORY OF THE STATE — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed courses 1 and 2 or 15.

A study of the theory of the state, the origin, nature, purpose and justification of the state, population and territory. Leading theories, like the divine, contract, modern socialistic, individualistic, and social welfare, are considered; also the question of state interference and state management of industries. This course includes a study of classification of law, governments, and states. A text-book, with lectures and topical readings.

9. POLITICAL PARTIES — MR. SCHAPER
Two credits (two hours per week) — First semester
Open to those who have taken courses 1 and 2.

An advanced course in political parties, their origin, development, and function. Such topics as methods of making nominations, securing minority representation, the recall, the initiative and referendum are taken up. Text, lectures, and special topics.

10. DIPLOMACY — MR. ALLIN
Two credits (two hours per week) — Second semester
Open to those who have completed course 1.

The object of this course is to outline the growth of international relations, the mode of conducting foreign affairs, the relation of the treaty-making power to legislation, the duties and immunities of diplomats, the consular service, the framing, interpretation, and termination of treaties and compacts, and the character and procedure of courts of arbitration. Considerable attention will be given to concrete illustrations of the principles of international practice as exemplified in such matters as the fisheries question, the Geneva arbitration, the Caroline incident, etc. Text, lectures, and supplementary reading.

11. SEMINAR IN POLITICAL SCIENCE — MESSRS. SCHAPER AND ALLIN
Six credits (three hours per week) — Both semesters
Open to graduate students and seniors of suitable preparation.

A seminar for research in the field of political science. A feature of the seminar is the discussion of current problems in politics and administration.

12. COLONIAL ADMINISTRATION — MR. ALLIN
Three credits (three hours per week) — First semester
Open to those who have completed courses 1 and 15. Forms with course 13 in economics a year course in colonization.

This course embraces a discussion of the principal classes of colonies, the causes of colonization, the social, economic, and political tendencies of colonial development, imperial relations, preferential trade, and independence. A study is made of the political systems of modern colonial governments, of the organization and administration of the Spanish, English, French, Dutch, German, and American colonies. Lectures, assigned readings, and special topics. Given in alternate years. Offered in 1909-10.

13. TEACHER'S COURSE IN GOVERNMENT
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.

14. ADMINISTRATIVE LAW — MR. SCHAPER
Two credits (two hours per week) — Second semester
Open to those who have completed courses 1, 2 or 15.

A course dealing with administration as a science, its origin and development, the law of officers under the national government, the merit system, and the growth of special administrative tribunals. Text, lectures, and cases.

15. STATE AND LOCAL ADMINISTRATION — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

A special course in the problems of our state and local governments; a comparative study of new experiments in legislation and administration, the workings of our courts, the jury system, and the new state police. Lectures, cases, and special topics.

16. AMERICAN GOVERNMENT
Two credits (two hours per week) — First semester
Intended for students in the college of Engineering.

17. MODERN POLITICAL THOUGHT — PROF. SCHAPER
Two credits (two hours per week) — First semester
Open to those who have taken course 1.
A study of democracy, the reform movements, the decline of individualism, the extension of the sphere of governmental activity and American political ideals and theories. Lectures, and assigned readings.

18. COMPARATIVE FEDERAL GOVERNMENT — MR. ALLIN
Three credits (three hours per week) — Second semester
Open to those who have taken courses 1 and 2 or 12.
A comparative study of ancient and modern confederations and federal unions. Special attention will be given to the description and analysis of the federal constitutions of the United States, Switzerland, Canada, Australia, and the proposals for the South African Union and Imperial federation. The nationalizing tendencies of the federal system, and the influence of political parties and commercial policies upon federal organization will be carefully considered. Lectures, reports and assigned reading. Given in alternate years. Offered in 1909-10.

*19. ROMAN LAW
Three credits (three hours per week) — First semester
Open to those who have taken courses 1. and 3.
A study of the growth of the Roman Law and its influence on the development of the Continental, English and American Law. Text and assigned reading.

*20 COMPARATIVE LATIN AMERICAN GOVERNMENTS
Three credits (three hours per week) — First semester
Open to those who have taken course 1.
A study of the governments and political conditions of Brazil, Argentine, Chile and Mexico. Text, lectures and assigned reading.

EDUCATION

GEORGE F. JAMES, Professor, Head of Department of Education
ALBERT W. RANKIN, Professor
FLETCHER H. SWIFT, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.
FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from history, philosophy, economics, politics, sciences and languages according to special aim of the individual.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Hist. of Educ. to Reformation	1	3	Jr., Sr.	None
2.	Hist. of Mod. Education.....	2	3	Jr., Sr.	1
3.	Educational Psych.....	2	3	Soph., Jr., Sr.	Philosophy 1
4.	Secondary Education.....	1	3	Jr., Sr.	1 and 2
5.	Prin. and Org. of El. Teaching	2	3	Sr.	1, 2, and Philosophy 1
6.	Prin. and Org. of Sec. Teaching.....	2	3	Jr., Sr.	1 and 2

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Theory of Education.....	1	3	Jr., Sr.	Philosophy 1
8.	School Administrntion.....	1	3	Sr.	1 and 2
9.	School Supervision.....	2	3	Sr.	See statement
10.	Comp. Study of Sch. System..	2	3	Sr.	1 and 2
11.	Modern Educ. Theories.....	2	3	Sr.	1 and 2, and Philosophy 1
12.	Current Prob. in Elem. Teaching.....	1	2	Sr. Grad.	5
13.	Educational Classics.....	1	2	Sr.	1 and 2
14.	Current Prob. in Sec. Teaching.....	2	2	Sr. Grad.	6
15.	Probl. in Sch. Administration	2	2	Sr. Grad.	1 and 2
16.	School Sanitation.....	1	2	Sr. Grad.	None
17.	Organization of Higher Education.....	2	1	Sr. Grad.	1 and 2

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 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 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 civlization and to show the connection of schools with other social institutions. Attention will be given especially to 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.

2. HISTORY OF MODERN EDUCATION — MR. SWIFT
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

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. EDUCATIONAL PSYCHOLOGY — MESSRS. MINER AND HAYNES
Three credits (three hours per week) — Second semester
Open to sophomores and juniors who have completed philosophy 1.

Identical with philosophy 3. The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. SECONDARY EDUCATION — MR. JAMES
Three credits — First semester
Open to seniors who have completed courses 1 and 2.

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. RANKIN
Three credits — First semester
Open to seniors who have completed courses 1. and 2 and philosophy 1.
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 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 — Second semester
Open to seniors who have completed courses 1 and 2.
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. JAMES
Three credits — First semester
Open to juniors and seniors who have completed philosophy 1.
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 — First semester
Open to seniors who have completed courses 1 and 2.
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 — Second semester
Open to seniors; intended only 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 — Second semester
Open to seniors who have completed courses 1 and 2.
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. Modern Educational Theories — Mr. James
Three credits — Second semester
Open to students who have completed courses 1 and 2 and philosophy 1.

12. Current Problems in Elementary Teaching — Mr. Rankin
Two credits (two hours per week) — First semester
Open to seniors and graduate students who have completed course 5.
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 stuffent 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, and to graduate students.
A seminar course for the reading of selected educational classics and for 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 graduate students who have completed course 6.
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 problems 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 graduate students who have completed courses 1 and 2.
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
Two credits (two hours per week) — First semester
Open to seniors and graduate students.
This course will be conducted by text, by lectures, and by investigations into problems of school lighting, heating, ventilation, and other questions of school architecture and management connected with the physical wellbeing of the pupils.

17. Organization of Higher Education — Mr. James
One credit (one hour per week) — Second semester
Open to seniors and graduate students who have completed courses 1 and 2.
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 an historical sketch of the development of the American university, with discussions of modes of organization and administration, problems of departmental teaching, and questions of class instruction.

20. History of Religious Education — Mr. Swift
One credit (one hour per week) — First semester
Open to juniors, seniors, and graduate students.
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, seniors, and graduate students.
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.

ENGLISH

Richard Burton, Professor, Head of Department of English
Frederick Klaeber, Professor
Frances Squire Potter, Professor
Joseph W. Beach, Assistant Professor
Mary Gray Peck, Assistant Professor
Eleanor Sheldon, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not counting courses 1 and 2, and including course 19 or 22.

For a Major, courses 3, 6, 7, 14, 15 and 22, together with reinforcing subjects (thirty credits) selected from comparative philology, rhetoric (courses 2, 3 and 4), advanced modern language, ancient language, philosophy, history and additional English.

For B. A. with Distinction, the general requirements (page 46), course 3 in rhetoric, and nine credits in English (six of which shall be in old Engilsh) in addition to the requirements for a major.

For a Teacher's Certificate, courses 3 (first semester), 6, 7, 14, 15, 18 and 22, six additional credits and course 2 in rhetoric.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Outline Eng. Lit.	1	3††‡	All	See statement
2.	Outline Am. Lit.	2	3‡††	All	See statement
3.	Old Eng.	1, 2	6	Soph., Jr., Sr.	None
4.	Middle Eng.	1	2	Soph., Jr., Sr.	See statement
5.	Piers the Plowman	1	2	Soph., Jr., Sr.	See statement
6.	Chaucer	1	3	Soph.	None
7.	Spenser	2	3	Soph.	None
8.a	Outline 18 Cent. Lit.	1	3	Jr., Sr.	Six credits
8b.	The English Humorists	1	3	Jr., Sr.	Six credits
9.	Outline 19 Cent. Lit.	2	3	Jr., Sr.	Six credits
12.	Eng. Novel	1	3	Jr., Sr.	Six credits
13.	Bible as Lit.	2	3	Jr., Sr.	None
14.	Milton	1	3	Jr.	6 and 7, or six credits
15.	Shakespeare	2	3	Jr.	6, 7 and 14, or nine credits
16.	Mod. Drama	1, 2	6*	Sr.	15 or nine credits
18.	Teacher's Course	1, 2	2*	Sr.	6, 7, 14 and 15
19.	Hist. Lit. Crit.	1, 2	2*	Jr., Sr.	None
20.	Eng. Prose	1	3	Jr. Sr.,	Six credits

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courser
21.	Browning-Tennyson	2	3	Jr., Sr.	Six credits
22.	Hist. Eng. Lang.	2	1	Soph., Jr., Sr.	3 (1st. sem.)
23.	Trags and Romances of Shaks.	1	3	Jr., Sr.	Six credits
24.	Sen. Seminar	1, 2	2	Sr., Grad.	See statement
25.	Anglo-Saxon	1	..	Grad.	Major in Eng.
26.	Beowulf	2	..	Grad.	Major in Eng.
27.	Shakespeare	1, 2	..	Grad.	Major in Eng.
28.	Prose Fiction	1, 2	..	Grad.	Major in Eng.
29.	Drama	1, 2	..	Grad.	Major in Eng.

‡Juniors and seniors are allowed only half credit, not credited toward a minor.

†Courses 1 and 2 must be completed before credit is allowed for either.

*Both semesters must be completed before credit is allowed for the first semester.

1. OUTLINE OF ENGLISH LITERATURE — MISS PECK AND MR. BEACH

Three credits (three hours per week) — First semester

Open to sophomores, and to freshmen who have passed, with a grade of good or excellent, part 2 of the entrance examination in English. Juniors and seniors are allowed only half credit; freshmen must also complete course 2 before credits will be allowed for this course; not credited toward a major in English.

An outline sketch of the main personalities of English literature from the earliest times to the present. The intention is to enable the student later to approach more specific aspects of the study with a general notion of the subject.

2. OUTLINE OF AMERICAN LITERATURE — MR. BURTON AND MISS PECK

Three credits (three hours per week) — Second semester

Open to freshmen who have completed course 1, and to sophomores; half credit to juniors and seniors; not credited toward a major in English.

A study of the salient figures of our native literary development. Special attention is given to contemporary writers.

3. OLD ENGLISH — MESSRS. KLAEBER AND BEACH

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors and seniors; required of all who take a major or obtain a teacher's certificate.

A study of the language and reading of representative selections of old English prose and poetry. The relation to the modern English will be particularly emphasized.

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE 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 3; alternates with course 5.

An outline of middle English grammar including the interpretation of selected texts.

5. 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 3; alternates with course 4; not given in 1908–9.

A critical study of *Piers the Plowman.*

6. CHAUCER — MISS PECK, MR. BEACH AND MR. FIRKINS
Three credits (three hours per week) — First semester
Open to sophomores.
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*.

7. SPENSER — MISS PECK, MR. BEACH AND MR. FIRKINS
Three credits (three hours per week) — Second semester
Open to sophomores.
A course in the forms and literary influences in the Elizabethan period which are illustrated in the poetry of Edmund Spenser, with selected readings from the minor poems and three books entire of the *Faery Queen*.

8a. OUTLINE OF EIGHTEENTH CENTURY LITERATURE — MR. BEACH
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed one year of work in English.
An outline study of the main personalities and literary forms of the eighteenth century. Particular attention to Defoe, Addison and Steele, Swift, Pope, Gray, and Johnson, with a sketch of the minor poets and novelists. Reports required on the reading of representative works. Not given in 1909-10.

8b. THE ENGLISH HUMORISTS — MR. BEACH
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed one year in English.
Courses 8a and 8b will be given in alternate years.

9. OUTLINE OF NINETEENTH CENTURY 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.
An outline study of the main literary forms in the nineteenth century, with some consideration of all the major writers in poetry, the novel and the essay. Reports required on the reading of representative works.

12. THE ENGLISH NOVEL — MRS. POTTER
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed one year of work in English.
A study of the history and development of the English novel.

13. THE BIBLE AS LITERATURE — MRS. POTTER
Three credits (three hours per week) — Second semester
Open to juniors and seniors.
A literary study of the Old Testament with special attention to forms and the critical study of selected readings.

14. MILTON — MRS. POTTER
Three credits (three hours per week) — First semester
Open to juniors who have completed courses 6 and 7, or one year of work in English; courses 6 and 7 are the most suitable preparation; required of all who take their major or obtain a teacher's certificate in English.
A critical study of the early poems, six books of *Paradise Lost* and *Samson Agonistes*.

15. SHAKESPERE
Three credits (three hours per week) — MRS. POTTER
Second semester
Open to juniors who have taken course 6, course 7, course 14 or a year and a

half of English; courses 6, 7 and 14 are the most suitable preparation. Required of all who take their major or obtain a teacher's certificate in English.

An outline study of the Shakespere plays, with a critical study of selected comedies, tragedies, and historical plays.

16. CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA — MISS PECK
Six credits (three hours per week) — Both semesters
Open to seniors who have completed two years of work in English, which must include course 15.

First semester: a study of the theory of the drama, with the history of Engilsh drama to the middle of the nineteenth century. Second semester: a study of the inter-relation of the English with the continental drama in the late nineteenth century with special emphasis upon Ibsen.

18. TEACHER'S COURSE IN ENGLISH — MRS. POTTER
Two credits (one hour per week) — Both semesters
Open to seniors who have completed courses 6, 7, 14, and 15; both semesters must be completed before credit is allowed for the first semester.

A survey of English literature with emphasis on methods of interpretation and teaching in the secondary schools.

19. HISTORY OF LITERARY CRITICISM — MR. BURTON
Two credits (one hour per week) — Both semesters
Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.

This course traces the rise, growth and present condition of the principles of criticism as applied to literature.

20. 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.

A discussion of current idiom with the purpose of relating it to the underlying principles of historical development.

21 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.

This course involves a reading of the representative work of the two major poets of the Victorian era, in order to show their quality and contrasted power.

22. 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 3; required of all who take their major or obtain a teacher's recommendation in English.

23. THE LATEST TRAGEDIES AND ROMANCES OF SHAKESPERE — MR. BURTON
Three credits (three hours per week) — First semester
Open to juniors and seniors who have gained six credits in the department.

24. SENIOR AND GRADUATE SEMINAR IN ENGLISH — MISS PECK
Two credits (one hour per week) — Both semesters
Open to seniors and graduates who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.

Hakluyt's Voyages will be studied. The work will consist of an inquiry

into the vivid and dramatic sources of the language and literature found in this "prose epic" of the Elizabethan seamen.

25. ANGLO-SAXON — MR. KLAEBER
First semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

26. BEOWULF — MR. KLAEBER
Second semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

27. SHAKESPERE — MRS. POTTER

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

28. THE DRAMA AS A LITERARY FORM — MR. BURTON
Both semesters

Open in alternate years to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

29. FICTION AS A LITERARY FORM — MR. BURTON
Both semesters

Open in alternate years to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

GEOLOGY AND MINERALOGY

CHRISTOPHER W. HALL, Professor, Head of Department of Geology and Mineralogy
EDWARD M. LEHNERTS, Assistant Professor
FREDERIC W. SARDESON, Assistant Professor
FRANK F. GROUT, Instructor
——————————, Instructor.
A. ALFRED JOHNSON, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from animal biology, botany, chemistry, mathematics, physics, topographic drawing, advanced modern languages and additional geology and mineralogy.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, the same as for a major.

COURSES

GEOLOGY

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	General Geology	1	3	Jr., Sr.	None
2.	Essentials Phys. Geog	1	3	Jr., Sr.	None
3.	Indust. Geography	2	3	Jr., Sr.	1 or 2
4.	Elements of Meteorology	2	3	Jr., Sr.	1 or 2
5.	Geog. and Geol. of Minn	2	3	Jr., Sr.	1
6.	Historical Geology	2	3	Jr., Sr.	1, 7, or 8
7.	Elements of Paleontol	1	3	Jr., Sr.	See statement
8.	Paleontology	1, 2	6	Jr., Sr.	See statement
9.	Paleontologic Practice	1, 2	6	Jr., Sr.	See statement
10.	Elements of Rock Study	1	3	Jr., Sr.	1
11.	Petrography	2	3	Jr., Sr.	10
12.	Applied Geology	1	3	Jr., Sr.	1
13.	Ore Deposits	1	3	Sr.	1
14.	Special Problems	2	2	Sr.	Geol. 1 and Min. 1
15.	Method and Material of Geog.	1, 2	2	Jr., Sr.	1 or 2
16.	Outline Study of Minerals and Rocks	1, 2	2	Sr.	None
17.	Regional Physiography	2	3	Jr., Sr.	1 or 2
18.	Climatology	1	3	Sr.	4
19.	Field and Lab. Practice	1, 2	2	Jr., Sr.	None
20.	Probs. in Indus. Geog	1	3	Sr.	
21.	Petrographical Problems	1, 2	..	Grad.	See statement
22.	Keweenawan Eruptives	1, 2	..	Grad.	See statement
23.	Glacial Geology	1, 2	..	Grad.	See statement
24.	Paleontologic Geol	...	3	Grad.	1, 6 and 8
25.	Advanced Paleontology	1, 2	6	Grad.	8

MINERALOGY

1.	Elements of Mineralogy	1	3	Soph., Jr., Sr.	None
2.	Descriptive Mineralogy	1, 2	6	Soph., Jr., Sr.	None
3.	Quantitative Mineralogy	2	3	Soph., Jr., Sr.	1
4.	Optical Mineralogy.	2	3	Sr.	1
5.	Morphology of Minerals	1	3	Jr., Sr.	
6.	Physico-Chem. Methods	2	3	Sr.	
7.	Outline of Mineralogy	1, 2	2	Jr., Sr.	None
8.	Original Problems	1, 2	..	Grad.	See statement
9.	Special Investigations	...	..	Grad.	See statement
10.	Occurrences and Association.	1, 2	..	Grad.	See statement

GEOLOGY

Students who desire to take double courses in geology may do so be electing any of the following combinations: First semester, 1 and 2, 1 and 7, 1 and 10, 6 and 8, 8 and 9, 10 and 12; second semester, 3 and 4, 3 and 5, 5 and 6, 8 and 9, 6 and 11. By vote of the faculty, credit will be given to students who satisfactorily complete any of the general field courses in geology offered in the joint announcement of various universities for the summer of 1909.

1. General Geology — Mr. Hall
Three credits (three hours per week) — First semester
Open to juniors and seniors.
Comprises: (1) geodynamics, in which are set forth the energies and phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles, and lantern-slides.

2. Essentials of Physical Geography — Mr. Lehnerts
Three credits (three hours per week) — First semester
Open to juniors and seniors.
Discussions of the principles of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.

3. Industrial Geography — Mr. Lehnerts
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or 2.
The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating 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 the geographic causes of local industries effected through excursions and reports. A brief survey of the geography 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 course 1 or 2.
The general principles of meteorology are treated, embracing the 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-book, lectures, and reference reading.

5. Geography and Geology of Minnesota — Mr. Hall
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.
(a) The physical geography of the state in its relations 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. Historical Geology — Mr. Sardeson
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1, 7 or 8.
A course in historical geology, including a study of the more important types of fossils in their geological relations. The history of the North American continent in particular is considered. Lectures and demonstrations.

7. ELEMENTS OF PALEONTOLOGY — MR. SARDESO
Three credits (three hours per week) — First semester
Open to juniors and seniors who have taken courses in geology or biology.
This course includes an elementary study of fossil organisms and a discussion of the sources and interpretation of paleontologic evidence and the relation to it of theories of evolution. Lectures and demonstrations. Occasional excursions will be arranged.

8. PALEONTOLOGY — MR. SARDESON
Six credits (three hours per week) — Both semesters
Open to juniors and seniors who have taken or are taking courses in geology or biology.
The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations.

9. PALEONTOLOGIC PRACTICE — MR. SARDESON
Six credits (three hours per week) — Both semesters
Open to juniors and seniors who have completed course 8; may be taken by students pursuing courses in geology and biology in conjunction with course 7.
The collection, preparation, and study of materials, examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course 7.

10. ELEMENTS OF ROCK STUDY — MR. GROUT
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1.
The structures, textures, and mineral and chemical composition of rocks. A practical study of rock types with laboratory and field practice. The origin, occurrence, variation, and alteration of rocks are considered with a view to their accurate description. An introduction to the use of the microscope concludes the course. Text book, reference reading, and practice.

11. PETROGRAPHY — MR. GROUT
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 10.
The identification of rocks through the optical study of the component minerals, rock structures as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field, and an examination of some group of Minnesota crystalline rocks are features of the course. Laboratory, lectures, reference reading, and field work.

12. APPLIED GEOLOGY — MR. GROUT
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1.
An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic value, including coal, mineral oil, and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief summary of the nature and distribution of ore deposits. Textbook and reference reading.

13. ORE DEPOSITS — MR. HALL
Three credits (three hours per week) — First semester
Open to seniors who have completed geology 1 and mineralogy 1.

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead, and zinc.

14. SPECIAL PROBLEMS — MR. HALL
Two credits (two hours per week) — Second semester
Open to seniors who have completed courses 1 and 13.
The investigation by individual students of particular problems, involving the field work of an investigation of some particular formation and the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books, and the preparation of geological maps, profiles, and sections will be taught.

15. THE METHOD AND MATERIAL OF GEOGRAPHY — MR. LEHNERTS
Two credits (one hour per week) — Both semesters
Open to juniors and seniors; designed espcially 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 materials; map drawing, chalk modeling, and relief work; organization of geographical subject matter for class-room instruction; and the method of the recitation.

16. OUTLINE STUDY OF MINERALS AND ROCKS — MESSRS. HALL AND GROUT
Two credits (one hour per week) — Both semesters
Open to seniors; designed specially for teachers.
This course treats of the leading physiographic facts and principles; the macroscopic characters of the common rocks and a discussion of the general principles of petrographical and stratigraphical geology. Lectures and reading, supplemented by excursions and practical problems.

17. REGIONAL PHYSIOGRAPHY — MR. LEHNERTS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or 2.
An application of the principles of physical geography in a study of the continents and their physiographic provinces; the origin and geographic significance of their physical features; and the influence of these on the early settlement of countries and the subsequent industrial and political development of nations.

18. CLIMATOLOGY — MR. LEHNERTS
Three credits (three hours per week) — First semester
Open to seniors who have completed course 4.
An application of the principles of meteorology to a study of the climates of the world and the factors on which these climates depend; climatic influences on the distribution and characteristics of plants and animals, and on man's needs and occupations. Lectures, recitations and reference reading.

19. FIELD AND LABORATORY PRACTICE — MESSRS. HALL AND LEHNERTS
Two credits (one hour per week) — Both semesters
Open to juniors and seniors; designed specially 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.

20 PROBLEMS IN INDUSTRIAL GEOGRAPHY — MR. LEHNERTS
Three credits (three hours per week) — First semester
Open to seniors who have completed course 3.

The effects of coast-lines and harbors, navigable rivers, water powers, mountains and plains, rock formations and soils, ground and surface waters for municipal and farm supplies, upon the utilization and conservation of natural resources and mineral wealth. A series of special problems in Geography.

21. PETROGRAPHICAL PROBLEMS — MESSRS. HALL AND GROUT
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbro schists of the Minnesota river valley or the granites and basic eruptives of central Minnesota.

22. THE KEWEENAWAN ERUPTIVES — MESSRS. HALL AND GROUT
Both semesters

Open to graduate students; other arrangements may be ascertained upon applicntion to the department.

This course treats first, eastern and northwestern Minnesota, their stratigraphic relations, textural and structural characters; second, other problems in the Keweenawan to be selected on consultation.

23. GLACIAL GEOLOGY — MR. HALL
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of Saint Anthony, the Dalles of the Saint Croix, and other problems. The special field to be selected on consultation.

24. PALEONTOLOGIC GEOLOGY — MR. SARDESON
Three credits (three hours per week)
Open to graduate students who have completed courses 1, 6, and 8.

A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.

25. ADVANCED PALEONTOLOGY — MR. SARDESON
Six credits (three hours per week) — Both semesters
Open to graduate students who have completed course 8.

A study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The class work is to be supplemented by a thesis.

MINERALOGY

1. ELEMENTS OF MINERALOGY — MESSRS. HALL AND GROUT
Three credits (six hours per week) — First semester
Open to sophomores, juniors, and seniors; the laboratory fee is three dollars.

(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.

2. Descriptive Mineralogy — Messrs. Hall and Grout
Three credits (six hours per week) — Second semester
Open to sophomores, juniors, and seniors; the laboratory fee is three dollars.
(a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal-axes. Theses. (b) Laboratory work; includes quantitative blowpipe analysis, crystal measurement, the sight determination of minerals, and reference reading.

3. Quantitative Mineralogy — Messrs. Appleby and Christianson
(In the School of Mines)
Three credits (six hours per week) — Second semester
Open to sophomores, juniors, and seniors, who have completed course 1; the laboratory fee is five dollars.
Determination of the values of ores. Lectures, recitations, and laboratory work. Identical with metallurgy 1 in the School of Mines.

4. Optical Mineralogy — Mr. Grout
Three credits (six hours per week) — Second semester
Open to juniors and seniors who have completed course 1 in Mineralogy.
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 stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

5. The Morphology of Minerals — Mr. Grout
Three credits (three hours per week) — First semester
Open to juniors and seniors.
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.

6. Physico-Chemical Methods with their Applications — Mr. Grout
Three credits (three hours per week) — Second semester
Open to seniors.
The methods of micro-chemical analysis are described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.

7. An Outline of Mineralogy — Mr. Grout
Two credits (one hour per week) — Both semesters
Open to juniors and seniors.
A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.

8. Original Problems in Morphological and Physical Mineralogy
Messrs. Hall and Grout
Both semesters
Open to graduate students; individual arrangements may be ascertained upon application to the department.

Investigations in mathematical crystallography and its applications to crystal development and structure. Further applications than are made in course 4 of the optical characters of minerals in identification of mineral species.

9. Special Investigations in Chemical and Physical Mineralogy Mr. Grout

Open to graduate students; other arrangements may be ascertained upon application to the department.

Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage, and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.

10. Mineral Occurrences and Association Messrs. Hall and Grout
Both semesters

Open to graduate students; individual arrangements may be ascertained upon application to the department.

A discussion of genetic relationships. Field work in connection with different phases of the particular problem in hand.

GERMAN

John G. Moore, Professor, Head of Department of German
Carl Schlenker, Professor
Hans Juergensen, Assistant Professor
Oscar Burkhard, Assistant Professor
Matilda J. Wilkin, Assistant Professor
Richard Wischkaemper, Instructor
Alfred E. Koenig, Assistant
James Davies, Assistant
Leon Metzinger, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not including course 1.

For a Major, eighteen credits, not including course 1, together with reinforcing subjects (thirty credits) selected from philology, Anglo-Saxon and old English, Icelandic, advanced Scandinavian, advanced English, Latin, Greek, and additional German.

For B. A. with Distinction, the general requirements (page 46) and courses 8, 9 and 10 and any two of courses 12, 13, 14 and 17.

For a Teacher's Certificate, an average of at least good in courses 2 or 4, 6 or 7, 8, 9, 10 and 11.

m Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1a.	Beginning	1, 2	10*‡	All	None
1b.	Beginning	1, 2	6*‡	Engineers	None
2.	Intermediate	1, 2	6*	Soph., Jr., Sr.	1
3a.	Scientific Intermediate	1, 2	6*	Soph., Jr., Sr.	1
3b.	Scientific Intermediate	1, 2	6*	Soph. Eng.	1b

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
4.	Prose and Poetry	1, 2	6*	All	Two yrs. prep. Ger.
5.	Conversation	1, 2	4*	All	See statement
6.	Drama	1, 2	6*	Soph., Jr., Sr.	1 and 2,or 4
7.	Adv. Sc. Reading	1, 2	6*	Soph., Jr., Sr.	2 or 3 or 4
8.	Adv. Conversation	1, 2	4*	Soph., Jr., Sr.	See statement
9.	Classic Period	1, 2	6*	Jr., Sr.	See statement
10.	Modern Authors	1, 2	6*	Jr., Sr.	9
11.	Teacher's Course	2	1	Sr.	9
12.	Reformation	1, 2	4*	Sr. Grad	9 or 10
13.	Middle High Ger	1, 2	4*	Sr. Grad.	9 or 10
14.	Old High Ger	1, 2	4*	Sr.	9 or 10
15.	Seminar on Drama	1, 2	..	Grad.	See statement
16.	Volkslied	1, 2	2*	Grad.	9 or 10
17.	Hist. of Ger. Lit	1, 2	4*	Sr. Grad.	9
18.	Sem. on Reading	1, 2	4*	Grad.	See statement

‡Juniors and seniors are allowed only half credit.

*Both semesters must be completed before credit is allowed for the first semester.

1a. BEGINNING — MR. SCHLENKER AND MRS. WILKIN, MESSRS. JUERGENSEN, WISCHKAEMPER AND EICHHOLZER

Ten 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.

1b. BEGINNING — MR. BURKHARD

(In the College of Engineering.)

Six credits (three hours per week) — Both semesters

Open to engineering students only.

2. INTERMEDIATE — MESSRS. SCHLENKER, EICHHOLZER, WISCHKAEMPER AND MISS STAMM

Six credits (three 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. 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.

3a. SCIENTIFIC INTERMEDIATE — MESSRS. JUERGENSEN AND WISCHKAEMPER

Six credits (three hours per week) — Both semesters

Open to all who have completed course 1. Not open to those who have obtained credit for course 2 or course 3b. Both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5.

Wait's German Science Reader (or equivalent). The course aims to give the student a reading knowledge of German for use in scientific studies.

3b. SCIENTIFIC INTERMEDIATE — MR. BURKHARD

(In the College of Engineering.)]

Six credits (three hours per week) — Both semesters

Open only to students in College of Engineering who have completed course 1a or course 1b. Not open to those who have credit for course 2 or course 3a.

Merchel, Bilder aus der Ingenieurtechnik. This course is arranged to meet the peculiar needs of engineering students.

4. PROSE AND POETRY MR. MOORE, MRS. WILKIN, MESSRS. BURKHARD, WISCHKAEMPER AND MISS STAMM

Six credits (three hours per week) Both semesters

Open to all who enter the University with two years of German; not open to those who have obtained credit in course 2 or course 3; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5.

Meissner's *Aus deutschen Landen*; *Goethe's Gedichte.* Heine's *Buch der Leider.* Geography, history and legend. Review of German grammer throughout the year.

5. ELEMENTARY CONVERSATION AND COMPOSITION MRS. WILKIN, MESSRS. JUERGESEN, BURKHARD, WISCHKAEMPER AND EICHHOLZER

Four credits (two hours per week) Both semesters

Open to those who are taking or have taken course 2 or 3, or 4; no credit to those who are taking, or have taken course 9 or course 10; both semesters must be completed before credit is given for the first semester.

Translation of short English selections; conversation on topics of everyday life; narrative and descriptive essays and letter writing.

6. THE DRAMA MR. SCHLENKER, MRS. WILKIN, MESSRS. JUERGENSEN AND BURKHARD

Six credits (three hours per week) 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. This course may be supplemented by course 8.

First semester: Modern drama. Play of Hebbel, Hauptmann, or Sudermann. Study of the present-day drama in Germany. Assigned readings and reports. Second semestes: Classic drama. Play of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

7. ADVANCED SCIENTIFIC READING MR. JUERGENSEN

Six credits (three hours per week) Both semesters

Open to those who have taken course 2 or 3, or 4: not open to those who have credit for course 6; this course may be supplemented by course 8; both semesters must be completed before credit is given for the first semester.

Reading of monographs and periodicals.

8. ADVANCED CONVERSATION, GRAMMAR, AND COMPOSITION MR. SCHLENKER, MRS. WILKIN AND MR. BURKHARD

Four credits (two hours per week) Both semesters

Open to those who are taking or have taken course 6, 7 or 9; both semesters must be completed before credit is given for first semester; 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.

Essays on assigned subjects; oral exercises in German by means of discussions on everyday subjects; debates, narration, and the like.

9. GERMAN LITERATURE OF THE CLASSIC PERIOD MR. MOORE

Six credits (three hours per week) Both semesters

Open to those who have completed courses 1 and 2 (by special permission)

or 3 and 7, or 4 and 6; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Goethe's *Faust:* its genesis; the Faust legend; its treatment in literature before and since Goethe's time; plan of Goethe's *Faust:* solution of the Faust problem in Part II. Second. semester: Schiller's ballads and other representative poems of his period. German versification. Reading and discussion of Lessing's more important critiques, the *Laocoon* and *Dramaturgie.* Lectures and collateral reading; essays by the class.

10. MODERN AUTHORS — MR. MOORE
Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1, 2, and 9 (by special permission), or 4, 6, and 9, or 3, 7, and 9; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Romantic school and *Junge Deutschland.* Second semester: German literature since 1848.

11. TEACHER'S COURSE — MR. MOORE
One credit (one hour per week) — Second semester

Open to those who have completed course 10; especially designed for students who expect to become teachers of German in high schools.

12. HISTORY AND LITERATURE OF THE REFORMATION — MR. MOORE
Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given the first semester.

Brandt, Luther, Hutten, Sachs, Murner, and Fischart. Selections from Jansen and Egelhaaf.

13. MIDDLE HIGH GERMAN — MR. SCHLENKER
Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.

Study of the language and literature of the period. Paul's *Mittelhochdeutsche Grammatik.* Selected readings from *Armer Heinrich, Nibelungen Lied, Gudrun,* the poems of Walter von der Vogelweide, *Parsifal,* etc.

14. OLD HIGH GERMAN — MR. KLAEBER
Four credits (two hours per week) — Both semesters

Open to seniors who have taken course 9; both semesters must be completed before credit is given for the first semester.

This course is identical with comparative philology, course 11.

15. SEMINAR IN GERMAN DRAMA — MR. SCHLENKER
Two credits (one hour per week) — Both semesters

Open to graduates and, by permission of the department, to undergraduates but without credit.

An outline of the history of the German dramatic literature from its beginning to and including the so-called classic drama. Assigned readings, reports, and discussions.

16. THE GERMAN VOLKSLIED — MR. WILLIAMS
Two credits (two hours per week) — Both semesters

Open to graduate students who have completed course 9.

Outline of the history and development of the *Volkslied.* Study of selected

numbers in Uhland's *Volkslieder* with references to other general and special collections. Influence of the *Volkslied* upon lyric and ballad writers.

17. History of German Literature — Mr. Juergensen
Four credits (two hours per week) — Both semesters
Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.
Lectures in German on the history of German literature. Reviews and topical research on the part of the students.

18. Seminar in Scientific Reading — Mr. Juergensen
Four credits (two hours per week) — Both semesters
Open to graduate students who have completed course 9 or 10, and (by permission of the department) to undergraduates who have completed course 7 or 9; both semesters must be completed before credit is given for the first semester.
1909-10 The literature of evolution (Haeckel, Reinke, et al.)
1910-11 Psychology and philosophy (Wundt, et al.)
For courses in Germanic philology see the statement of the department of comparative philology, pp. 52-53.

GREEK

John Corrin Hutchinson, Professor, Head of Department of Greek.
Charles Albert Savage, Professor

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.
For a Major, eighteen credits, together with reinforcing subjects (thirty credits) selected from Latin, advanced German and French, philology, English, advanced rhetoric, ancient history and additional Greek.
For B. A. with Distinction, the general requirements (yage 46) and at least courses 4, 5, 6, 7, 8 or 9, 10 and two hours per week of seminar work throughout one year.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	First Year Greek	1, 2	10*	All	None
2.	History and Epic Poetry	1, 2	6*	Soph., Jr., Sr.	1
3.	Historical Prose	1, 2	6*	All	See statement
4.	Oratory	1	3	Soph., Jr., Sr.	2 or 3
5.	Philosophy	2	3	Soph., Jr., Sr.	2 or 3
6.	Lyrics	1	3	Jr., Sr.	4 or 5
7.	Tragedy	2	3	Jr., Sr.	5
8.	Philosophy (Advanced)	1	3	Jr., Sr.	5
9.	Oratory (Advanced)	1	3	Jr., Sr.	4
10.	Epic Poetry (Advanced)	2	3	Jr., Sr.	7
11.	Archæology	1, 2	6	Jr., Sr.	None
12.	Dramatic Poetry	1, 2	4	Soph., Jr., Sr.	See statement
13.	Composition	1, 2	2*	Jr., Sr.	4 and 5
14.	Greek Literature and Life	2	2	Jr., Sr.	None
15.	Greek Mythology	1, 2	2	Jr., Sr.	None
16.	Later Greek	1, 2	6	Jr., Sr.	5

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
17.	Seminar	1	1	Jr., Sr.	4 or 5
18.	Seminar	1	1	Jr., Sr.	5
29.	Epic Poetry (Advanced)	...	..	Grad.	
20.	Dramatic Poetry (Advanced)	...	..	Grad.	
21.	Oratory (Advanced)	...	..	Grad.	
22.	Later Greek	...	..	Grad.	

*Both semesters must be completed before credit is allowed for the first semester.

1. FIRST YEAR IN GREEK — MR. HUTCHINSON
Ten credits (five hours 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.

The work of the first semester is based upon Brook's *Introduction to Attic Greek*, and has for its object the mastery of the declensions and conjugations, and the simpler rules of syntax, together with the ability to read readily simple sentences based on the vocabulary of the first chapter of the *Anabasis*, which is learned by heart, and to translate into Greek idiomatic English sentences based upon the same text.

In the second semester the *Anabasis* itself is used as the reading book; an amount equivalent to about a book and a half is read. Hadley's *Greek Grammar* is studied systematically. Etymology is reviewed and syntax is studied sufficiently to enable the student to proceed confidently in the translation of the text. The translation from English into Greek is continued.

2. HISTORY AND EPIC POETRY: *Anabasis* and *Iliad* — MR. SAVAGE
Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors, who have completed course 1; credits allowed only when both semesters are taken. The course is designed for students who have begun Greek in the University. Students who have begun Greek before coming to the University may, with the consent of the department, take Homer during the second semester.

Books 2, 3, and 4 of Xenophon's *Anabasis* are read during the first semester; particular attention is given to syntax and irregular verbs. Selections from Homer's *Iliad* are read during the second semester; special attention is given to prosody, and to poetical forms and usages.

3. HISTORICAL PROSE; Xenophon and Herodotus — MR. SAVAGE
Six credits (three hours per week) — Both semesters

Open to freshmen, sophomores, juniors, and seniors, who offer two years of Greek for admission to the University, or have completed course 1, and in the judgment of the department are qualified for the work; both semesters must be completed before credit is allowed for the first semester.

Selections from Xenophon's *Cyropaedia* are read during the first semester, and special attention is given to syntax and irregular verbs. Selections from Herodotus are read during the second semester, and particular attention is paid to peculiarities of dialect and style. The work is supplemented by lectures on Greek historiography.

4. ORATORY: Lysias and Demosthenes — MR. SAVAGE
Three credits (three hours per week) — Second semester
Open to those who have completed course 2 or course 3.

The course consists chiefly of readings from the orations of Lysias and Demosthenes; selections from Isocrates may also be read. This work is supplemented by 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.

5. PHILOSOPHY: Plato's *Apology*, and Xenophon's *Memorabilia* — MR. SAVAGE
Three credits (three hours per week) — First semester
Open to those who have completed course 2 or course 3.

The course consists chiefly in the reading of Plato's *Apology*, together with selections from Xenophon's *Memorabilia*. The reading of texts is supplemented by lectures on Greek philosophy.

6. LYRICS — MR. BROOKS
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 4 or course 5.

7. TRAGEDY; Aeschylus and Sophocles — MR. BROOKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 5.

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 5; alternates with course 9; not offered in 1909-10.

The Republic of Plato is read, not primarily for its philosophic interest but as one of the masterpieces of Greek literature. The study is, therefore, in the main, a study of literary style.

9. ORATORY (Advanced): Demosthenes' *De Corona* — MR. HUTCHINSON
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 4.
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.

10. EPIC POETRY (Advanced): The *Odyssey* — MR. HUTCHINSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 7.
The object of this course is to secure as intimate an acquaintance as possible, at first hand, with Homer. The Homeric Question is given but scanty attention; its place is 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.

11. ARCHAEOLOGY — MR. BROOKS
Six credits (three hours per week) — Both semesters
Open to juniors and seniors; a knowledge of the Greek language is not required.
A study of the monuments or remains of Greek art, illustrating Greek customs, civilization, and life. Laboratory methods and theses are largely employed.

12. DRAMATIC POETRY: Euripides and Aristophanes — MR. SAVAGE
Four credits (two hours per week) — Both semesters

Open in the first semester to those who have completed course 2 or 3, and in the second to those who have completed the first semester of course 7.

During the first semester, either the *Alcestis* or the *Medea* of Euripides is read; during the second semester the *Frogs of* Aristophanes is studied. Special attention is given to metre, literary style, and mythology, and the work is supplemented by lectures on the authors studied.

13. GREEK COMPOSITION — MR. HUTCHINSON
Two credits (one hour per week) — Both semesters
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.

The course consists of a systematic review of Greek syntax and the retranslation into Greek of passages translated from various classic authors, illustrative of various styles.

14. GREEK LITERATURE AND LIFE — MR. SAVAGE
Two credits (two hours per week) — Second semester
Open to juniors and seniors; a knowledge of Greek is not required. This course may not be counted toward a major or a minor.

The course is intended primarily for students who have not had an opportunity to study Greek. It consists of lectures, text book work, and illustrative readings; and, from time to time, special lectures illustrated by stereopticon views will be given. The course is especially recommended to students who are intending to teach Greek, Latin, English, or ancient history.

15. GREEK MYTHOLOGY — MR. SAVAGE
Two credits (one hour per week) — Both semesters
Open to seniors and juniors; no knowledge of Greek is required. This course will not be counted toward a major or a minor.

The course will consist chiefly of lectures, which will be supplemented by assigned readings, and by occasional stereopticon illustrations. The course is recommended particularly to students who are specializing in languages or philosophy.

16. LATER GREEK — MR. HUTCHINSON
Six credits (three hours per week) — Both semesters
Open to juniors and seniors who have completed course 5.

The course consists chiefly of selected readings from the Septuagint and the New Testament. Credit will be given for either half of the course.

17. SEMINAR IN ORATORY OR PHILOSOPHY — MR. HUTCHINSON
One credit (one hour per week) — First semester
Open to juniors and seniors who have completed course 4 or course 5.
In 1909-10 the work will be in connection with Demosthenes *De Corona*.

18. SEMINAR IN GREEK TRAGEDY — MR. BROOKS
One credit (one hour per week) — Second semester
Open to juniors and seniors who have completed course 5.

19. ADVANCED COURSE IN EPIC POETRY — MR. HUTCHINSON
Open to graduate students only.*

20. ADVANCED COURSE IN GREEK DRAMATIC POETRY — MR. BROOKS
Open to graduate students only.*

21. ADVANCED COURSE IN GREEK ORATORY — MR. SAVAGE
Open to graduate students only.*

22. LATER GREEK (322 B. C. to 200 A. D.) — MR. HUTCHINSON
Open to graduate students only.*

*For further information students are requested to confer with the professor in charge of the subject.

HISTORY

WILLIS M. WEST, Professor, Head of Department of History
FRANK M. ANDERSON, Professor
ALBERT B. WHITE, Professor
WILLIAM STEARNS DAVIS, Professor
WALLACE NOTESTEIN, Instructor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including course 1.

FOR A MAJOR, eighteen credits, not including course 1, together with reinforcing subjects (thirty credits) selected from economics and political science, sociology, biological sciences, languages according to individual needs, and additional history.

FOR A B. A. WITH DISTINCTION, the general requirements (page), thirty-six credits in history (nine of which shall be in "intensive courses") and at least twelve credits in economics, political science, sociology and anthropology.

FOR A TEACHER'S CERTIFICATE, twenty-four credits, including 4 or 5, 16, and at least six credits in "intensive courses", At least the elements of the other social sciences are recommended.

The department of Economics and Political Science, History, and Sociology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one the departments of the social science group ought to be familiar at least with the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others. To students who are interested in the work of these departments, but who do not care to elect their major before the end of the sophomore year, the departments unite in the following recommendations for the freshman and sophomore years:

RECOMMENDATIONS FOR FRESMAN AND SOPHOMORES

1. The student should take the elementary work of each department within the group as early as possible. Accordingly the following courses are recommended:

Freshman year: history 2 (English constitutional); sophomore year: history 5 (American); economics 1, first or second semester; political science 1, first or second semester.

2. The student is advised to take in these years his required minor in science from the departments of Botany or Animal Biology, and his required minor in language from the French or German, unless he has a reading knowledge of both these languages at entrance.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Europe 31 B.C.-1500 A.D.	1, 2	6†	All	None
2.	English Constitution	1, 2	6	All	Two yrs.prep hist
3.	Renaissance and Reform	1	3	Soph., Jr., Sr.	1 or 2
4.	Europe since 1789	1, 2	6	Soph., Jr., Sr.	1 or 2
5.	American to 1840	1, 2	6	Soph., Jr., Sr.	2
6.	American since 1840	1	3	Jr., Sr.	5
7.	Making of Constitution	1, 2	6*	Jr., Sr., Grad.	See statement
8.	American Constit'l Law	1, 2	6*	Sr., Grad.	6
9.	American Statesmen	2	3	Jr., Sr., Grad.	5
10.	Historical Masterpieces	1	3	Jr., Sr., Grad.	See statement
11.	American Diplomacy	1	3	Jr., Sr., Grad.	5
12.	Europe Diplomacy	2	3	Jr., Sr., Grad.	4
13.	Colonial Expansion	2	3	Jr., Sr., Grad.	4 or 5
14.	Authorities for N. E.	1, 2	4*	Sr., Grad.	See statement
15.	Hitorical Method	2	2	Soph., Jr., Sr.	1 or 2
16.	Teacher's Course	2	1	Sr., Grad.	See statement
17.	English Parliament	2	3	Jr., Sr., Grad.	2 and six credits
18.	English Judiciary	2	3	Jr., Sr., Grad.	2 and six credits
19.	Eng. Institutions 17th Cent.	2	3	Jr., Sr., Grad.	2 and six credits
20.	England Since 1815	1	3	Soph., Jr., Sr. Grad.	2
21.	History of Greece	1	3	Soph., Jr., Sr.	1 or 2
22.	Greek Political Inst's	2	3	Jr., Sr., Grad.	See statement
23.	Roman Imp. Organization	2	3	Jr., Sr., Grad.	Twelve credits

†Juniors and seniors receive only half credit; not counted toward a minor in history.

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

INTRODUCTORY COURSES

Freshmen who have taken two years of history in the preparatory school may omit course 1 and begin with course 2. Course 1 admits directly to courses 2, 3, 4, 15, and 21. Course 2 is required as a prerequisite for all courses in American history (5 to 9 inclusive, 11, 13 and 14) and for courses 17 to 20 in English history, while it admits also to 3, 4 and 15. Students who intend to specialize in history or in any social science should elect course 2 in the freshman year.

1. European History from the Establishment of the Roman Empire to the Reformation. 31 B. C.-1500 A. D. Mr. Davis
Six credits (three hours per week) Both semesters.

Open to all, but juniors and seniors receive only half credit; especially designed for freshmen who have had less than two years of history in the preparatory school; not credited toward a minor in history.

The course will show how modern institutions are largely derived from Roman imperial institutions. The leading topics will be the gathering up of the contributions of the older world by Rome, the imperial organization of the first "political people" the Germanic invasions, the growth of the Frankish state and Charlemagne's premature attempt at organization, the medieval church, the feudal system, the crusades, the rise of the towns, and the development of modern nations. This last topic will be studied mainly as it is illustrated in the history of Germany and of France from 814 to 1500. A definite portion of the course (about one-third) will go to the careful use of source material.

2. English Constitutional History to the Accession of George I
Mr. White and Mr. Notestein
Six credits (three hours per week) Both semesters.
Open to all who have had two years of history in the preparatory school or who have completed course 1.

While the general narrative of English history is not neglected, the making and testing of the English government are the main themes of the course. Much time is spent upon the study of documents which illustrate the origin and development of important institutions.

GENERAL COURSES

3. The Renaissance and Reformation Mr. White
Three credits (three hours per week) First semester
Open to those who have completed course 1 or course 2.

The Renaissance and Reformation will be studied as general European movements, with the 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 those who have completed course 1 or course 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states. The entire class meets twice each week for lectures or reciations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions and other select Documents Illustrative of the History of France* 1789-1901. This work is done in small groups which meet in the European history seminar room.

5. American Constitutional History to 1840 Mr. West
Six credits (three hours per week) Both semesters
Open to those who have completed course 2; required for courses 6 to 9 inclusive 11, 13, 14, and 19, and therefore to students who intend to specialize in history recommended for the sophomore year.

The aim is to make this a "practice course"; the work is done partly by cooperative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

15. Historical Method and Bibliography Mr. White
Two credits (two hours per week) Second semester
Open to those who have completed course 1 or course 2, but designed only for those who intend to specialize in history.

This course aims to make clear to the student the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.

2. History of historical writings:especially the work of Ranke and his followers

and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.

3. Bibliography. Purpose, to gain a working knowledge of existing helps to historical study, such as standard bibliographies, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

16. Teacher's Course — Mr. West
One credit (one hour per week) — Second semester
Open to seniors and graduates who have, including courses in progress, twenty-four credits in history; required for those who obtain a teacher's recommendation in history.

This course is designed to assist those who expect to teach history in high schools. Professor West will be aided by other members of the department.

20. England since 1815 — Mr. Anderson
Three credits (three hours per week) — Second semester
Open to those who have completed course 2; may be taken to advantage in connection with course 4.

The course opens with a rapid survey from the point where course 1 stops down to 1815. From there on the work is more intensive. Through topics and assigned readings an opportunity is afforded to become acquainted with the principal British reviews and with two or three of the leading British newspapers.

21. History of Greece — Mr. Davis
Three credits (three hours per week) — First semester
Open to those who have completed course 1 or course 2.

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, with particular emphasis upon the later part of the period. Especial attention will be given to the permanent influence of Greek civilization.

ADVANCED OR INTENSIVE COURSES

6. American Constitutional History, 1841-1885 — Mr. Anderson
Three credits (three hours per week) — First semester
Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-09, and in alternate years thereafter.

Special attention is given to the development of the slavery issue in politics, the political history of the civil war, and reconstruction.

7. The Making of the Constitution — Mr. West
Six credits (three hours per week) — Both semesters
Open to juniors, seniors, and graduates who have completed course 5, but only on approval of the instructor; both semesters must be completed before credit is given for the first semester.

Each member of the class studies in detail the transition in one of the original American colonies to commonwealth government, with the constitution of his chosen state. The work of the Philadelphia convention is then taken up and the accounts of later writers are compared with the sources. "We the people," the "compact" theory, and the province of the Supreme Court as "final arbiter," are topics especially investigated, with such further aids as the writings of the day and the discussions of the ratifying state conventions afford. Besides the class work each student will present a written report upon the history of some important bill providing for the

admission of a state, and some constitutions question in connection with congressional legislation.

8. AMERICAN HISTORY SINCE 1789 AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW — MR. WEST
Three credits (three hours per week) — First semester
Open to seniors and graduate students who have completed courses 2, 5, 6 and 7; not given in 1909-10.

This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from *Thayer's Cases on Constitutional Law*, studied in their historical setting and with reference to the course of development.

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 courses 2 and at least the first semester of course 5.

A research course. Each member of the class makes a study of some prominent American statesman who has left a considerable body of materials valuable for information upon his own career and the general history of the United States. The greater part of the work consists in the sifting of these materials and the preparation of brief reports in regard to points assigned for investigation. The class exercises are chiefly devoted to the criticism of these reports and the synthesis of the results thus obtained. Only a limited period is traversed. In the work will be confined to the period of the Federalist supremacy, 1789-1801.

10. A CRITICAL STUDY OF A HISTORICAL MASTERPIECE — MR. ANDERSON
Three credits (three hours per week) — First semester
Open to those who have completed course 5.

The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Each student will be required to read critically the entire work studied and, in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussing carried on by the students under the direction of the instructor. In 1909-10, Rhode's *History of the United States from the Compromise of* 1850 *to the Restoration of Home Rule in the south in* 1877 will be read.

11. THE HISTORY OF AMERICAN DIPLOMACY — MR. ANDERSON
Three credits (three hours per week) — First semester
Open to seniors and graduates who have completed course 5.

A research course dealing principally with the more important features of American foreign policy during the earlier years of the federal government.

12. THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789 — MR. ANDERSON
Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

This course centers about the critical reading of the principal treaties and numerous state papers dealing with international relations.

13. COLONIAL EXPANSION AND ADMINISTRATION — MR. WEST
Three credits (three hours per week) — Second semester
Open to seniors and graduate who have completed course 4 or course 5; given in alternate years; not offered in 1909-10.

The history of the colonial acquisitions of the great nations will be surveyed

rapidly and colonial institution and governments will be studied and compared in detail.

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 graduates who have completed eighteen credits, including course 5;both semesters must be completed before credit is given for the first semester; given in alternate years.

This is primarily a course in historical criticism, based on a minute study of Winthrop's *History of New England*. Each member of the seminar has a group of secondary authorities assigned him which he is to criticise in the light of the original sources. The study involves also a careful comparison of the chief sources with one another, and incidedtally it leads to a minute treatment of political, social, and economic development in early New England. The number admitted to the course is limited to seven.

17. Beginnings of Parliament Mr. White
Three credits (three hours per week) Second semester
Open to juniors, seniors and graduates, who have completed twelve credits including course 2. Students should have a reading knowledge of Latin. Latin 9 gives a good preparation for this period.

This course will be given in alternate years with course 18, not given in 1909-10.

18. Origin of the English Judicial System Mr. White
Three credits (three hours per week) Second semester
Open to juniors, seniors and graduates who have completed six credits, including course 2, and who obtain the permission of the instructor; students should be able to read Latin, and Latin 9 is recommended to give this preparation.

The work will consist of detailed study in the sources of the twelfth and thirteenth centuries, and will aim to show how the king's court, from which the present judicial system has grown, superseded the older communal and private courts, the development of the primitive king's court into a system of courts, and the growth in it of a new procedure. In this last connection the critical stages in the early history of the jury will receive special attention. This course will be given in alternate years with 17. Given in 1909-10.

19. English Institutional Development in the Seventeenth Century
Mr. Notestein
Three credits (three hours per week) Second semester
Open to juniors, seniors and graduates who have completed twelve credits in history, including course 2.

22. Greek Political Institutions Mr. Davis
Three credits (three hours per week) Second semester
Open to juniors, seniors, and graduates, who have completed courses 1 or 2, 21 and six additional credits.

A study of the development of Greek political forms and of their operation as seen in typical oligarchic, democratic, federal, and monarchic states.

23. Roman Imperial Organization Mr. Davis
Three credits (three hours per week) Second semester
Open to juniors, seniors and graduates, who have completed twelve credits.

This course will survey the development and organization of the imperial system from the beginning of Roman expansion outside of Italy to the time of the Germanic invasion. Special attention will be given to the administration of the municipalities and provinces under the Empire and to the development of despotism.

LATIN

JOSEPH B. PIKE, Professor, Head of Department of Latin
JOHN S. CLARK, Professor
JOHN E. GRANRUD, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, courses 1, 2, 3 and 4.

FOR A MAJOR, courses 1, 2, 3 and 4, together with six additional credits selected from courses 6 and 14 inclusive, and reinforcing subjects (thirty credits) selected from Greek, advanced modern language, English (course 3, 4, 5, 6, 24 and 25) philology, history (courses 1, 15, 21, 17, 18 22 and 23) philosophy (course 9), political science (course 19) and additional Latin courses.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and twelve credits in addition to the requirements for a major, course 10 being compulsory.

FOR A TEACHER'S CERTIFICATE, course 1, 2, 3, 4, 6, and 7 with an average of at least good.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Livy	1	3	Fresh.	4 yrs. prep Latin
2.	Plautus and Terence	2	3	Fresh.	1
3.	Horace	1	3	Soph., Jr., Sr.	1 and 2
4.	Roman Lit	2	3	Soph., Jr., Sr.	1-3
5.	Ovid	1, 2*	2	Soph., Jr., Sr.	1 and 2
6.	Adv. Cæsar	1	3	Jr., Sr.	1-4
7.	Adv. Virgil	2	3	Jr., Sr.	1-4
8.	Pliny's Letters	1	2	Jr., Sr.	1-4
9.	Med. Latin	1	1	Jr., Sr.	1-4
10.	Composition	2	2	Jr., Sr.	1-4
11.	Elegiac Poetry	1	3	Jr., Sr.	1-4
12.	Corresp. of Cicero	1	2	Jr., Sr.	1-4
13.	Satire	2	3	Jr., Sr.	1-4
14.	Drama	2	2	Jr., Sr.	1-4
15.	Arch. and Public Life	1	2	Jr., Sr.	None
16.	Private Pife	2	2	Jr., Sr.	None
17.	Lucretius	1, 2	2	Grad.	
18.	Seneca	1, 2	2	Grad.	
19.	Roman Elooquence	1, 2	2	Grad.	

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

1. LIVY: BOOKS I, II, XXI, XXII. Selections MESSRS. PIKE, CLARK AND GRANRUD
Three credits (three hours per week) First semester

Open to freshmen who have completed four years of Latin in preparatory schools; course 2 must also be completed before credit is given for this course.

The course consists of (a) a correct translation of Latin into idomatic English with a study of the difference between the idioms of the two languages; (b) Latin composition and review of the principles of Latin syntax.

2. PLAUTUS AND TERENCE, Selections MESSRS. PIKE, CLARK AND GRANRUD
Three credits (three hours per week) Second semester

Open to freshmen who have completed course 1.

The course comprises the translations of selected plays of Plautus and Terence with an outline study of the beginnings of the Roman drama and also of Roman political institutions.

3. HORACE — MESSRS. PIKE AND GRANRUD
Three credits (three hours per week) — First semester

Open to those who have taken course 1 and 2; course 4 must also be taken before credit is given for this course.

Selections from the odes, epodes, satires and epistles with a study of the life and literary art of Horace.

4. ROMAN LITERATURE — MESSRS. PIKE AND GRANRUD
Three credits (three hours per week) — Second semester

Open to those who have taken courses 1, 2 and 3.

A brief history of Roman literature with illustrative readings from the most important writers.

5. OVID — MR. CLARK
Two credits (one hour per week) — Both semesters

Open to those who have taken courses 1 and 2; both semesters must be completed before credit is given for the first semester.

Translations from Ovid's *Fasti*, with a study of the religion and religious ceremonials of the Romans.

6. ADVANCED COURSE IN CÆSAR — MR. PIKE
Three credits (three hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive; required for a 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 Latin composition. An amount of time approximately equal to one hour for one-half semester will be spent upon the technical portions of the work, e. g., class drill work and discussion of 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. An amount of time approximately equal to one hour for one-half semester will be spent upon the strictly technical portions of the subject.

8. PLINY'S LETTERS — MR. PIKE
Two credits (two hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from the correspondence of Pliny the Younger with a study of his times.

9. MEDIEVAL LATIN — MR. PIKE
One credit (one hour per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

A course intended primarily to assist the student in rendering Latin historical documents of the middle ages. The work consists principally in the reading of selec-

ted documents of the middle ages with an outline of the main peculiarities of medieval Latin.

10. LATIN COMPOSITION — MR. PIKE
Two credits (two hours per week) — Second semester
Open to those who have completed course 1 to 4 inclusive; required for degree with distinction.
A course in advanced Latin composition and a study of Latin prose style.

11. ROMAN ELEGIAC POETRY — MR. CLARK
Three credits (three hours per week) — First semester
Open to those who have completed courses 1 to 4 inclusive.
Selections from Catullus, Tibullus, Propertius, and Ovid, with a study of the rise, development and characteristics of Roman elegiac poetry.

12. CORRESPONDENCE OF CICERO — MR. CLARK
Two credits (two 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 his life and the history of his times.

13. ROMAN SATIRE — MR. CLARK
Three credits (three hours per week) — Second semester
Open to those who have completed courses 1 to 4 inclusive.
Selections from Juvenal, Persius, Horace, and from early satire, with a study of the rise, development, and characteristics of Roman satire.

14. ROMAN DRAMA — MR. CLARK
Two credits (two hours per week) — Second semester
Selections from Seneca's tragedies and from the comedies of Plautus and Terence, with a study of the rise and development of the drama at Rome.

15. ROMAN ARCHÆOLOGY AND PUBLIC LIFE — MR. GRANRUD
Two credits (two hours per week) — First semester
Open to juniors and seniors; no knowledge of Latin required.
A study of the city of Rome; the forums; Roman architecture, sculpture, and painting; the Roman assemblies, senate, and magistracies. Lectures with stereopticon views and collateral reading. Not credited toward a major or minor.

16. ROMAN PRIVATE LIFE — MR. GRANRUD
Two credits (two hours per week) — Second semester
Open to juniors and seniors; no knowledge of Latin is required.
The Roman house, family, dress, food, education, and amusements are studied. Lectures with stereopticon views and collateral reading. Not credited toward a major or minor.

17. LUCRETIUS — MR. CLARK
Two credits (two hours per week) — Both semesters
Open to graduate students; other arrangements may be ascertained upon application to the department.
The course consists of the reading and interpretation of the text of Lucretius with a study of his philosophy and its sources.

18. SENECA — MR. PIKE
Two credits (two hours per week) — Both semesters

Open to graduate students; ot er arrangements may be ascertained upon application to the department.

Reading, interpretation and annotation of the *de Beneficiis* of Seneca with a study of Stoicism at Rome.

19. THE THEORY OF ROMAN ELOQUENCE — MR. GRANRUD
Two credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Cicero's *De Oratore* will form the basis of the work.

MATHEMATICS

JOHN F. DOWNEY, Professor, Head of Department of Mathematics
GEORGE N. BAUER, Professor
WILLIAM H. BUSSEY, Assistant Professor
ANTHONY L. UNDERHILL, Assistant Professor
GEORGE P. PAINE, Assistant Professor
ROYAL R. SHUMWAY, Instructor
JAMES S. MIKESH, Instructor.

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including courses 1 and 2.

FOR A MAJOR, eighteen credits, including course 9, but not including courses 1 and 2, together with reinforcing subjects (thirty credits) selected from astronomy, physics, mechanics, logic, advanced modern language and additional mathematics.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and one year of pure mathematics in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 6, 7, 8 and 9. Course 13 is also recommended.

COURSES

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Higher Alg. Part I	1	5	Fresh.	El. Alg.
2.	Alg. cont. and Pl. Trig.	2	5	Fresh.	1
3.	Higher Alg. Part II	1	3*†	Fresh., Soph.	1
4.	Trigonometry	2	3*†	Fresh., Soph.	3
5.	Hgr. Alg. Parts II & III and Trig.	1, 2	10	Fresh.	1
6.	Higher Alg. Part III	1	3	Soph., Jr., Sr.	2 or 3
7.	Analyt. Geom.	2	3	Soph., Jr., Sr.	6
8.	Differential Calculus	1	3	Jr., Sr.	7
9.	Integral Calculus	2	3	Jr., Sr.	8
10.	Adv. Plane Anal. Geom.	1	3	Jr., Sr.	7
11.	Solid Anal. Geom.	2	3	Jr., Sr.	10
12.	Differential Equations	1	3	Sr.	9
13.	Mathematical Pedagogy	2	1	Sr.	7
14.	Method of Least Squares	2	2	Sr.	9
15.	Theoretical Mechanics	1, 2	10	Sr.	9
16.	Advanced Calculus	1, 2		Grad.	9
17.	Modern Geometry	1, 2		Grad.	9 and 11

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
18.	Theory of Numbers.....	1, 2		Grad.	9
19.	Funcs. of a Cplx. Var.....	1, 2		Grad.	12
20.	Projective Geometry.....	1, 2		Grad.	9, 10, 11
21.	Elliptic Integrals.....	1, 2		Grad.	12

*Juniors and seniors are allowed only half credit.

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

1. HIGHER ALGEBRA, Part I — MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE 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 school; not credited toward a minor in mathematics.

The fundamentals 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.

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. BAUER, BUSSEY, UNDERHILL, PAINE AND MIKESH

Five credits (five hours per week) — Second semester

Required of freshmen who have not an entrance credit in course 1.

This is a continuation of course 1 and consists of algebra through logarithms and plane trigonometry.

3. HIGHER ALGEBRA, PART II. — MESSRS. BAUER, BUSSEY, UNDERHILL AND PAINE

Three credits (three hours per week) — First semester

Open to those who have completed course 1; must be followed by course 4.

Variation, quadratic equations, special higher equations, simultaneous equations of the second degree, maxima and minima of algebraic functions, differentiation of algebraic functions, development of functions, logarithms, theory of equations and solution of numerical higher equations.

4. TRIGONOMETRY — MESSRS. BUSSEY AND PAINE

Three credits (three hours per week) — Second semester

Open to those who have completed course 3.

Text, tables, and numerous problems.

5. HIGHER ALGEBRA, Parts II and III, AND TRIGONOMETRY — MESSRS. BUSSEY, PAINE AND MIKESH

Ten credits (five hours per week) — Both semesters

Required of freshmen who have an entrance credit in course 1, but not in solid geometry, and of freshmen in the School of Chemistry.

6. HIGHER ALGEBRA, PART III — MESSRS. BUSSEY AND PAINE

Three credits (three hours per week) — First semester

Open to those who have completed course 2 or 4.

Maxima and minima of functions, indeterminate forms, discussion of functions and problems, indeterminate equations, theory of equations and solution of numerical higher eqations, series, interlopation, permutations and combinations, and determinants.

7. Analytical Geometry — Messrs. Bussey, Underhill and Paine
Three credits (three hours per week) — First semester
Open to those who have completed course 6.
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 eqations.

8. Differential Calculus — Messrs. Downey and Underhill
Three credits (three hours per week) — First semester
Open to those who have completed course 7.
Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, subtangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes, and singular points. Not given in 1909-10.

9. Integral Calculus — Messrs. Downey and Underhill
Three credits (three hours per week) — Second semester (first semester in 1909-10).
Open to those who have completed course 8.
Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volumes.

10. Advanced Course in Plane Analytical Geometry — Mr. Bauer
Three credits (three hours per week) — First semester
Open to those who have completed course 7.
Supplementary to course 7, treating more fully of the subjects of that course and taking up additional subjects.

11. Solid Analytical Geometry — Mr. Bauer
Three credits (three hours per week) — Second semester
Open to those who have completed course 10.
Elementary theorems of projection, co-ordinates, the plane, the line in space, quadric surfaces, transformation of co-ordinates, tangents, poles and polars, the general equation of the second degree. Numerous examples are assigned to illustrate the theory.

12. Differential Equations — Mr. Downey
Three credits (three hours per week) — First semester (second semester in 1909-10).
Open to those who have completed course 9.
Text and lectures.

13. Mathematical Pedagogy — Mr. Bauer
One credit (one hour per week) — Second semester
Open to those who have completed course 7
A lecture course, in which special attention is paid to the fundamental principles of algebra and geometry.

14. Method of Least Squares — Mr. Leavenworth
Two credits (two hours per week) — Second semester
Open to those who have completed course 9.

A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering, physics and astronomy.

15. THEORETICAL MECHANICS (In College of Engineering)
Ten credits (five hours per week) Both semesters
Open to those who have completed course 10.
Recitations and lectures.

16. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS MR. DOWNEY
Open to graduate students who have completed course 9. Both semesters
This course goes farther into some of the subjects treated in courses 8 and 9, and takes up some important subjects not included in those courses.

17. MODERN GEOMETRY MR. BAUER
Both semesters
Open to graduate students who have completed courses 9 and 11.

18. THEORY OF NUMBERS MR. BUSSEY
Open to graduate students who have completed course 9. Both semesters

19. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE MR. UNDERHILL
Open to graduate students who have completed course 12. Both semesters
Lectures, readings and problems.

20. PROJECTIVE GEOMETRY MR. BUSSEY
Both semesters
Open to graduate students who have completed courses, 9, 10 and 11.

21. ELLIPTIC INTEGRALS MR. BROOKE
(In the College of Engineering).
Open to graduate students who have completed course 12. Both semesters

MILITARY SCIENCE AND TACTICS

EDWARD SIGERFOOS, Professor, Head of Department of Military Science and Tactics
BERT ROSE, Instructor of Band

MILITARY SCIENCE AND TACTICS

1. MILITARY DRILL MR. SIGERFOOS
(Three hours per week) First and second semester
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.
A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled 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 two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

2. MILITARY SCIENCE — MR. SIGERFOOS
(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.

Miltary instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company, battalion and regimental manœuvres, 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.

THE ROSTER OF THE CORPS OF CADETS

CADET COLONEL

Chester S. Wilson.

CADET MAJORS

Wilbur D. Shaw.
J. Russell Smith.
John W. Haw.

BAND

B. A. Rose, Instructor of Music.
R. T. Glyer, Cadet Chief Musician.
W. W. Norton, Cadet Principal Musician.

CADET CAPTAINS

Lawrence W. King, Company E.
Lewis S. Diamond, Company A.
Robert W. Foulke, Company C.
Willis Shippam, Company G.
S. G. Mooney, Company F.
Maurice V. Jenness, Company B.
L. V. Crandall, Company I.
Robert A. Pratt, Company D.

Robert Nelson, Regimental Quartermaster.
Allan B. Stork, Company H.
Chas. T. Haas, Regimental Commissary.
Warner G. Workman, Regimental Adjutant.
A. R. Blackburn, Company K.
V. L. Lenz, Company L.
Max Brownell, Company M.
V. Chase, Company N.

Cadet First Lieutenants

J. R. Buffington, Adjutant First Battalion.
G. M. Briggs, Adjutant Third Battalion.
W. D. Timperly, Commanding Battery.
Oscar V. Anderson, Company F.
Harry W. Dahleen, Company G.
Thomas A. Peppard, Adjutant Second Battalion.
Donald R. Brewster, Company I.
Porteus B. Palmer, Company E.
Howard R. Hush, Company B.
H. R. Bicknell, Company C.
Allan J. Wash, Company D.
C. P. Robb, Quartermaster Third Battalion.
C. Arthur Carlson, Company A.
Cyrus H. Fiske, Company H.
E. Hoffman, Company K.
L. E. Mark, Company L.
M. D. Clark, Company M.

Cadet Second Lieutenants

George P. Gurley, Company A.
Lewis H. Merrill, Quartermaster First Battalion.
Sheldon H. Smith, Battery.
C. Hugo Nelson, Company F.
C. T. Ekman, Company G.
C. W. Bowen, Company I.
W. F. Cantwell, Company H.
Paul Johnson, Company G.
J. E. Dorsey, Company B.
R. W. Whittier, Quartermaster Second Battalion.
Howard Williams, Company C.
C. M. Jesperson, Company E.
R. D. Newhall, Company D.
Harold Munck, Company A.
P. A. Anderson, Assistant Adjutant Third Battalion.
R. V. Smith, Company K.
D. Holbrook, Company L.
Geo. Workman, Company M.
H. C. Huntly, Company N.

MUSIC

CARLYLE SCOTT, Professor, Head of Department of Music

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including courses 4, 6 and 7.

A MAJOR is not offered.

Students entering the University for the express purpose of studying music must register for courses 1 and 4 and two other three-hour subjects outside of the Department of Music.

With practical aim of the theoretical courses is to acquaint the student with the laws underlying musical composition, enabling him, at the same time, through critical analysis, to arrive at the keenest perception and appreciation of master works in music; and, finally, to stimulate latent talent to self-expression of musical thoughts in correct form. A certificate of proficiency in music will be granted to students who, having completed the theoretical courses and two year of pianoforte, are able to play one of the standard concertos and, in addition, show marked musical ability.

Courses

No.	Title	Semester	Credits	Offered to	Prerep. courses
1.	Harmony	1, 2	4	Jr., Sr.	None
2.	Counterpoint	1, 2	4	Jr., Sr.	See statement
3.	Form and Composition	2	2	Sr.	See statement
4.	Pianoforte	1, 2	3 or 6	Jr., Sr.	See statement
5.	Pinoforte, second course	1, 2	3 or 6	Jr., Sr.	See statement
6.	Choral culture	1, 2	1 or 4	Jr., Sr.	See statement
8.	History of Music	1, 2	2	Jr., Sr.	None

1. HARMONY — MR. SCOTT

Four credits (two hours per week) — Both semesters

Open to juniors and seniors. The fee is four dollars per semester.

The study of chords, their construction, relations, and progressions. The work consists of written exercises on basses, the harmonization of given melodies. Foote and Spaulding's *Modern Harmony* is used as text book.

2. COUNTERPOINT — MR. SCOTT

Four credits (two hours per week) — Both semesters

Open to juniors and seniors who have a thorough knowledge of harmony. The fee is four dollars per semester.

The work includes the harmonization of melodies in two, three, and four voices in the different orders of counterpoint. Spaulding's *Tonal Counterpoint* is used as a text book.

3. MUSICAL FORM AND FREE COMPOSITION — MR. SCOTT

Two credits (two hours per week) — Second semester

Open to seniors who have completed courses 1 and the first semester of course 2; for those specializing in music and can be taken only with the consent of the instructor. The fee is four dollars per semester.

At the close of the year a program of original composition will be given.

4. PIANOFORTE — MR. SCOTT

Three or six credits (one and a half or three hours per week) — Both semesters

Open to juniors and seniors, who have mastered technical difficulties of the

degree of Czerny's *School of Velocity* and the easier Haydn and Mozart sonatas, for those who intend to pursue the higher branches of the pianoforte, the art of playing, or to fit themselves for piano teachers. The fee is thirty-two or sixty-four dollars per semester.

5. PIANOFORTE, second course — MR. SCOTT
Three or six credits (one and a 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. The fee is two dollars per semester. A single credit may be secured for chorus work. Students may pursue the chorus work without credit, by paying the required fee and securing consent of the director.

A popular course in choral practice for four-part mixed voices, with occasional selections for male voices and female voices separately; features: sight singing with hints on proper tone-production, correct breathing, vocalization and solfeggio; the art-forms in choral compositions will be studied and analyzed. (Chorus a capella, motet, cantata, oratorio.)

8. HISTORY OF MUSIC — MR. SCOTT
Two credits (one hour per week) — Both semesters
Open to juniors and seniors. The fee is four dollars per semester.

A literary course. Lectures are given on the development of music from the time of Palestrina to the present day.

PHILOSOPHY AND PSYCHOLOGY

NORMAN WILDE, Professor, Head of Department of Philosophy and Psychology
DAVID F. SWENSON, Assistant Professor
JAMES B. MINER, Assistant Professor
ROWLAND HAYNES, Assistant Professor
HERBERT H. WOODROW, Instructor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected as follows: in philosophy, Greek, Latin, mathematics, physics, sociology, political science, English and additional philosophy and psychology; in psychology, biology, physics, education and additional philosophy and psychology.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major, at least six of twenty-four credits in the department being from intensive courses.

The courses offered by the department fall into three groups.

1. *Introductory courses;* 1 and 2. Course 1 is required for all advanced work in psychology, and either 1 or 2 for all work in philosophy, but students are advised to take both.

2. *General courses.*

3. *Advanced intensive courses.* These courses are open only to graduates and properly qualified seniors. All will not be offered each year but a selection will be made to meet the qualifications of the students presenting themselves.

The courses may also be grouped according to their purpose as follows:

1. Of special value for education: 1, 2, 3 and 11.
2. Fundamental courses in psychology: 1, 3, 4, 5, 16, and 21.
3. Fundamental courses in philosophy: 1, 2, 9, 10, 11 and 14.

Courses

No.	Title	Semester	Credits	Offered to	Prereq.-courses
1.	Introductory Psych.....	1 or 2	3	Soph., Jr., Sr.	None
2.	Logic.....	1 or 2	3	Soph., Jr., Sr.	None
3.	Educational Psych.....	1 or 2	3	Soph., Jr., Sr.	1
4.	Exp. Psych.: The Senses....	1	3	Jr., Sr.	1
5.	Exp. Psych.: Higher Mental Processes.....	2	3	Jr., Sr.	1 and 4
7.	Psychological Interpretation	1	3	Jr., Sr.	1
8.	Aesthetics.....	2	3	Jr., Sr.	1
9.	Ancient and Med. Philos....	1	3	Jr., Sr.	1 or 2
10.	Modern Philosophy.....	2	3	Jr., Sr.	1 or 2
11.	Principles of Ethics.....	1	3	Jr., Sr.	1 or 2
12.	Phil. of Religion.....	2	3	Jr., Sr.	1 or 2
13.	Psychol. of Moral and Relig. Develop.....	1	3	Jr., Sr.	3
14.	Logic of Science.....	2	3	Jr., Sr.	2
15.	Mental Retardation.....	2	3	Jr., Sr., Grad.	3
16.	Psychological Problems.....	1, 2	..	Sr. Grad.....	1, 4 and 5
17.	Research in Psych.....	1, 2	6†	Grad.	16
18.	*Descartes, Spinoza, Leibnitz	1, 2	6†	Sr. Grad.	9 and 10
19.	*Kant.....	1, 2	6†	Sr. Grad.	9 and 10
20.	*Hume.....	1, 2	6†	Sr. Grad.	9 and 10
21.	Psychol. Principles.....	1	3	Jr., Sr., Grad.	1 and 2
*22	.Metaphysics.....	1, 2	6†	Sr. Grad.	9 and 10 or 11
*23.	Systematic Ethics.....	1, 2	6†	Sr Grad.	9, 10 and 11
*24.	Hist. of Ethics.....	1, 2	6†	Sr. Grad.	9, 10 and 11
*25.	German Idealism.....	1, 2	6†	Grad.	9, 10 and 19
*26.	The Nervous System and Mental Life.....	2	3	Jr., Sr., Grad.	1

†Both semesters must be completed before credit is given for the first semester.
*Open to students only upon approval of the department.

INTRODUCTORY COURSES

1. Introductory Psychology — Messrs. Miner, Swenson and Haynes
Three credits (three hours per week) — Each semester
Open to sophomores, juniors and seniors; required for all advanced work in psychology and for the teacher's certificate; it also serves as an introduction to the courses in philosophy.

The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. In connection with the work several lectures and demonstrations on the nature of the nervous system will be given in the neurological laboratory of the College of Medicine and Surgery. Text book, essays, and discussions.

2. Logic — Messrs. Wilde, Swenson and Haynes
Three credits (three hours per week) — Each semester
Open to sophomores, juniors, and seniors.

A study of 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.

GENERAL COURSES

3. EDUCATIONAL PSYCHOLOGY — MESSRS. MINER AND HAYNES
Three credits (three hours per week) — Each semester
Open to those who have completed course 1.
The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. EXPERIMENTAL PSYCHOLOGY: The Senses — MESSRS. MINER AND HAYNES
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1. As the number in each laboratory section will be limited, students should arrange with the instructor for their section before registration.
This course, together with course 5, is designed to give a general survey of experimental methods and results as well as a training for laboratory research in psychology. The work involves typical experiments on sensation and movement. One hour of class discussion and two double hour laboratory periods are required.

5. EXPERIMENTAL PSYCHOLOGY: Higher Mental Processes — MR. MINER
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 4.
A continuation of course 4 with experiments on affection, memory, attention, and such other processes as can be studied by laboratory methods. The quantitative phase of experimental psychology is taken up for special discussion.

6. OUTLINE OF EXPERIMENTAL PSYCHOLOGY — MR. MINER
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1; not given in 1909-10.
A study of the methods and accredited results of experimental investigation in psychology. Class-room demonstrations, lectures and discussion.

7. PSYCHOLOGICAL INTERPRETATION — MR. MINER
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1.
Unusual and pathological mental states are studied for the light they throw upon normal mental life. The student is given drill in the detecting of mental defects and in the psychological explanation of characters in history and literature. The subconscious, dreams, suggestibility, telepathy, nervous disorders, insanity, secondary personalities, and the crowd are among the topics treated.

8. AESTHETICS — MR. SWENSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.
An introduction to the history and theory of aesthetics, including a psychological analysis of the consciousness of beauty and of the asthetic impulse and some consideration of the main historic theories of beauty.

9. ANCIENT AND MEDIAEVAL PHILOSOPHY — MR. WILDE
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1 or course 2.

This and the following course are designed to 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 this first semester the main work will be upon the philosophies of Plato and Aristotle, but the later development will be traced as far as the Renaissance.

10. MODERN PHILOSOPHY — MR. WILDE
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or course 2.

Lectures on the representative systems of modern philosophy from the Renaissance to our own day, 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, Mill, Schopenhauer.

11. PRINCIPLES OF ETHICS — MR. WILDE
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1 or course 2.

An introductory course, comprising a study of the distinction between moral and non-moral phenomena, an analysis of voluntary conduct, and a discussion of the nature of conscience, the meaning of right and wrong, the purpose of life, human responsibility, and the authority of moral law.

12. PHILOSOPHY OF RELIGION — MR. WILDE
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or course 2.

A study of the religious consciousness, its origin, development and significance; an analysis of the conception of God and a discussion of the place and function of religion in modern life.

13. PSYCHOLOGY OF MORAL AND RELIGIOUS DEVELOPMENT — MR. HAYNES
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 3.

The purposes of this course are (1) to give a psychological analysis of moral and religious experience, (2) to trace the usual course of development in the individual of these forms of experience, and (3) to suggest the application of these facts to moral and religious education.

ADVANCED INTENSIVE COURSES

14. LOGIC OF SCIENCE — MR. SWENSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 2.

This course serves as an introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relations of their fundamental principles.

15. MENTAL RETARDATION — MR.
Three credits (three hours per week) — Second semester
Open to juniors, seniors and graduates who have completed course 3. A study of the nature and conditions of retarded and perverted development in children with a view to the detection of mental defects and the devising of special methods for the training of backward children. The course is specially designed for those contemplating teaching or social work. The observation of backward children will be part of the work required.

16. Psychological Problems — Mr. Miner
Both semesters

Open to seniors and graduate students who have completed courses, 1, 4 and 5; other arrangements may be ascertained upon application to the department.

Original work on special topics.

17. Research in Psychology — Mr. Miner
Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course 17; both semesters must be taken before credit is given for the first semester.

Minor or major research in experimental, educational, analytic, genetic, or comparative psychology.

18. The Philosophy of Descartes, Spinoza and Leibnitz — Mr. Swenson
Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.

A study of the pre-critical period of modern philosophy. The work will center in the discussion of the *Ethics* of Spinoza and *Monadology* of Leibnitz.

19. The Philosophy of Kant — Mr. Swenson
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 1, 2, 9, and 10; both semester must be completed before credit is given for the first semester.

A critical reading of the three Critiques; the relation of Kant to the development of modern philosophy.

20. The Philosophy of Hume — Mr. Swenson
Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9 and 10; both semester must be completed before credit is given for the first semester.

A critical reading of Hume's philosophical works; the position of Hume in the development of English philosophy.

21. Psychological Principles — Mr. Swenson
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed courses 1 and 2.

An advanced course, treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

22. Metaphysics — Mr. Swenson
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed course 9 and course 10 or 11; both semester must be completed before credit is given for the first semester.

A critical and constructive discussion of theories of knowledge and reality.

23. Systematic Ethics — Mr. Wilde
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10 and 11; both semesters must be completed before credit is given for the first semester.

A detailed study of the principles of conduct and the basis of moral obligation.

24. History of Ethics — Mr. Wilde
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10 and 11; both semesters must be completed before credit is given for the first semester.

A critical study of the development of Greek, English and German ethical thought. Chief attention will be paid to the work of Plato and Aristotle in ancient times, and to the relation between utilitarianism and idealism in modern philosophy.

25. German Idealism — Mr. Wilde
Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course 9, 10, and 19; both semesters must be completed before credit is given for the first semester; a knowledge of German is required.

A study of the development of German philosophy after Kant, especially as found in the writings of Fichte and Hegel.

26. The Nervous System and Mental Life — Mr. Johnston
Three credits (three hours per week) — Second semester

Open to juniors, seniors and graduates by consent of the instructor.

This course is given in the neurological laboratory of the College of Medicine and Surgery and is recommended for advanced students in psychology and education.

The course will include an analysis of nervous mechanisms on the basis of function, followed by a study of the mechanisms of correlation, the growth and education of the nervous system, cerebral functions and localization, and the neural basis of elementary phenomena of consciousness.

PHYSICAL TRAINING

For Men

Louis J. Cooke, Director
William K. Foster, Assistant Director

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 culture upon registration and during the course as often as the indications of the physical conditions 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 on personal hygiene during the first semester.

For Women

Anna M. Butner, Director
Jessie A. Matson, Assistant

The course in physical culture is offered to the women of the University as

a regular part of their work in the freshman year, and may be taken in any of the following years. A full year of work, in addition to the work required in this department, counts as a two-hour credit in the second semester of the senior year. The work consists of systematic exercises for the development of all parts of the body. Women pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse waist and bloomers, with the regulation shoes. All suits must be of black material.

It is a common observation that students often enter the University with an imperfect physical development because of an excessive use of some muscles, while others are weakened through disuse. This occasions attitudes and movements that are unseemly in appearance and unhealthful in their general effect. The purpose of this course, therefore, is to develop a strong and symmetrical physique with a graceful and easy carriage. A physical examination is made of each student and physical measurements are taken in the fall and again in the spring.

In addition to the regular class work, sports and pastimes are open to all women of the University. These include basket ball, indoor base ball, archery, tennis, and also the use of the running track and swimming pool.

PHYSICS

JOHN ZELENY, Professor, Head of Department of Physics
ANTHONY ZELENY, Professor
HENRY S. ERIKSON, Assistant Professor
ALOIS F. KOVARIK, Instructor
WILLIAM F. HOLMAN, Instructor.
————————, Instructor
LOUIS W. MCKEEHAN, Assistant
FRANZ AUST, Assistant

FOR A MINOR, twelve credits, not including courses 1, 2, 3 and 4.

FOR A MAJOR, eighteen credits, not including courses 1, 2 3 and 4, together with reinforcing subjects (thirty credits) selected from mathematics, mechanics, astronomy, advanced modern language, and additional physics.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and courses 5, 6, 7 and 8, and four other courses open to juniors and seniors, together with mathematics 9 and 10.

FOR A TEACHER'S CERTIFICATE, courses 5, 6, 7, 8 and 22, and six credits in chemistry.

Students should begin the study of physics with course 5. Courses 1 and 3 are elementary in character and do not prepare the student for any other courses in the department except courses 2 and 4.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. Courses
1.	Gen. Physics.....	1	3	Soph., Jr., Sr.	Math. 4 or 2
2.	Gen. Lab. Practice.....	1	1	Soph., Jr., Sr.	See statement
3.	Gen. Physics.....	2	3	Soph., Jr., Sr.	1
4.	Gen. Lab. Practice.....	2	1	Soph., Jr., Sr.	See Statement
5.	Mechanics of Solids and Fluids.....	1	4	Soph., Jr., Sr.	Math. 4 or 2
6.	Heat, Magnetism and Electrostatics.....	2	4	Soph., Jr., Sr.	5

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Electro kinetics.....	1	4	Jr., Sr.	6
8.	Sound and Light.....	2	4	Jr., Sr.	5
9.	Advanced Electrical Measurements.....	2	1	Jr., Sr.	7
10.	Physical Manip. and Lab. Technique.....	2	3	Jr., Sr.	5 and 6
11.	Dynamics.....	1	3	Jr., Sr.	5 and Math. 9-10
12.	Adv. Physical Measurements	1	3	Sr. Grad.	5, 6, 7 and 8
13.	Adv. Physical Measurements	1	6	Sr. Grad.	5, 6, 7 and 8
14.	Theory of Light.....	2	3	Grad.	8 and Math. 9-10
15.	Elect. Meas. of Precision....	2	3	Sr.	7
16.	Radioactivity.....	2	3	Grad.	5, 6, 7 and 8
17.	Adv. Phys. Measurements....	2	3	Sr. Grad.	5, 6, 7 and 8
18.	Adv. Phys. Measurements...	2	6	Sr. Grad.	5. 6. 7 and 8
19.	Kinetic Theory of Gases....	2	3	Sr. Grad	5, 6, 7 and 8
20.	Discharge of Elect. thru Gases.....	1	3	Grad.	6 and 7 and Math. 9 and 10
21.	Math. Theory of Elect. and Magnetism.....	2	3	Grad.	6 and 7, and Math. 9 and 10
22.	Teachers' Course.....	2	1	Sr.	5-8 incl.

1. GENERAL PHYSICS — MR. JOHN ZELENY

Three credits (three hours per week) — First semester

Open to sophomores, juniors and seniors who have completed mathematics 4 or 2; 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 — MR. KOVARIK

One credit (two hours per week) — First semester

Open to sophomores, juniors and seniors, who have completed or are taking course 1. The laboratory fee is three dollars.

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 — MR. JOHN ZELENY

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 began under course 1. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, X radiation, and the electrical constitution of matter, are discussed and illustrated. There will be one experimental lecture and two recitations each week.

4. GENERAL LABORATORY PRACTICE — MR. KOVARIK

One credit (two hours per week) — Second semester

Open to sophomores, juniors and seniors, who have completed or are taking course 3. The laboratory fee is three dollars.

Physical measurements in light, electricity and magnetism, giving the student a knowledge of experimental methods.

5. MECHANICS OF SOLIDS AND FLUIDS MESSRS. JONES, J. ZELENY, A. ZELENY ERIKSON AND KOVARIK
First semester

Four credits, (three recitations and one lecture or two hours laboratory)

Open to sophomores, juniors and seniors who have completed mathematics 4 or 2 (Trigonometry)

The laboratory fee is two dollars.

The course consists of a thorough drill in the elementary principles of mechanics. 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. JONES, J. ZELENY A. ZELENY, ERIKSON AND KOVARIK
Four credits (one lecture, two recitations and two hours laboratory)
Second semester

Open to those who have completed course 5.

The laboratory fee is three dollars.

The fundamental principles of the subjects are studied mainly from the experimental side. The laboratory work consists of the measurements of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS MESSRS. JONES, J. ZELENY, A. ZELENY, ERIKSON AND KOVARIK
Four credits (one lecture, two recitations and two hours laboratory)
First semester

Open to those who have completed course 6. The laboratory fee is three dollars.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges, Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT MESSRS. JONES, J. ZELENY, ERIKSON AND KOVARIK
Four credits, (one lecture, two recitations and two hours laboratory)
Second semester

Open to those who have completed course 5. The laboratory fee is three dollars.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight into some of the relations which obtain in the subjects.

9. ADVANCED ELECTRICAL MEASUREMENTS MR. A. ZELENY
One credit (two hours per week) Second semester

Open to those who have completed course 7.

The laboratory fee is three dollars.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities.

10. Physical Manipulation and Laboratory Technique Mr. John Zeleny
Three credits (six hours per week) Second semester.
Open to juniors and seniors who have completed courses 5 and 6. The laboratory fee is three dollars. 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 (such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc.), and to acquaint him with the use of some instruments of precision (such as the cathetometer, the dividing engine, the balance, mercury air pumps and guages, etc.)

11. Dynamics Mr. Jones
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed courses 5 and 6, and mathematics 9 and 10 (calculus).

A discussion of some problems in dynamics which are important in the study of advanced physics.

12. Advanced Physical Measurements Mr. John Zeleny
Three credits (six hours per week) First or second semester
Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is three dollars.

The course consists of individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

13. Advanced Physical Measurements Mr. John Zeleny
Six credits (twelve hours per week) First or second semester
Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is five dollars.

The same as course 10 except that twice as much time is devoted to the subject.

14. The Theory of Light Mr. Jones
Three credits (three hours per week) Second semester
Open to graduate students who have completed course 8 and mathematics 9 and 10 (calculus).

A study of the important optical phenomena. Preston's *Theory of Light* is used as a text.

15. Electrical Measurements of Precision Mr. Anthony Zeleny
Three credits (six hours per week) Second semester
Open to seniors and graduate students who have completed course 7. The laboratory fee is three dollars. The course is intended for electrical engineering and scientific students who desire to specialize in electrical work of the highest precision.

The course is chiefly experimental and includes the following: making of standard cells; calibration of Wheatstone box bridge; adjustment of resistances, ammeters, and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance, and magnetic flux; measurement of temperatures by electrical methods.

16. Radio-activity Mr. Kovarik
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 5, 6, 7 and 8.

The course consists entirely of lectures, experimental and descriptive. The various theories and the methods of investigation are fully considered.

17. ADVANCED PHYSICAL MEASUREMENTS MR. JOHN ZELENY
Three credits (six hours per week) Second semester
Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.
The course is the experimental study of some physical phenomena, the nature or laws of which are not yet understood.

18. ADVANCED PHYSICAL MEASUREMENTS MR. JOHN ZELENY
Six credits (twelve hours per week) Second semester
Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is five dollars.
The same as course 17, except that twice as much time is devoted to the subject.

19. THE KINETIC THEORY OF GASES MR. ERIKSON
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).
This course is a study of Meyer's *Kinetic Theory of Gases.*

20. DISCHARGE OF ELECTRICITY THROUGH GASES MR. JOHN ZELENY
Three credits (three hours per week) First semester
Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).
The course consists of lectures, with experimental illustrations, on the conduction of electricity through gases. A study is made of the conductivity imparted to gases by the action of X rays, ultra-violet light, radio-active substances, and glowing metals; of the discharge of electricity from points and in vacuum tubes; and of the spark and arc discharges. The methods of measuring the velocity of the ions and the charges carried by them are studied in detail.

21. THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM
MR. JOHN ZELENY
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).
This course consists in the study of J. J. Thomson's *Elements of the Mathematical Theory of Electricity and Magnetism.*

22. TEACHER'S COURSE MR. JONES
One credit (one hour per week) Second semester
Open to seniors who have completed courses 5 to 8 inclusive.
No subject matter is discussed, but methods of presentation and the selection of lecture and laboratory experiments are considered. The work is conducted by the students under the direct supervision of the instructor.

RHETORIC AND PUBLIC SPEAKING

JOSEPH M. THOMAS, Professor, Head of Department of Rhetoric and Public Speaking
ADA L. COMSTOCK, Professor

FRANK M. RARIG, Assistant Professor
OSCAR W. FIRKINS, Assistant Professor
————————, Assistant Professor
CHARLES W. NICHOLS, Instructor
WILFORD O. CLURE, Instructor
HALDOR GISLASON, Instructor
ANNA H. PHELAN, Instructor
NELLIE A. WHITNEY, Instructor
THOMAS CAHILL, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits not including course 1.

FOR A MAJOR, eighteen credits, not including courses 1, together with reinforcing subjects (thirty credits) selected from English (courses 3, 16, 21 and 22), philology, philosophy, Latin, advanced modern languarge and additional rhetoric.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in the department in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 1, 2, 3 5 and 6, and two additional courses in argumentation and elocution or public speaking.

HONORS IN PUBLIC SPEAKING

Students who have been on the debating teams in their freshman and sophomore years, or have won places in the oratorical contests of those years, and have taken part in intersociety and intercollegiate debates, winning at least one intercollegiate contest, or have won places in the Pillsbury oratorical contest, may, if the department deems them worthy, receive honors in public speaking.

COURSES

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Composition and Rhetoric...	1, 2	6	Fresh.	None
2.	Advanced Comp. and Rhet..	1, 2	6	Soph., Jr., Sr.	1
3.	Advanced Rhetoric.....	1, 2	6	Jr., Sr.	1 and 2
4.	Argumentative Writing.....	1	3	Jr., Sr.	1 and 2
5.	Short Story Writing.....	2	3	Jr., Sr.	1 and 2
6.	Seminar.....	1, 2	4	Sr., Grad.	Statement
10.	Public Speaking.....	1, 2	6	Soph., Jr., Sr.	1 or Eng. 1 and 2
11.	Interpretative Reading.....	1, 2	6	Jr., Sr.	1 or Eng. 1 and 2 and 10
12.	Argumentation and Debate..	1, 2	6	Jr., Sr.	Same as 11
13.	Oratorical Composition.....	1, 2	6	Jr., Sr.	Same as 11

RHETORIC

1. COMPOSITION AAND RHETORIC — MESSRS. THOMAS, FIRKINS, CLURE AND MISS COMSTOCK, MISS WHITNEY, AND MRS. PHELAN

Six credits (three hours per week) — Both semesters

Required of freshmen who have not passed , with a grade of good or excellent, part 2 of the entrance examination in English.

The aim of this course is to give practical training in the art of writing. In connection with the written work the student will be required to study the principles of structure and to analyze specimens of good prose.

2. ADVANCED COMPOSITION AND RHETORIC — MESSRS. THOMAS, FIRKINS AND CLURE, MISS WHITNEY AND MRS. PHELAN
Six credits (three hours per week) — Both semestersn
Open to those who have completed course 1, or English 1 and 2.
This course is intended to give the student practice in writing in the four type-forms of discourse. Description and narration will be studied in the first semester, exposition and argument in the second. Fortnightly themes and short exercises will be accompanied by lectures on theory and the analysis of models.

3. ADVANCED RHETORIC — MISS COMSTOCK
Six credits (three hours per week) — Both semesters
Open to juniors and seniors who have taken courses 1 and 2.
Structure and style, theoretically and practically considered, are subjects of study in this course. Some time is given to the oral presentation of topics. In the composition work the student is allowed to select his own subjects and methods of treatment.

4. ARGUMENTATIVE WRITING — MR. THOMAS
Three credits (three hours per week) — First semester
Open to those who have completed courses 1 and 2.
A study of the principles which underlie argument. Special attention will be paid to the brief and relative value of various forms of proof. The course will include lectures, recitations and weekly essays.

5. SHORT STORY WRITING — MR. THOMAS
Three credits (three hours per week) — Second semester
Open to those who have shown exceptional proficiency in course 2.
Analytical studies in the technique of the short story will be accompanied by constructive work in story writing.

6. SEMINAR — MR. THOMAS
Four credits (two hours per week) — Both semesters
Open to seniors and graduates who have taken courses 1 and 2 and at least one other course.
This is intended for those who are specializing in Rhetoric and Composition. In 1909–10 the course will be devoted to lectures, reports and thesis on the history of rhetorical theory.

PUBLIC SPEAKING

10. A GENERAL COURSE IN PUBLIC SPEAKING — MESSRS. RARIG AND GISLASON
Six credits (three hours per week) — Both semesters
Open to those who have had Rhetoric 1, or English 1 and 2.
The work of the first semester consists of the study and practice of the principles of breathing, voice production, articulation and gesture. During the second semester students make short speeches of their own composition and deliver extracts from the works of well known writers and speakers.

11. INTERPRETATIVE READING — MR. RARIG
Six credits (three hours per week) — Both semesters
Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

This course aims to develop intelligent, suggestive, sympathetic reading. The text used is Shakespeare's plays.

12. ARGUMENTATION AND DEBATE — MR. GISLASON
Six credits (three hours per week) — Both semesters

Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

This course furnishes instruction in the science of organization and in the art of debate. The work consists of the study of the laws and processes of reasoning and their application to written and spoken argument. Argumentative writings and speeches by eminent men are analyzed and briefed. Practical exercises in debate and forensics form an important part of the work. Students receive individual training in delivery.

13. INTER-COLLEGIATE DEBATING — MR. RARIG
Three credits (three hours per week) — First semester

Only men who have been awarded places on the inter-collegiate debating teams and the alternates will register for this course. The question for inter-collegiate debate will be studied and briefed, and frequent practice debates will be held.

14. ORATORICAL COMPOSITION — MR. RARIG
Six credits (three hours per week) — Both semesters

Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

Masterpieces of oratory are read and analyzed. Students write orations with special reference to the occasion, the timeliness of the material used, and the nature of the audience.

ROMANCE LANGUAGES

CHARLES W. BENTON, Professor, Head of Department of Romance Languages
CHARLES M. ANDRIST, Professor
JULIUS T. FRELIN, Assistant Professor
CARL M. MELOM, Instructor
EMMA BERTIN, Instructor
RENE M. DELAMARE, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, in French, course 2 or 3 and course 5; in Spanish, twelve credits.

FOR A MAJOR, in French, courses 2 or 3, 5 and 7, together with reinforcing subjects (thirty credits) selected from philology, Latin, Italian, Spanish, English, philosophy, history, and additional French; in Spanish, eighteen credits, together with reinforcing subjects (thirty credits) selected from French, philology, Latin, Italian, English, and history.

FOR B. A. WITH DISTINCTION (in French only), the general requirements (page 46) and courses 8 and 9 or 10 in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 2 or 3, 4, 5 6, 7 and 8.

COURSES

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Begin. French	1, 2	10†*	All	None
2.	Intermediate French	1, 2	6†	Soph., Jr., Sr.	1
3.	Adv. Fr. G. and Comp.	1, 2	6*	All	None
4.	Begin. Fr. Conversation	1, 2	4*	Soph., Jr., Sr.	See statement
5.	Classic Fr. Lit.	1, 2	6*	Soph., Jr., Sr.	2 or 3
6.	Adv. Fr. Conversation	1, 2	4*	Soph., Jr., Sr.	2 or 3
7.	Fr. Lit. of 19 Cent.	1, 2	6*	Soph., Jr., Sr.	2 or 3
8.	Teachers Fr.	1, 2	2*	Jr., Sr.	5
9.	Romance Phil.	1, 2	2*	Jr., Sr.	5
10.	Italian Lit.	1, 2	2*	Jr., Sr.	5
11.	Begin. Spanish	1, 2	10*	Soph., Jr., Sr.	Two years prep.
12.	Intermediate Span.	1, 2	6*	Soph., Jr., Sr.	11
13.	Adv. Span.	1, 2	6*	Jr., Sr.	12
14.	Old French	1, 2	4	Grad.	
15.	Hist. of Fr. Lit.	1. 2	6*	Grad.	
16.	Ital. Lit.	1, 2	2*	Grad.	5

*Both semesters must be completed before credit is given for the first semester.
†Juniors and seniors receive only half credit.

1. BEGINNING FRENCH — MESSRS. ANDRIST AND FRELIN AND MADAM BERTIN

Ten 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; not credited toward a minor in French.

Fraser and Squair's *French Grammar and Reader:* modern texts.

2. INTERMEDIATE FRENCH — MESSRS. ANDRIST AND FRELIN AND MADAM BERTIN

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, et al.

3. ADVANCED FRENCH GRAMMAR AND COMPOSITION — MESSRS. ANDRIST AND FRELIN

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.

Francois' *Introduction to French Composition:* readings from modern authors, including selections from Coppee, Feuillet, and Sandeau.

4. BEGINNING FRENCH CONVERSATION — MESSRS. ANDRIST AND FRELIN AND MADAM BERTIN

Four credits (two hours per week) — Both semesters

Open to those who have completed or who are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.

Conversation based on modern French life.

5. THE CLASSICAL PERIOD OF FRENCH LITERATURE — MR. BENTON

Six credits (three hours per week) — Both semesters

Open to those who have completed course 2 or course 3; 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. Compositions.

6. ADVANCED FRENCH CONVERSATION — MR. BENTON
Four credits (two hours per week) — Both semester
Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
Conversations on French history, literature, the drama, etc.

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 course 3 and course 5; both semesters must be completed before credit is given for the first semester.
Lectures in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.

8. TEACHER'S COURSE IN FRENCH — MR. BENTON
Two credits (one hour per week) — Both semesters
Open to those who have completed course five; both semesters must be completed before credit is given for the first semester.
Special practice in pronunciation. Discussion in French of methods of teaching the French language and literature.

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 semesters.
Lectures on the phonetical development of the French and other Romance language from popular Latin. Reading of old French texts.

10. ITALIAN LITERATURE — 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.
Edgren's *Italian Grammar*, Dante's *Divine Comedy*.

11. BEGINNING SPANISH — MR. MELOM
Ten credits (five hours per week) — Both semesters
Open to sophomores, juniors and seniors. Both semesters must be completed before credit is given for the first semester.
Monsanto and Languellier's *Spanish Course-Josselyn*. Worman's *First Spanish Book*. Bransby's *Spanish Reader*.

12. INTERMEDIATE SPANISH — MR. MELOM
Six credits (three hours per week) — Both semesters
Open to those who have completed course 11; both semesters must be complete before credit is given for the first semester.
First semester: Umphrey, *Spanish Composition:* Brownel, *El Pajaro Verde*. Second semester: Grays's *Fortuna:* Alarcon's *El Capitan Veneno*.

13. ADVANCED SPANISH — MR. MELOM
Six credits (three hours per week) — Both semesters
Open to those who have completed course 11 and 12; both semesters must be completed before credit is given for the first semester.

F. Solderilla, *Compendio de la Literatura Espanola:* Alarcon, *El Sombrero de Tres Picos.* Lectures and collateral readings of representative Spanish authors.

14. ROMANCE LANGUAGES OLD FRENCH — MR. BENTON
Four credits (two hours per week) — Both semesters
Open to graduate students; other arrangements may be ascertained upon application to the department.
Comparative phonetics and grammar of French and other Romance languages. Some of the oldest monuments of the French language are studied and the phonetic changes compared with modern French and English. Special attention is given to the period when French words came into the English language.

15. HISTORY OF FRENCH LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters
Open to graduate students; both semesters must be completed before credit is given for the first semester.
A discussion of the evolution of the various schools and doctrines in French literature.

16. ITALIAN LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters
Open only to graduate students who have completed course 5; both semesters must be completed before credit is given for the first semester.
History of Italian Literature, special: *The Divine Comedy.*

SCANDINAVIAN

GISLE BOTHNE, Professor, Head of Department of Scandinavian Languages
ANDREW A. STOMBERG, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including course 1 and 3.
FOR A MAJOR, eighteen credits, not including courses 1 and 3, together with reinforcing subjects (thirty credits) selected from philology, advanced German, Anglo-Saxon and old English, Latin, Greek, advanced English and additional Scandinavian.
FOR B. A. WITH DISTINCTION, the general requirements (page 46) and one year of Scandinavian in addition to what is required for a major.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Elem. Norwegian	1, 2	10*†	All	None
2.	Adv. Norwegian	1, 2	6*	Soph., Jr., Sr.	1
3.	Elem. Swedish	1, 2	10*†	All	None
4.	Adv. Swedish	1, 2	6*	Soph., Jr., Sr.	3
5.	Old Norse (Icelandic)	1, 2	4	Jr., Sr., Grad.	1 and 2, or 3 & 4.
6.	Modern Norwegian Lit.	1, 2	6*	Jr., Sr., Grad.	1 and 2
7.	Swedish Literature	1, 2	6*	Jr., Sr., Grad.	3 and 4
8.	Henrik Ibsen	1	2*	Jr., Sr., Grad.	See statement
9.	History of Northern Europe	1, 2,	6	Jr., Sr.	None
10.	Early Nor. Lit.	1	2	Jr., Sr.	See statement
11.	Mod. Danish Lit.	2	2	Jr., Sr.	See statement

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
12.	Swedish Lang. and Lit.....			Grad.	
13.	Hist. Scand. Lang.....	1, 2	2	Grad.	
14.	Adv. Old Norse.....	1, 2	4	Grad.	

*Boths semester must be completed before credit is given for the first semester·
†Juniors and seniors received only half credit.

1. ELEMENTARY NORWEGIAN — MR. BOTHNE
Ten 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.
Elementary study of the language, grammar, composition, select reading in easy prose and poetry.

2. ADVANCED NORWEGIAN — MR. BOTHNE
Six credits (three hours per week) — Both semesters
Open to those who have completed course 1 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.
Grammar, composition, conversation, elementary history of literature, and select works of modern authors.

3. ELEMENTARY SWEDISH — MR. STOMBERG
Ten 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.
Grammar and composition; select reading in easy prose and verse.

4. ADVANCED SWEDISH — MR. STOMBERG
Six credits (three hours per week) — Both semesters
Open to those who have completed course 3 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.
First semester: grammar and composition. Modern prose texts will be read. Second semester: an elementary history of the literature of Sweden and reading of Tegner's *Fröthjofs Saga* and Runeberg's *Fanrik Stals Sagner*.

5. OLD NORSE (Icelandic) — MR. BOTHNE
Four credits (two hours per week) — Both semesters
Open to those who have completed courses 1 and 2, or 3 and 4, and to other qualified students with the approval of the department. Not given in 1909-10.
Grammar and reading. *Gunnlaugs Saga Ormstungu.*

6. MODERN NORWEGIAN LITERATURE — MR. BOTHNE
Six credits (three hours per week) — Both semesters
Open to those who have completed courses 1 and 2; both semesters must be completed before credit is given for the first semester.
History of Norwegian literature from 1814 to the present day.

7. SWEDISH LITERATURE — MR. STOMBERG
Six credits (three hours per week) — Both semesters
Open to qualified students upon the approval of the department; both semesters must be completed before credit is given for the first semester.

History of the literature and study of modern authors, including Selma Lagerlof, Geijerstam, Strindberg.

8. IBSEN — MR. BOTHNE
Two credits (two hours per week) — Second semester
Open to qualified students upon the approval of the department.
Lectures, reading and interpretation.

9. HISTORY OF NORTHERN EUROPE — MR. STOMBERG
Six credits (three hours per week) — Both semesters
Open to juniors and seniors; no knowledge of the Scandinavian languages is required.
The course includes the history of the Scandinavian countries from the earliest period to recent times.

10. EARLY NORWEGIAN LITERATURE — MR. BOTHNE
Two credits (two hours per week) — First semester
Open to qualified students upon approval of the department.

11. MODERN DANISH LITERATURE — MR. BOTHNE.
Two credits (two hours per week) — Second semester

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE — MR. STOMBERG

13. HISTORY OF THE SCANDINAVIAN LANGUAGES — MR. BOTHNE
Two credits (one hour per week) — Both semesters
For courses in Scandinavian philology, see statement of the department of comparative philology. Not given in 1909-10.

14. OLD NORSE (advanced course THE ELDER EDDA — MR. BOTHNE
Four credits (two hours per week). Not given in 1909-10. — Both semesters

SEMITIC LANGUAGES

SAMUEL N. DEINARD, Assistant Professor

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Elem. Hebrew	1, 2	6*	Soph., Jr., Sr.	None
2.	Elem. Arabic	1, 2	6*	Jr., Sr.	Course 1
3.	Elem. Aramaic	2	3	Jr., Sr.	Course 1
4.	Hist. Hebrews	1, 2	6	Jr., Sr.	None

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

1. ELEMENTARY HEBREW — MR. DEINARD
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.
First semester, Harper's *Elements of Hebrew* and reading of easy prose passages from the Old Testament; second semester, critical readings of some books of the Old Testament and a review of Hebrew grammar.

2. ELEMENTARY ARABIC — MR. DEINARD
Six credits (three 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, Socin's *Arabic Grammar* and the reading of the prose sections contained in it; second semester, selected suras from the Koran and a review of Arabic grammar.

3. ELEMENTARY ARAMAIC OR SYRIAC — MR. DEINARD
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockleman's *Syrische Grammatik*.

4. HISTORY OF THE HEBREWS TO THE CLOSE OF THE PERSIAN PERIOD — MR. DEINARD
Six credits (three hours per week) — Both semesters
Open to sophomores, juniors, and seniors; no knowledge of any Semitic language is required.

A survey of the political, social, and religious life of the Hebrews. The English Bible will be used as a text-book, a careful study of the Palestinian, Egyptian, and Assyro-Babylonian inscriptions will be made, and the works of some modern writers on Hebrew history will be consulted.

SOCIOLOGY AND ANTHROPOLOGY

SAMUEL G. SMITH, Professor, Head of Department of Sociology and Anthropology
ALBERT ERNEST JENKS, Professor
SAMUEL N. REEP, Assistant Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from economics and politics, history, animal biology, geology, psychology and additional sociology and anthropology.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major, with the provision that six credits shall be from advanced courses and one course shall be accompanied by individual work under the special direction of the department.

FOR A TEACHER'S CERTIFICATE, an average of at least good in four courses, one of which must be course 2.

FOR RECOMMENDATION FOR SOCIAL WORK, an average of at least good in not ess than three courses, two of which must be courses 3 and 12.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq-courses
1.	Descrip. Sociology.....	1	3	Jr., Sr.	None
2.	Elements of Sociology.....	1, 2	3	Jr., Sr.	None
3.	Social Pathology.....	1	3	Jr., Sr.	None
4.	Social Theory.....	2	3	Jr., Sr., Grad.	2, 7 or 13
5.	Social Groups.....	2	3	Jr., Sr., Grad.	None
6.	Institutions.....	1	3	Jr., Sr.	None

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Anthropology	1	3	Jr., Sr.	None
8.	Ethnology	2	3	Jr., Sr., Grad.	1, 2 or 7
9.	Philippine People	2	3	Jr., Sr., Grad.	1, 7 or 8
10.	Physical Anthropology	2	3	Jr., Sr., Grad.	7 or 8 or An. Biol
11.	American Negro Race	2	3	Jr., Sr., Grad.	None
12.	American People	1	3	Jr., Sr., Grad.	None
13.	Biblical Sociology	1	3	Jr., Sr., Grad.	None
14.	Modern Social Institutions	1	3	Jr., Sr., Grad.	None
15.	Social Psychology	1	3	Jr., Sr., Grad.	None

1. DESCRIPTIVE SOCIOLOGY — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors and seniors.

This is a preliminary course designed as the first work of students in the department. It presents concrete data concerning human association, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilzation, and enlightenment; and it discovers the activities and institutions natural and peculiar to the several groups studied. Text-book, lectures, assigned readings, and thesis.

2. ELEMENTS OF SOCIOLOGY — MR. REEP
Three credits (three hours per week) — Each semester
Open to juniors and seniors.

This course is designed to give a general knowledge of the field of modern sociology, the attempt being to prepare students for such special sociological investigations as they may wish to make. Text-book, lectures, assigned readings, and thesis.

3. SOCIAL PATHOLOGY — MR. SMITH
Three credits (three hours per week) — First semester
Open to juniors and seniors.

This course covers the field of charities and corrections, dealing especially with problems of poverty, crime, insanity and social degeneration. It also presents a discussion of the child problem and methods of social amelioration.

4. SOCIAL THEORY — MR. REEP
Three credits (three hours per week) — Second semester
Open to juniors, seniors and graduate students.

This course includes 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.

5. SOCIAL GROUPS — MR. REEP
Three credits (three hours per week) — Second semester
Open to juniors, seniors and graduate students.

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. THE STUDY OF INSTITUTIONS — MR. SMITH
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

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.

7. ANTHROPOLOGY — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors and seniors.
This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It primarily investigates 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.

8. ETHNOLOGY — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1, 2 or 7, and to graduate students.
This is a study of the different races of men natural to America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of several races and subraces are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Text-books, lectures, assigned readings, and thesis.

9. THE PHILIPPINE PEOPLE — MR, JENKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1, 7 or 8, and graduate students.
This course presents the geography, natural resources, and ethnology of the Phillipine Islands. A careful comparative study of the four large ethnic and culture groups of people is made; tropical influences are noted; the present policy of the Insular Civil Government is outlined, so far as it tends to modify the natural characteristics and modern culture of the inhabitants, and to effect American home interests in the orient. This course aims to present a practical model for the investigator of human culture, and to introduce students to oriental race problems; it will also better fit students for government , business, or missionary service in the orient. Lectures illustrated lectures, assigned readings, and thesis.

10. PHYSICAL ANTHROPOLOGY — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 7 or 8, or course 1 in Animal Biology, and to graduate students.
This course studies the physical variations in the human body. It pays special attention to those variations which distinguish one race or group of men from another; and it seeks the cause and significance of such variations. It also attempts to trace the physical evolution of the human body and to forecast its future, studying both its development and decline. Six lectures on the development and anatomy of the human brain are given by Dr. Charles A. Erdmann of the medical faculty. This course is of prime importance to advanced students preparing for the medical course. Lectures, laboratory work, assigned readings, and thesis.

11. THE AMERICAN NEGRO RACE — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors, seniors, and graduate students; not given in 1909-10.
This course begins with a study of the negro's African tribal kinsmen, and

traces the rise and development of the American negro race from the birth of American slavery. The present characteristics, traits, and conditions of the negro are especially considered. The developing tendencies of the negro are studied for the purpose of considering the probable future of the American negro race. Lectures, assigned readings, and thesis.

12. THE AMERICAN PEOPLE — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors, seniors, and graduate students.

This course presents the distribution in the United States of the different peoples of the world found here. It seeks the natural genius of the peculiar home development of these peoples, and notes the modifications of this development in America, thus portraying the ethnic contribution of each to American civilization. It aims to discover the dominant physical, mental, and moral characteristics of each people, and attempts to determine the relative ethnic and culture importance of each to the nation.

13. BIBLICAL SOCIOLOGY — MR. SMITH
Three credits(three hours per week) — First semester
Open to juniors, seniors, and graduate students.

This is a study of the development of Hebrew institutions, especially the church, the family and the state. It also presents a comparison of similar institutions among peoples of like conditions of culture.

14. MODERN SOCIAL INSTITUTIONS — MR. REEP
Three credits (three hours per week) — First semester
Open to juniors, seniors and graduate students.

The fundamental social institution, the family, will be studied, as also the development of modern industrial, political, educational, and ecclesiastical institutions in their relation to human progress.

15. SOCIAL PSYCHOLOGY — MR. REEP
Three credits (three hours per week) — First semester
Open to juniors, seniors and graduate students.

This is a study of the social mind, public opinion, impulsive and rational social action, fashion, convention and custom, the mob and the crowd. It is also an examination of the theories of Giddings, Tarde, Baldwin, Ross, Brinton and others

Students

SENIORS—197

Acomb, Marie R., Minneapolis.
Adams, C. Roy, Austin.
Altenburg, Carl L., Wells.
Anderson, Carl A., Hutchinson.
Anderson, Herbert I., Goodhue.
Babcock, Fager M., Minneapolis.
Baillif, Matilda, Osakis.
Bardsley, Myrtle, Duluth.
Beals, James B., Minneapolis.
Beardsley, Edythe, Hibbing.
Beck, Clara L., St. Paul.
Bell, Grace, St. Paul.
Bennett, Lillian, Madison.
Berger, Nanda M., St. Paul.
Bickford, E. Albi, Battle Lake.
Blakey, Roy, Minneapolis.
Blanchett, Frederic J., Elk River.
Bolcom, Winfred G., Chatfield.
Bredvold, Louis, Belview.
Briggs, Florence M., St. Paul.
Brink, Irma, Minneapolis.
Brown, Mayme E., Granite Falls.
Bruhn, Louise H., Minneapolis.
Burgan, Myrle E., Minneapolis.
Burnett, Ralph, Cummings, N. D.
Cant, Harold G., Duluth.
Carlson, Charles E., Albert Lea.
Carpenter, Lucy, Helena, Mont.
Cassidy, Anna C., Eyota.
Chapman, Esther, Minneapolis.
Chase, Marjorie C., Minneapolis.
Child, Emily, Minneapolis.
Churchill, Alta P., Minneapolis.
Clark, Miriam S., Minneapolis.
Connelly, John, Savage.
Conway, Ethelyn, Detroit.
Cosgrove, Ethel C., State Fair Grounds.
Crosby, Walter, Willmar.
Dahleen, Harry W., Maynard.
Danielson, Jessie L., Litchfield.
Davidson, Hazel B., Minneapolis.
Davis, Alfred, Minneapolis.
Dellinger, Virginia E., St. Paul.
Diamond, Lewis S., Mankato.
Dickerson, Helen, Minneapolis.
Dunning, Frances D., Minneapolis.
Engstrom, Lillian F., Minneapolis.
Erickson, Jennie S., Anoka.
Ewy, Edwin W., Butterfield.
Finkle, Lillian S., Minneapolis.
Ford, Gertrude, St. Paul.
Foulke, Robert W., St. Paul.
Fraiken, Wanda, Minneapolis.
Francis, Helen E., St. Paul.
Franklin, Laura G., Blue Earth.
Frenzel, Rose M., St. Paul.
Fulkerson, Jay E., Zumbrota.
Gardner, Alice, Minneapolis.
Gausemel, Arthur N., Kenyon.
Gilpin, John, Minneapolis.
Gould, Marian R., Minneapolis.
Graves, Arthur R., Minneapolis.
Grimes, Gordon, Minneapolis.
Hale, Beatrice E., Spring Valley.
Hallock, Mary J., Duluth.
Hanaford, A. Ruth, Minneapolis.
Hanratty, Catherine, Graceville.
Hanson, Bertha Mary C., Minneapolis.
Harding, Fred A., Minneapolis.
Harms, Samuel F., Norwood.
Harrison, Ruth, Minneapolis.
Hart, Una M., Anoka.
Heinsius, Cecil M., Minneapolis.
Hellickson, Blanche, Mabel.
Herum, Helen, Minneapolis.
Hill, Clarence E., Minneapolis.
Hixon, Agnes, Minneapolis.
Holcomb, Dora M., Warren.
Holm, Eva C., Stillwater.
Holt, Blanche M., Minneapolis.
Hoovel, Violet S., Minneapolis.
Hovey, Albert P., Minneapolis.

Hoyum, Anna Nelson, Minneapolis.
Hubbard, Katherine D., Mankato.
Hudson, Neva B., Minneapolis.
Hull, Harold J., Wahpeton, N. D.
Hull, Mabel B., Litchfield.
Hull, William M., Minneapolis.
Hunt, Thomas F., Le Sueur Centre.
Jenness, Maurice V., Willmar.
Jensen, Louise, Minneapolis.
Johnson, Esther C., Minneapolis.
Kelley, Frances R., Minneapolis.
Kessel, Martha C., Cresco, Ia.
Klimenhagen, Olive, St. Paul.
Kline, Gertrude, Minneapolis.
Knutson, Dagny, St. Cloud.
Kreis, Cora, Monticello.
Krueger, Richard G., Bellingham.
Kuethe, Emma S., Preston.
Lambert, Percy, Sauk Centre.
Lanterman, Evert, Mandan, N. D.
Lawton, George T., Minneapolis.
Leach, Grace, Spring Valley.
Leland, Rosamond, Minneapolis.
Leonard, Elva L., Minneapolis.
Leslie, Ruth, Minneapolis.
Leuthold, Walter M., Minneapolis.
Leveroos, Ethel, Minneapolis.
Lewis, E. Genevieve, Minneapolis.
Lovick, Paul J., Minneapolis.
Lowenthal, Max, Minneapolis.
Lycan, Donna M., Bemidji.
McCune, Robert H., Benson.
McIvor, Helen E., St. Paul.
McOuat, Frances M., Minneapolis.
Maland, Joseph O., Elmore.
Manderfeld, Cornelia B., Minneapolis.
Mason, Adelaide, Alexandria.
Matson, Charlotte, Minneapolis.
Matchan, Roy W., Zumbrota.
Maul, Earl C., Minneapolis.
Mecklenburg, George, Cedar.
Melin, E. Luther, Minneapolis.
Mooney, Florence H., Duluth.
Moore, Edna, St. Paul.
Morgan, Edith, St. Cloud.
Mouser, Carl B., Minneapolis.
Mousley, Josephine, Litchfield.
Nelson, Harriet, Minneapolis.
Nelson, Robert, Minneapolis.
Newell, Agnes F., Minneapolis.
Nicholson, Pearle Camp, Minneapolis.
Nielsen, Marie B., St. Paul.
Norelius, Wm. A., Luverne.
Nystrom, Hilda, Minneapolis.
Overpeck, Nell, St. Paul.
Palmer, Alice H., Minneapolis.
Palms, Edith, Minneapolis.
Paula, Sister, Duluth.
Pennington, Hazel, St. Paul.
Pitblado, Annie, Minneapolis.
Potter, Zenas L., Minneapolis.
Putnam, Gladys, Minneapolis.
Quigley, Alice R., Bird Island.
Reely, Stella Anne, Minneapolis.
Rehnke, Edgar B., Minneapolis.
Reid, Harry C., Sleepy Eye.
Rice, Mary G., Minneapolis.
Riheldaffer, Helen, Minneapolis.
Ringsred, Ruth E., Duluth.
Robinson, Fred H., Scobey, Mont.
Rockwood, Edith, Minneapolis.
Roverud, Nora, Caledonia.
Rowe, Elfie, Minneapolis.
St. Amour, Ruby C., Minneapolis.
Salisbury, Eva, Minneapolis.
Saterlie, Julia K., Montevideo.
Schriber, Alice E., St. Paul.
Schroeder, Anna T., Perham.
Shanley, Helen, St. Paul.
Shonts, Mary O., Fergus Falls.
Simmons, Juliet, Hunter, N. D.
Simpson, Jessie, Minneapolis.
Sinclair, Catherine, Fairmont.
Sleeper, Raymond A., Sheldon, Ia.
Smiley, William Yale, Minneapolis.
Smith, Audrey N., Minneapolis.
Smith, Marjorie, Minneapolis.
Solon, Lorraine, Minneapolis.
Spear, Florence, Minneapolis.
Spink, Helen E., White Bear.
Stegner, Hope A., St. Paul.
*Strate, Clara, Moorhead.
Stromgren, Lucia, Center City.
Sturtevant, Abby, Minneapolis.
Svensrud, Ida, Minneapolis.
Tallant, Ruth L., Minneapolis.
Tanikawa, Yoshio, Tsu Ise, Japan.
Thomson, H. Sears, Minneapolis.
Toomey, Mary, St. Paul.
Trask, Bertha M., Herman.
Turnbull, Lloyd W., Minneapolis.
Ueland, Elsa, Minneapolis.
Uzzell, Thomas H., Morgan Park, Chicago Ill.
Van Rhee, George, Milaca.
Van Slyke, Lois C., Minneapolis.
Von Scholten, Toska M., Minneapolis.
Waite, Camelia, Minneapolis.
Ware, Jennie, St. Paul.
Wedge, Vera E., Zumbrota.

Weese, Asa O., Hutchinson.
Welch, Louise, St. Paul.
Wigforss, Nanna, Red Wing.
* Died 1908.

Woolsey, Leona, Minneapolis.
Yates, Fanny A., St. Paul.
Yeaton, Walter J., Minneapolis.

JUNIORS—264

Aichele, Johanna, St. Paul.
Anderberg, Irene A., Sisseton, S. D.
Anderson, Clara S., Milan.
Anderson, Roscoe B., Minneapolis.
Anderson, Walter E., Stillwater.
Bamber, Carlotta, Rochester.
Barclay, Luvia, Minneapolis.
Barke, Arthur R., Fergus Falls.
Barlow, Frank, Kasson.
Barnard, Paul J., Minneapolis.
Berchem, Pauline, St. Paul.
Berrisford, Mercedes, St. Paul.
Bethke, William, Franklin.
Bibb, Frank, Minneapolis.
Birkenhauer, Mary, Minneapolis.
Bowen, Mercy H., St. Paul.
Bowyer, Helen, Murillo, Ont.
Boyson, Maybelle, Minneapolis.
Brigham, Helen, Minneapolis.
Brinsmaid, Martha M., Minneapolis.
Brohaugh, George, Shelley.
Brown, Edna M., Minneapolis.
Brown, Thirza ,Minneapolis.
Bruce, Edna A., Minneapolis.
Buck, Florence, Minneapolis.
Burns, Margaret, Graceville.
Burton, Lois L., Alden.
Caldwell, Josephine, St. Paul.
Cammack, William R., St. Paul.
Campbell, Stella, Tracy.
Carlson, C. Arthur, Minneapolis.
Carlson, Esther E., Minneapolis.
Carlson, Ethyl Belle, Minneapolis.
Celestine, Sister, Duluth.
Chance, Harold K., Minneapolis
Chenery, Isabella, Jamestown, N. D.
Chesnut, Edward T., Minneapolis.
Clapp, Ella, St. Paul.
Clark, Harriet O., Minneapolis.
Clendening, Gladys, Minneapolis.
Coleman, Myrtle, Minnetonka Beach.
Collier, Frances L., Minneapolis.
Collins, Lucile, Minneapolis.
Collins, Thos. J., Minneapolis.
Comstock, Belle May, St. Paul.
Confer, Marie, Kansas City, Mo.
Coon, Chauncey C., Minneapolis.
Cosgrove, Edward B., St. Paul.
Cowling, Helen, Ely.
Crawford, Ruth, Minneapolis.
Critchett, Francis E., New Ulm.
Crittenden, Ethel, Minneapolis.
Crocker, Katherine, Minneapolis.
Crogan, Mattie, Minneapolis.
Currie, Helen H., Minneapolis.
Cutler, Mary E., Minneapolis.
Dahl, Olga, Minneapolis.
Deming, Portia, Minneapolis.
Dinsmoor, Viola, Austin.
Dix, Gertrude Ethel, Minneapolis.
Donaghue, Belle, Minneapolis.
Dorsey, Cora, Minneapolis.
Dorsey, James E., Minneapolis.
Downey, Vina K., Minneapolis.
Dunlap, Alta, Mandan, N. D.
Duvigneaud, Jeanette A., Minneapolis.
Duxbury, Leland S., Caledonia.
Eckholdt, Laura B., Minneapolis.
Edgar, Hazel C., St. Paul.
Eenkema, Katherine, Clara City.
Elke, Estella L., Chaska.
Elmquist, Marie, St. Paul.
Engle, Margaret, Minneapolis.
Erdall, Agnes R., Minneapolis.
Evans, Nevada S., Minneapolis.
Fagundus, Ruth, Minneapolis.
Ferguson, Clare, Minneapolis.
Fernald, Robert N., St. Paul.
Fiske, Cyrus H., St. Paul.
Fitzsimmons, Mary A., St. Paul.
Foley, Mabel M., Minneapolis.
Freeman, Howard H., Washburn Park.
Gardner, Edwin L., Minneapolis.
Gaylord, Robert M., Minneapolis.
Gibbs, Velzora A., Waterville.
Gilbert, Grace, St. Paul.
Gilger, Bessie, Minneapolis.
Giltinan, Eleanor, Minneapolis.
Gould, Anna M., Glencoe.
Grapes, Iva, Adrian.
Green, Ethelinda B., Stillwater.
Gullickson, Glenn, Minneapolis.
Gundersen, Margaret E., Minneapolis.
Gurley, George P., Minneapolis.
Haines, Helen B., Minneapolis.
Hamilton, William J., Minneapolis.

Hammond, Eva G., Minneapolis.
Hankey, Clara Minneapolis.
Hanson, Minnie O., Morris.
Haupt, Mary C., St. Paul.
Hayes, Mary C., Minneapolis.
Headley, D. Grant, Two Harbors.
Heritage, Mary Hill, Hudson, Wis.
Herring, Hazle S., Riceville, Ia.
Hill, Robert A., Minneapolis.
Hobbs, Marabeth, Minneapolis.
Hodgson, Marie, Minneapolis.
Hoffmann, Pauline, St. Paul.
Holmen, Helen, Kenyon.
Holt, Mabel, Minneapolis.
Hudson, Dorothy, Minneapolis.
Hudson, Mabelle, Minneapolis.
Hutchinson, Enid M., Minneapolis.
Jewett, Helen E., Fergus Falls.
Johnson, Fred. R., New Richland.
Johnson, Freda D., St. Paul.
Johnson, Henry G., Minneapolis.
Johnson, Marie, Minneapolis
Johnson, Millie E., Minneapolis.
Kellogg, Ada B., St. Paul.
Kemp, Etheleen, Minneapolis.
Kitaji, Sentaro, Singu, Japan.
Knewbuhl, Emily, Minneapolis.
Koerner, Illa, St. Paul.
Lampert, Edna, Minneapolis.
Lane, Anna M., St. Paul.
Laughlin, Vera M., Eau Claire, Wis.
Lawrence, Marion, Minneapolis.
Lenart, Elta, Minneapolis.
Leonard, F. Perry, Minneapolis.
Lia, Alma, Hancock.
Lloyd, Frances H., St. Paul.
Loomis, Ruth Robbins, Robbinsdale.
Loomis, Veda, Minneapolis.
Losse, Hyme, Minneapolis.
Lucker, Edith M., Minneapolis.
Lundeen, Marie, Minneapolis.
Lydon, Helen, Minneapolis.
Lyford, Stella E., St. Paul.
Mabie, Harriet, Minneapolis.
Machen, Jane, Savanna, Ill.
Mallory, Walter, St. Paul.
Maloy, Agnes C., St. Cloud.
Marden, Irene, Barnesville.
Mathes, Florence, St. Paul.
McCullough, Clara M., Buffalo.
McDermott, Joseph C., Clontarf.
McDowell, Effie, Hutchinson.
McFetridge, Auverne, St. Paul.
McGovern, Almira, Hammond, Wis.
McKennan, Pearl, Minneapolis.
McKenzie, John, Jr., Lake Benton.
Miller, Arleigh R., Minneapolis.
Montgomery, John, Minneapolis.
Munck, Harold, Owatonna.
Murseth, M. Lillian, Minneapolis.
Naeve, Edith A., Minneapolis.
Nelson, Edna C., Red Wing.
Nelson, Herbert, Minneapolis.
Nelson, O. Norman, St. Paul.
Nesse, James N., Mabel.
Newhall, Richard A., Minneapolis.
Newton, Caroline, Minneapolis.
Nichols, Marjorie P., Pipestone.
Nickell, Marion, Minneapolis.
Nixon, Hugh H., Wells.
Norris, Sadie, Minneapolis.
Nutter, Hannah, Minneapolis.
Ober, Mary L., Duluth.
O'Leary, Abigail, Wabasha.
Olsen, Phoebe M., Minneapolis.
Olsgard, Eugene, Minneapolis.
Olson, Mary D., Lake Park.
Olston, Herbert L., Minneapolis.
Ostby, Gena, Minneapolis.
Ovestrud, Edmund, Spring Grove.
Paddock, Laura, Minneapolis.
Painter, Helen D., Minneapolis.
Parkell, Irene M., Minneapolis.
Parker, Alonzo E., North Branch, Ia.
Petersen, Ernest A., Albert Lea.
Peterson, Sigurd, Minneota.
Phelan, Mary, Graceville.
Pidgeon, Vernon, Minneapolis.
Pinkus, Olga, St. Paul.
Pitts, Eva L., Alton, Ia.
Pomeroy, Eunice, Minneapolis.
Putnam, Leslie R., Minneapolis.
Quigley, Catherine, Bird Island.
Race, Adah M., Minneapolis.
Ramsey, Grace, Minneapolis.
Ramsland, Rudolph J., Sacred Heart.
Rankin, Edward P., Jamestown, N. D
Reed, Ethel E., Minneapolis.
Renning, Clara, Kasson.
Reque, Anna D., Decorah, Ia.
Ries, Joseph A., Fairfax.
Robbins, Esther M., Robbinsdale.
Robinson, Sarah, Minneapolis.
Rogers, Caroline E., Minneapolis.
Rossi, Julia, Mantorville.
Rothrick, H. B., Minneapolis.
Rowe, Ina, Minneapolis.
Rowley, Edith K., Minneapolis.
Sackett, Ina P., Minneapolis.
Salzer, Helen C., Minneapolis.

Scharf, Arthur, Lake City.
Schmidt, Matilda, Minneapolis.
Schulte, Henry, Plato.
Schwartz, Katherine, Omaha, Neb.
Seabury, Paul R., St. Paul.
Seaman, Susie, Minneapolis.
Sedgwick, Fred G., Minneapolis.
Sefton, Adel, St. Paul.
Simmons, Marjorie M., Hunter, N. D.
Simms, Marjorie, Minneapolis.
Sinclair, Myra Jean, Minneapolis.
Sinderson, Grace, Minneapolis.
Skoglund, Alma G., North St. Paul.
Sly, Gertrude B., Minneapolis.
Smith, A. Blanche, Rochester.
Smith, Corinne, St. Paul.
Smith, Eunice H., Minneapolis.
Smith, Maud M., Miles City, Mont.
Snell, Charles F., Detroit.
Snere, Irma L., Minneapolis.
Souba, Lucie, Hopkins.
Spring, Arthur D., Minneapolis.
Stearns, Gertrude C., Hutchinson.
Stoft, Esther, Minneapolis.
Stork, Allen, Harmony.
Storr, Hazel, St. Paul.
Stratton, Ethel, Minneapolis.
Strong, Louise A., Minneapolis.
Sutton, Pearl G., Stillwater.
Swanson, Gertrude M., St. Paul.
Swedberg, Luella C., Luverne.
Swinburne, Gertrude, Minneapolis.
Tate, Elizabeth, Faribault.
Tebbets, Marion, Minneapolis.
Terriere, Margery, Minneapolis.
Thomson, Theodore W., Minneapolis.
Thorsen, Elizabeth, Minneapolis.
Thuet, Julia, Minneapolis.
Tillotson, Alice, Minneapolis.
Tisdale, Mary Vaill, Slayton.
Tornstrom, Mary, Stillwater.
Turner, Winifred E., Minneapolis.
Turnquist, Florence, Minneapolis.
Utendorfer, George W., Gaylord.
Vance, Erskine W., Crookston.
Vidal, James H., Minneapolis.
Warren, Jessie A., Minneapolis.
Wash, Allan J., Minneapolis.
Webster, Jennie, Minneapolis.
Wessberg, May, Fergus Falls.
White, Lucy J., Luverne.
Williams, George E., Minneapolis.
Williams, Howard, Minneapolis.
Winterer, Florence, Valley City, N. D.
Winterquist, Albert L., Little Falls.
Witchie, Hazel M., Minneapolis.
Wretling, Hilma E., Alexandria.

SOPHOMORES—308

Ainsworth, Caroline, Minneapolis.
Aldrich, Robt. G., Osakis.
Allen, Arthur E., Minneapolis.
Allen, Edgar M., Minneapolis.
Allen, William L., Minneapolis.
Amy, Helen L., Minneapolis.
Anderson, Alice E., Minneapolis.
Anderson, Henrietta, Clarkfield.
Anderson, Hilda A., St. Paul.
Anderson, Joseph Elmer, Amboy.
Anderson, Marie L., Minneapolis.
Andrews, Dalton, St. Paul.
Applebee, Ruby M., Anoka.
Arnold, Benjamin E., Brainerd.
Ayers, Grace F., Minneapolis.
Babcock, Lana, Minneapolis.
Bailey, Herbert, Jackson.
Ballie, James G., Virginia.
Beddall, Claude R., Ellsworth, Wis.
Beeman, Elna, Minneapolis.
Billau, Helen, St. Paul.
Blake, Frances E., St. Paul.
Bobb, Bessie E., Minneapolis.
Bonniwell, Donna, Minneapolis.
Borden, Ethel, Minneapolis.
Borst, R. Warner, Minneapolis.
Bowman, Clementine, Howard Lake.
Boyd, Susan E., Minneapolis.
Braden, Elizabeth, Minneapolis.
Brande, G. Herbert, Minneapolis.
Branham, Alice, Minneapolis.
Breen, Genevieve R., Minneapolis.
Brooks, Ida, Mansfield, S. D.
Brown, Arthur V., Alexandria.
Brown, Doris L., Minneapolis.
Browne, Marie, Minneapolis.
Bruchholz, Henry V. A., Minneapolis.
Bruder, Victor W., Minneapolis.
Bryant, Stewart, St. Paul.
Buckley, Irene H., Minneapolis.
Burgett, Georgia L., Faribault.
Burkhard, Arthur C., Preston.
Burns, Bessie, Graceville.
Buswell, Calvin, Minneapolis.
Byrnes, Lyle, Minneapolis.
Cabot, Verne S., Hector.

Campbell, Lowell M., Minneapolis.
Carey, Elizabeth, Minneapolis.
Carman, Paul I., Minneapolis.
Casey, Elizabeth, St. Paul.
Casey, Joseph T., Franklin.
Casey, Nellie, St. Paul.
Chilton, Alice, Howard Lake.
Clark, Jennie, St. Paul.
Clark, Margaret B., Minneapolis.
Cliff, F. Neill, Ortonville.
Clifford, C. May, West Concord.
Collins, Elsie M., Crookston.
Corbett, Louise, St. Paul.
Corniea, Albert P., Plato.
Cotnam, Louise, St. Paul.
Cowan, Frances W., Minneapolis.
Cox, F. Hanford, Cloquet.
Currier, Helen L., Minneapolis.
Dane, Harold J., St. Paul.
Davies, Pearl J., Afton.
Davis, Margaret G., Minneapolis.
Day, Levi W., Clinton Falls.
Dayton, Josephine, Minneapolis.
De la Barre, Louise, Minneapolis.
Dickinson, Rhoda, Buffalo.
Didier, Marcelle C., Minneapolis.
Doherty, Vivienne R., Minneapolis.
Donaldson, Zoe, Minneapolis.
Donohue, John N., St. Paul.
Doremus, Fern, Duluth.
Drake, Leah R., Detroit.
Du Toit, Dana W., Minneapolis.
Eder, Walter H., Blue Earth.
Edsall, Mary Louise, Minneapolis.
Ehri, Eda, Minneapolis.
Eisler, Charles J., Minneapolis.
Elliott, William T., Minneapolis.
Engberg, Edward John, Cambridge.
Erd, Marie, Minneapolis.
Erickson, Beda, Minneapolis.
Erickson, Ruth, Minneapolis.
Ewing, Louise, St. Paul.
Faegre, J. Barthell, Flandreau, S. D.
Fletcher, Margaret N., Minneapolis.
Fligelman, Frieda, Helena, Mont.
Foley, Florence, Stillwater.
Ford, Beth E., Mazeppa.
Foster, Bernice, Duluth.
Foster, Evelyn, Minneapolis
Foster, Mary, Duluth.
Fuller, Ruth, Minneapolis.
Gage, Pansy M., Minneapolis.
Gee, Marian, Minneapolis.
Gillette, Raymond M., Minneapolis.
Goldsmith, Glenn, Hutchinson.
Goodman, A. Laird, Duluth.
Graff, Fred W., Cooperstown, N. D.
Grand-Maitre, Blanche, Floodwood.
Grondahl, Mabel, Red Wing.
Guttersen, Alvin W., Lake Crystal.
Hanke, Ethel F., Minneapolis.
Hansen, Alta I., Kenyon.
Hansen, Anna M. K., Minneapolis.
Hansen, Pearl C., Duluth.
Harris, Charles L., Minneapolis.
Hart, Verna M., Minneapolis.
Heffner, Bernhardina, Minneapolis.
Henderson, Elizabeth, Minneapolis.
Hensel, Kenneth N., St. Paul.
Hermann, Ruth E., Minneapolis.
Hibbard, Hazel L., Minneapolis.
Higley, Merle, Minneapolis.
Hillman, Merton S., Minneapolis.
Hitchcock, Blanche S., Minneapolis.
Hitchcock, Helen, Minneapolis.
Hodapp, Aloys P., Eagle Lake.
Hodgson, Drusilla M., Elbow Lake.
Holmer, Adolph F., Virginia.
Holmes, Donald S., Duluth.
Houck, Margaret, Minneapolis.
Houghtaling, Elma, Fairmont.
Hull, Anne, Minneapolis.
Jacobson, Albert, Jewell, Ia.
Jensen, Dora, Minneapolis.
Johnson, Allina, Minneapolis.
Johnson, Irene B., Minneapolis.
Johnston, Lisle A., St. James.
Jones, Elinor, Wabasha.
Joyce, Helen, Minneapolis.
Julien, Margaret, St. Paul.
Kaiser, Walter, Stillwater.
Kelley, Alta, Crystal Bay.
Kells, Lyman, Sauk Center.
Kentner, Mattie G., Dawson.
King, Mary, Ellendale, N. D.
Kingsford, W. G., Mazeppa.
Kirkevold, Hans P., Hendricks.
Klatt, Albert, Waconia.
Klein, Kenneth O., Minneapolis.
Klimenhagen, Ray R., St. Paul.
Klossner, Lulu, Winthrop.
Knappen, Marjorie, Minneapolis
Kramer, Anna, Minneapolis.
Lange, Lorna, St. Paul.
Larsen, Albertine, Halstead.
Lee, Ruth, Stillwater.
Leete, Helen P., Sparta, Wis.
Lenning, A. Viola, Duluth.
Lien, Luella, Granite Falls.
Lilienthal, Charlotte, Minneapolis.

Lindberg, Lillian, Little Falls.
Lindem, Zelma M., Herman.
Lindgren, Agnes A., Minneapolis.
Linton, Hildur T., Minneapolis
Longstaff, R. S., Huron, S. D.
Love, Genevieve, Wayzata.
Lucker, Edith, Minneapolis.
Lutzi, Pearl A., Minneapolis.
Lyle, Marie C., Minneapolis.
McCall, Margaret, Minneapolis.
MacCallum, Marion S., Minneapolis.
McConkey, Clyde J., Brewster.
McConnell, Vera G., Minneapolis.
McCray, Alice R., St. Paul.
McDermott, Helen C., Rhinelander, Wis.
McGregor, Della, St. Paul.
McHugh, Helen, Goodhue.
McKeen, Edwin, Minneapolis.
McKenzie, John Wallace, Groton, S. D.
McMillan, Effe, Luverne.
McNally, William J., Minneapolis.
Magnuson, Ida, Red Wing.
Mark, Mary E., St. Peter.
Martens, Irma, Minneapolis.
Marvin, Mary M., Zumbrota.
Mason, Harold C., Minneapolis.
Mather, Wm. S., Minneapolis.
Matheson, Amer C., St. Hilaire.
Matson, Ethel R., Minneapolis.
Melbourn, Della, Minneapolis.
Menefee, Guy C., Albert Lea.
Merriman, Mildred, Minneapolis.
Mielke, Edwin J., Glencoe.
Miles, Alice M., St. Paul.
Miles, Mary R., Fergus Falls.
Millar, Marguerite I., Minneapolis.
Miller, Eliz. W., Minneapolis.
Minier, Emma, New Richmond, Wis.
Mitchell, Hattie, Minneapolis.
Morin, Alvida J., Aberdeen, S. D.,
Moulton, Nettie, Dawson.
Muir, Helen, St. Paul.
Murayama, Takashi, Tokio, Japan.
Murnane, Winifred, St. Paul.
Neumeier, Karl G., Stillwater.
O'Connor, Irene, Renville.
O'Hare, Edward S., Minneapolis
Olsen, Myrtle F., Minneapolis.
Ostergren, Ralph C., Gladstone.
Overlock, Ellen, Minneapolis.
Palmer, Ben, St. Paul.
Parks, Carl H. Montevideo.
Parsons, B. France, Minneapolis.
Patterson, Helen, Minneapolis.
Payette, Charles T., Minneapolis.
Pearce, Amy E., Hibbing.
Peik, Wesley E., Jordan.
Pershon, Erich, Young America.
Petersen, Laura Muller, Minneapolis.
Peterson, Harry H., St. Paul.
Peterson, Julian M., Bemidji.
Petterson, Gustav S., Battle Lake.
Phelps, Louana, Duluth.
Phillips, Mellie R., Minneapolis.
Pope, Anna E., Minneapolis.
Prest, Helen, St. Paul.
Ramsey, Harold, Minneapolis.
Rankin, Charlotte, Minneapolis.
Rathbun, Russell B., Minneapolis.
Reed, Mary L., Duluth.
Rees, Lester, Minneapolis.
Reese, Frank, Minneapolis.
Rickert, Paul M., Minneapolis.
Rippe, Lorena E., Fairmont.
Roberts, Caroline D., Minneapolis.
Roberts, Edward B., Minneapolis.
Robinson, Grace E., Minneapolis.
Roddis, Louis H., Osakis.
Roenisch, Clinton W., Minneapolis.
Root, Dorothy A., Minneapolis.
Rosenwald, Reuben M., Plato.
Rosing, Marguerite, St. Paul.
Ruble, Edna, Albert Lea.
Rude, Emil, Pelican Rapids.
Russell, Loretta, Minneapolis.
Ryan, Clara, Freeport, Ill.
Sage, Edith, Minneapolis.
Sanborn, Helen A., Minneapolis.
Sawyer, Sara E., Minneapolis.
Saxton, Florence, Minneapolis.
Schabacker, Carrie, Menomonie, Wis.
Schulstad, Einar T., St. Paul.
Schulz, Alma, Brainerd.
Sende, Jonas A., Monticello.
Senescall, Cleve, Ortonville.
Shannon, Bess L., Minneapolis.
Shearer, Hermione, Minneapolis.
Shepardson, Charlotte, Minneapolis.
Shepley, Clara, Minneapolis.
Sherwin, Eva, Monticello.
Sias, De Forrest J., Madison.
Simmons, Frank H., Minneapolis.
Simmons, Ralph A., St. Paul.
Sinclair, Nora F., Fairmont.
Smart, Ruth A., St. Paul.
Smith, Alice L., Minneapolis.
Smith, Arthur P., Minneapolis.
Smith, F. Paul, Groton, S. D.
Smith, Ralph G., Groton, S. D.
Smith, Vera C., Minneapolis.

Snell, Ella M., St. Paul.
Soloway, Sol., Minneapolis.
Springer, George T., Gladstone, Mich.
Stadsvold, Sidney, Austin.
Starrett, Raymond L., Minneapolis.
Steffen, Theodor, New Ulm.
Steinmetz, Jennie C., Minneapolis.
Stellwagen, Grace, Minneapolis.
Stevens, Dorothy C., Minneapolis.
Stiles, Glenn S., Minneapolis.
Sturtevant, F. Hardy, Detroit.
Suffel, Wm. Reynolds, Duluth.
Sutton, George E., Prior Lake.
Swain, Lila, Powers.
Swenson, Clarence E., Luverne.
Swenson, Esther L., Minneapolis.
Switzer, Elsie L., Minneapolis.
Thelen, Edward, Stillwater.
Thompson, May A., Los Angeles, Cal.
Totton, Frank M., Minneapolis.
Trautman, Olivia, Minneapolis.
Trevette, Hazel E., Minneapolis.
Tupper, Emily H., Minneapolis.
Tuseth, Amanda, Osseo.
Tydeman, F. E., Montevideo.
Van Vliet, Florence L., Minneapolis.
Viker, Selma H., Halstead.
Ware, Frederick, Minneapolis.
Warren, Louise, Minneapolis.
Waugh, Charlotte, St. Paul.
Weesner, Beulah, Minneapolis.
Wentz, Anna, Red Wing.
Whaley, Clementine R., St. Paul.
Williams, Eliz., Minneapolis.
Withee, Hazel E., St. Paul.
Woolsey, Lillian L., Minneapolis.
Wright, Mary, Minneapolis.
Wyckoff, George S., Worthington.
Wyman, Harold C., Minneapolis.
York, Anne G., Minneapolis.
Young, Blanche M., Minneapolis.

FRESHMEN—422

Abrahamson, Frances B., Houston.
Allen, Harriet, St. Paul.
Allen, Laura F., Minneapolis.
Alley, E. Louise, Minneapolis.
Amber, J. Walter, Fosston.
Ames, Laura, Willmar.
Ames, Luella B., Minneapolis.
Amundsen, M. H., Alexandria.
Anderson, Belle, Mazeppa.
Anderson, Edna, St. Paul.
Anderson, Martha, Audubon.
Anderson, Verna May, Mazeppa.
Babcock, Marjorie, Winnipeg, Man.,
Bailie, Earle C., Minneapolis.
Baker, Virginia, Brownton.
Barnaby, Anne L., Minneapolis.
Barnes, Mildred, Minneapolis.
Barry, Arthur, Minneapolis.
Bates, Wilbur K., Lake City.
Beehler, Irma A, Minneapolis.
Bergh, Maybelle, Spring Grove.
Berglund, J. LeRoy, Cambridge.
Bertram, Edward H., Minneapolis.
Bibb, Eugene, Minneapolis.
Billings, C Lee, St. Paul.
Bingenheimer, Margaret, Mandan, N. D.
Bjeldanes, M. Augusta, Madison.
Borst, Homer W., Minneapolis.
Boxell, Adah K., St. Paul.
Brand, Myrtle, Minneapolis.
Brecke, Amanda, Minneapolis.
Brockway, Truma F., Luverne.
Brooks, Robert L., Minneapolis.
Broom, Alice G., Minneapolis.
Brossard, Frances, Farmington.
Brown, Caroline, Minneapolis.
Brown, Chester, Buffalo, N. D.
Brown, Vesta, Minneapolis.
Brunelle Henry D., Cloquet.
Bryant, Gordon, St. Paul.
Bryant, John, Minneapolis.
Buckley, Catherine, Farmington.
Burns, Bessie, Graceville.
Burtness, Ruby, Enderlin, N. D.
Bush, Leila M., Dover.
Cahalan, Vera, Miller, S. D.
Caldwell, Louise, St. Paul.
Cammack, Gertrude, St. Paul.
Cant, Kenneth S., Duluth.
Carpenter, Glenn, Minneapolis.
Carr, Edna, St. Paul.
Caster, Elizabeth J., Minneapolis.
Catur, Edith G., St. Paul.
Chamberlain, Victor P., Minneapolis.
Chilton, Freeman E., Howard Lake.
Cirkel, Florence A., Minneapolis.
Clarity, Cecil, Minneapolis.
Clawson, Leonard H., New Castle, Ind.
Claypool, Agnes, Minneapolis.
Clement, Ruth M., Minneapolis.
Clifford, Ralph, Grand Forks, N. D.
Colgrove, Laura M., Minneapolis.

Collier, Ava I., Minneapolis.
Collins, Harry, Minneapolis.
Corbin, Mary R., Elk River.
Cornish, Mary E., Vernon Center.
Cornish, Ruth, Vernon Centre.
Crary, Josephine, Minneapolis.
Crocker, Thomas, Minneapolis.
Curial, Marie T., Anoka.
Current, Edith, New Ulm.
Currie, Paul M., Minneapolis.
Currier, Donna, St. Paul.
Dahl, Borghild, Minneapolis.
Davis, Grace O., Minneapolis.
Day, Frances, Minneapolis.
Dedolph, Louise G., St. Paul.
Dellinger, Margaret, St. Paul.
Dickinson, Dwight, Excelsior.
Doherty, Fayette C., Tracy.
Drake, Edward R., St. Paul.
Drake, Lenore, Minneapolis.
Drake, Zieda J., Minneapolis.
Dressel, Howard C., Le Sueur.
Drew, Cosette, Minneapolis.
Duffy, Lina, Fond du Lac, Wis.
Dunlop, Ednah, Minneapolis.
Dunn, Harold E., Luverne.
Dwyer, Mollie, Minneapolis.
Ebel, Gertrude, Minneapolis.
Eder, Everett E., Blue Earth.
Edgerly, Hattie, Mahnomen.
Egan, John K., St. Paul.
Engle, Eloise, Minneapolis.
Erdall, Arthur C., Minneapolis.
Erickson, Victor L., Stillwater.
Evans, Ida C., Kasson.
Evans, Pearsall W., Minneapolis.
Evers, J. A., Minneapolis.
Everts, Carolyn L., Minneapolis.
Faegre, A. Leonard, Flandreau, S. D.,
Falk, Byron, Otisville.
Feir, Earl E. Christenson, Wood Lake.
Ferguson, Janet, Minneapolis.
Filk, Anna M., Biscay.
Fissell, Walter, Minneapolis.
Fitzsimmons, Helena, St. Paul.
Fleming, Geraldine F., Brainerd.
Fleming, James J., St. Paul.
Fleming, William S., Minneapolis.
Flinn, Irma, Minneapolis.
Forrer, Minnie, Minneapolis.
Francis, Florence M., Minneapolis
Frankoviz, Nan, Fergus Falls.
Freeman, Neda B., Minneapolis.
Freeman, Theodore, Minneapolis.
Furlow, Walter S., Rochester.
Galliven, Nona, St. Paul.
Gamble, George H., Rochester.
Ganley, Frank, Minneapolis.
Ganssle, Grace. Minneapolis.
Ganssle, Waldorf L., Minneapolis.
Gardner, Frances E., Minneapolis.
Gates, Vernon, Rochester.
Gaus, Glendora, Minneapolis.
Giessler, Margaret, Minneapolis.
Gilkey, Harry A., Minneapolis.
Gillam, Stanley S., Windom.
Glynch, Frank, Minneapolis.
Goodwin, G. E., Webster, S. D.
Goold, Raymond H., Minneapolis.
Gould, Della, Glencoe.
Gowan, Claudia, Duluth.
Grant, Florence E., Minneapolis.
Gray, Grace A., St. Paul.
Greenly, Marshall H., Minneapolis.
Greiner, Oscar F., Chaska.
Griffin, Elsie H., Winona.
Grimes, Willard M., Edina.
Groettum, Rosetta, Minneapolis.
Gruman, Beatrice, Minneapolis.
Gude, Therese, Duluth.
Guernsey, Herbert J., Minneapolis.
Guethling, Minnie, Detroit.
Guy, Elnora, Minneapolis.
Hahn, Louis, Minneapolis.
Hall, Gertrude, Minneapolis.
Halstead, Paul B., St. Paul.
Hamilton, Floy K., Minneapolis.
Hanks, Mabelle L., Minneapolis.
Harrison, Helen, Minneapolis.
Hartman, Laura J., Minneapolis.
Harwood, Laura B., Minneapolis.
Hastings, Ellen M., Elk River.
Haugen, Nina S., Pelican Rapids.
Herber, Jessie A., Minneapolis.
Highland, Albert T., Langford, S. D.
Hill, Florence, Minneapolis.
Hillesheim, Gertrude M., Sleepy Eye.
Hilyer, Gale P., Duluth.
Hixon, Charles S., Minneapolis.
Hoag, Helen, Minneapolis.
Hoff, Borghild, Duluth.
Hoff, Ethel C., Minneapolis.
Hoff, Ethel Eunice, Sheldon, N. D.
Holden, Cora B., Minneapolis.
Holmen, Gertrude, Kenyon.
Homan, Audrey J., Minneapolis.
Hooker, Mercy, Chicago, Ill.
Hotchkiss, Robert, Minneapolis.
Hoy, Mary E., St. Paul.
Hughart, Jessie M., Minneapolis.

Hull, Bert J., Wahpeton, N. D.
Hultrans, Hilding, Minneapolis.
Humphrey, Kittie, Minneapolis.
Hurd, Glenn A., St. Paul.
Hutchinson, Emmajean, Faribault.
Hutchinson, Marjorie, Minneapolis.
Ingalls, Katherine, Minneapolis.
Ireland, Max, Dowagiac, Mich.
Jesness, Ingwold, Fosston.
Jesness, Oscar B., Fosston.
Johnson, Ada F., Benson.
Johnson, Carolyn A., St. Paul,
Johnson, Edythe, Cooperstown, N. D.
Johnson, F. Roy., Castleton, N. D.
Johnson, Per Otto S., Duluth.
Jones, Charles H., Mitchell, S. D.
Jones, Mary W., Minneapolis.
Kanter, Alex. B., Minneapolis.
Keating, Edward, Minneapolis.
Keating, Kathryn, Minneapolis.
Kennedy, Agnes, St. Paul.
Kent, Fay Marie, Minneapolis.
Kesson, Stella R., Byron.
Kiplinger, Carl T., Lena, Ill.
Kjerland, Gratia, Minneapolis.
Kneebone, Rubina, Chisholm.
Koontz, Zora V., Minneapolis.
Kreis, Foster H., Minneapolis.
Labbitt, Ruby, Detroit.
Lagerquist, Helen, Minneapolis.
Lane, Eva E., Minneapolis.
Lane, L. Emmett, Minneapolis.
Lang, Roy, Glenville.
Larson, Alfred, Gary, S. D.
Larson, Amanda E., Minneapolis.
Larson, Elvira C., Minneapolis.
Larson, Emanuel E., St. Paul.
Larson, Henry N., Houston.
Larson, Nettie, Minneapolis.
Lemke, Edna Gooch, St. Paul.
Lemon, Kenneth, St. Paul.
Lenz, Henry, Kennan, Wis.
Leonard, Faith, Minneapolis.
Leonard, Gladys, Minneapolis.
Liebenstein, Harry J., Whittemore, Ia.
Littel, Josephine, Minneapolis.
Look, Charles L., Sioux Falls, S. D.
Lovdahl, Mabel, Park Rapids.
Loyhed, Lois D., Faribault.
McAlmon, William, Minneapolis.
McBean, Alan J., Minneapolis.
McCall, Harrison, Minneapolis.
McCanna, Mable, Minneapolis.
McCargar, Fred, Montevideo.
McCawley, Anna K., Stillwater.
McCormick, Elmer, White Bear.
McCulloch, Hazel, Minneapolis.
McDivitt, Florence, Minneapolis.
McElroy, Monica, Minneapolis.
McEwen, Nora, St. Paul.
McGinty, Jenny E., Wayzata.
McGowan, Louise, Janesville, Wis.
MacLean, Edwin L., Minneapolis.
MacLennan, Ada, Grand Rapids.
McMahon, Lynnferd, Fergus Falls.
MacMullan, Rita, Minneapolis.
McNair, H. Harvey, St. Paul.
Macdonald, Alice, St. Paul.
Madden, Alecia V., Minneapolis.
Magelssen, Solveig, Minneapolis.
Major, Laura K., Minneapolis.
Mannheimer, George, St. Paul.
Marks, Edna A., Minneapolis.
Marquis, Antonia E., Minneapolis.
Mason, Dorothea, Minneapolis.
Matteson, Pearl, Minneapolis.
Mattson, Gustav J., Winthrop.
Meili, Irma, St. Paul.
Melin, E. Eleanor, Minneapolis.
Metcalf, F. Elliot, Madison, S. D.
Mettling, Pearle, Montevideo.
Mickelson, John, Cummings.
Miller, Eva S., Long Prairie.
Miller, Guy C., Winnebago.
Miller, Lucile C., Minneapolis.
Moe, Norman, Lake Crystal.
Montgomery, Mary, Greenfield, Ind.
Morton, Claude S., Brickton.
Muckley, Rose, Ottawa.
Muir, Jean I., Winnebago.
Nelligan, Francis E., Monson, Mass.
Nelson, Albert, Minneapolis.
Nelson, Eva T., Afton.
Nelson, Robert M., St. Paul.
Newton, Ethel R., Ortonville.
Nicholson, Arnold R., Minneapolis.
Niles, Harriet, Menomonie, Wis.
Niles, Natalie T., Anoka.
Norman, Ebba, Minneapolis.
Norton, Dorrice, St. Paul.
Norwood, Vivian, Minneapolis.
Ober, Catherine, Minneapolis.
Oberg, Laura, Minneapolis.
O'Brien, Julia, Brainerd.
Odell, Corinne V., Minneapolis.
Ogg, Edna, Orange City, Ia.
Olson, Florence, St. Paul.
Olson, Margretta, Seattle, Wash.
Olston, Arthur J., Minneapolis.
O'Neil, Grace, Minneapolis.

O'Neill, Richard, Graceville.
Overn, Oswald, Albert Lea.
Palmer, Mary J., Minneapolis.
Palmer, Ruth, Mankato.
Palmer, William, Le Roy.
Parker, Frederick L., St. Paul.
Partridge, Jessie, Owatonna.
Passmore, George, Minneapolis.
Paulsen, Walter H., Pipestone.
Payne, Catherine B., Minneapolis.
Payne, D. J., St. Paul.
Pearce, Myrtle, Hibbing.
Pearce, Will R., Minneapolis.
Pellatt, Amy R. A., Minneapolis
Pendergast, Bernice, St. Paul.
Peterson, Harry, St. Paul.
Peterson, Mabel F., Minneapolis.
Peterson, Pearl, Dawson.
Phillips, Charles, Minneapolis.
Phoenix, Maida, St. Paul.
Piemeisel, Robert L., Jordan.
Pierce, Dora, Minneapolis.
Pierce, Grace, Minneapolis.
Pirsch, Joseph H., Caledonia.
Plummer, Winnie, Minneapolis.
Poore, John C., St. Paul.
Prisk, Ethel, Ely.
Puffer, Paul, Minneapolis.
Quinn, Winifred, Minneapolis.
Raine, Nellie I., Minneapolis.
Ramsett, Bertha E., Willmar.
Randall, Laura, St. Paul.
Ransom, Ruth, Minneapolis.
Rasmussen, Peter L., St. Paul.
Rathbun, Bertha, Rochester, N. Y.
Ray, Philip L., Minneapolis.
Reed, Frances, Minneapolis.
Reedall, Allen H., Minneapolis.
Reeves, Jay E., Groton, S. D.
Reum, Virginia S., Minneapolis.
Rice, James J., Minneapolis.
Rice, Kenneth L., Adrian.
Roberts, Clinton R., Lime Springs, Ia.
Robertson, Ethel R., Minneapolis.
Robinson, G. Virginia, Montevideo.
Rogers, Helen, Faribault.
Rorem, Allen T., Minneapolis.
Rosche, Elizabeth M., Stillwater.
Russell, Jean, Minneapolis.
Rypins, Stanley I., St. Paul.
Sands, Grace, Minneapolis.
Schons, Wilhelmina, St. Paul.
Schroeder, Helen, St. Paul.
Schroeder, Mayme, Perham.
Scully, Helen, Stillwater.
Sealander, Elof, Detroit.
Sefton, Beatrice, St. Paul.
Seide, Henry, Milbank, S. D.
Shelley, Marie, Minneapolis.
Shephard, Amy E., Ft. Snelling.
Sheppard, Byron, Hutchinson.
Shol, Carolyn, Minneapolis.
Simmonds, Maurice, St. Paul.
Simpson, Charles D., West Concord.
Sinclair, Gregg M., Minneapolis.
Slade, Verna M., Minneapolis.
Smestad, Mattie H., Windom.
Smith, Kenneth H., Minneapolis.
Smith, LeRoy E., Renville.
Smith, Marian A., Minneapolis.
Sorenson, Ruth, Minneapolis.
Sorlien, Ella H., Granite Falls.
Sowden, Frank P., Sauk Centre.
Spaulding, Marjorie, Minneapolis.
Spencer, Julia, Henderson.
Stafford, Russell H., Minneapolis.
Staples, Alice M., St. Paul.
Staska, Joe, Angus.
Stearn, Harriet M., Minneapolis.
Stevens, Marion I., Minneapolis.
Strehlow, Lillian, Casselton, N. D.
Strong, Hazel M., St. Paul.
Strong, Ruth G., St. Paul.
Sullivan, Katherine, Stillwater.
Sumner, Louise M., St. Paul.
Sundby, Phil, Minneapolis.
Sunwall, J. Oscar, Minneapolis
Sutcliffe, Frederick H., Ft. Snelling.
Sutter, Hedwig M., St. Paul.
Sutton, Harris, Prior Lake.
Swanman, Ira C., Minneapolis.
Swanson, Stedy, Minneapolis.
Tallon, Maude M., Biwabik.
Terry, Florence, Minneapolis.
Thoen, Hazel V., Taylors Falls.
Thompson, Katherine G., Minneapolis.
Thompson, Nathan, Minneapolis.
Thomson, Margaret M., Minneapolis.
Tibbs, George M., Jr., St. Paul.
Tmey, Fred J., Hutchinson.
Tollefson, Dagna J., Rochester.
Tracy, Mabel, Minneapolis.
Trezona, Edith M., Ely.
Turnquist, Myrtle, Minneapolis.
Ulsaker, Oscar M., Wahpeton, N. D.
Underwood, Florence, Fergus Falls.
Utendorfer, Ray E., Gaylord.
Vaaler, Christopher, Spring Grove.
Van Valkenberg, Walter, Canby.
Van Vorst, Ada B., Paynesville.

Vaughan, Catherine, Minneapolis.
Vennemann, Rosalie, Ft. Snelling.
Viesselman, Percival, Minneapolis.
Vollum, Alfred T., Hayward.
Walsh, Rose, St. Paul.
Warden, Lee M., Minneapolis.
Warmington, Leone, Dubuque, Ia.
Warner, Grace M., Minneapolis.
Wasmuth, Bjarne, Minneapolis.
Wasser, Opal L., Minneapolis.
Watson, Ralph, Minneapolis.
Way, Mildred R., St. Paul.
Webb, Philip M., Bismarck, N. D.
Webber, Dot N. L., Luverne.
West, David, Minneapolis.
West, Elizabeth C., Minneapolis.
Wheelock, Nellie, Minneapolis.
Wicklund, Effie, Bingham Lake.
Wilder, Earl R., Amboy.
Will, Tillie, Minneapolis.
Williams, Natalie, Minneapolis.
Williams, Perry S., St. Paul.
Wilson, Alta D., Reeder, N. D.
Winter, J. D., Minneapolis.
Wist, Lawrence, Webster, S. D.
Womack, Lillian, St. Paul.
Woodward, Ray, Minneapolis.
Woolley, Isla, Howard Lake.
Wyman, Vincent, Minneapolis.
Zeches, Georgia R., St. Charles.

UNCLASSED—203

Abbott, Roy, St. Peter.
Albrecht, Lella, Minneapolis.
Allen, Harriet, St. Paul.
Ames, Georgiana, Minneapolis.
Andrews, Mrs. M. E., Minneapolis.
Atterbury, Marie, Minneapolis.
Backus, E. R., Minneapolis.
Bailey, Katherine, Minneapolis.
Bailey, Lucretia, Minneapolis.
Barber, Marty, Minneapolis.
Barnum, Julia, Minneapolis.
Bartholf, Mrs. K. J., Minneapolis.
Barto, Alphonso V., White Earth.
Bauers, Gregory, Minneapolis.
Benton, Mrs. Elma, Minneapolis.
Berg, David E., Minneapolis.
Bieber, Louise, Aberdeen, S. D.
Bock, Sidney E., Minneapolis.
Bohn, Mary I., St. Paul.
Bright, Elizabeth, Minneapolis.
Brill, Harry H., Minneapolis.
Brown, Jessica M., Minneapolis.
Bruland, P. O., Norman, Ia.
Bryan, Agnes S., Rochester.
Bryant, Gordon, St. Paul.
Burke, Mrs. Julia, Minneapolis.
Burnett, Ralph A., Cummings, N. D.
Carling, Marion J., St. Paul.
Carson, Helen D., St. Paul.
Chapin, George, St. Paul.
Christ, Lydia B., Minneapolis.
Clawson, Leonard H., New Castle, Ind.
Clefton, C. C., St. Paul.
Colburn, O. A., Minneapolis.
Constant, Mrs. F. H., Minneapolis.
Cornish, Mary, Vernon Center.
Curial, Atwater T., Anoka.
Darrow, Mabelle C., Minneapolis.
DeMarais, Lucille, Minneapolis.
DeVeau, James, Jr., Minneapolis.
Dobbs, Claire, Minneapolis.
Doherty, F. C., Tracy.
Doolittle, Madeleine, Minneapolis.
Door, Lester A., Mankato.
Dorn, Mrs. Helena, St. Paul.
Douglas, Leila, St. Paul.
Downey, Mrs. Hal., Minneapolis.
Downing, H. L., Minneapolis.
Ecklund, Jule A., Minneapolis.
Edgerton, Lou, Yankton, S. D.
Edwards, Mary, Minneapolis.
Emerson, Hazel, Minneapolis.
Eustacia, Sister, Duluth.
Evenson, Fred G., St. Paul.
Ferguson, Ida M., Minneapolis.
Ferrey, Marjorie, St. Paul.
Firestone, Emma A., Mankato.
Fleming, Beryl, St. Paul.
Flom, Otto, Belview.
Foley, Marcella D., Minneapolis.
Foster, George K., St. Paul.
Frary, Mrs. Alice W., Minneapolis.
Freeman, Vernon, Minneapolis.
Garland, Nathan R., Minneapolis
Gaus, Ottelie, Minneapolis.
Georgian, A., Caucasus, S. Russia.
Gertrude, Sister, Duluth.
Gilbertson, J. L., Minneapolis.
Goff, Belle, Minneapolis.
Goodrich, Donald, Minneapolis.
Granner, John P., Minneapolis.
Gray, Amy M., Valley City, N. D.
Gueffroy, H. A., White Rock, S. D.
Gutgesell, Hazel, Minneapolis.

Hake, O. W., St. Paul Park.
Hall, Arthur B., Minneapolis.
Hall, Bruce P., Minneapolis.
Hall, Margaret, St. Paul.
Hallinan, Mary, Minneapolis.
Handy, Georgia M., Minneapolis.
Hanggi, John A., St. Paul.
Hanson, Lillian, Morris.
Hart, Kathleen P., Mankato.
Hartgering, Genevieve, Minneapolis.
Harwood, Evelyn, Minneapolis.
Hedtke, Anna E., Henderson.
Heeter, E. E., Manchester, Ind.
Helgerson, Lynn S., Plainview.
Herrick, Lydia, Michigan City, Ind.
Herrick, William, Michigan City, Ind.
Hitchcock, Elizabeth, Redwood Falls.
Hobe, Ragnhild J., White Bear.
Hoefling, Neoma, Mitchell, S. D.
Hoidale, Margaret, Dawson.
Holbrook, David H., Minneapolis.
Holzschuh, Alma, Minneapolis.
Horton, Gilbert R., Litchfield.
Hovey, Frankie, Minneapolis.
Hubbard, William A., Minneapolis.
Huey, George, Minneapolis.
Humes, Dorothy, Cass Lake.
Hvid, Lillian, Minneapolis.
Jaynes, Irene, St. Paul.
Johnson, Ada F., Benson.
Johnson, Mrs. Mary F., Minneapolis.
Johnson, Odin J,, Lyle.
Johnson, Tord, Fergus Falls.
Jones, Charles H., Mitchell, S. D.
Kawata, Suehito, Kyoto, Japan.
Keefe, A. Percy, Minneapolis.
Kellogg, Helen, Minneapolis.
Kent, Fay, Minneapolis.
Kenyon, R. H., Minneapolis.
Kingsley, Kenneth, Minneapolis.
Klapp, Louise D., Minneapolis.
Knight, Mary, Minneapolis.
Koyama, Kozo, Minneapolis.
Krogh, Gudrun, Aberdeen, S. D.
Kueffner, Wm. R., St. Paul.
Larsen, Kathryn, Minneapolis.
Lasher, Lois B., Montevideo.
Laughlin, Elmer B., Tracy.
LaVayea, Florence, Minneapolis.
Lawler, Sturgis, St. Paul.
Lawrence, James G., Wabasha.
Libby, Howard C., New London, Wis.
Lillis, John H., Davenport, Ia.
Lindquist, Oscar F., Starbuck
Little, Helen M., Minneapolis.
Loberg, Nellie, Minneapolis.
Lothrop, Mary O., Minneapolis.
Lovejoy, Marjorie, Minneapolis.
Lyford, Dartt H., St. Paul.
Lyon, Marion S., Minneapolis.
MacCourt, Robert S., St. Paul.
MacDermott, Leila, Minneapolis.
McLennan, Eleanor, Minneapolis.
McMillan, Jean, Minneapolis.
Markoe, Arthur, Minneapolis.
Mielke, Wilhelmina, Lonsdale.
Miller, Nina, Minneapolis.
Moes, Lillian, Minneapolis.
Moir, Arthur D., Minneapolis.
Moore, Robert R., St. Paul.
Morris, Marie E., Barron, Wis.
Nehls, Mrs. Marie, Minneapolis.
Nelson, Elizabeth, Minneapolis.
Nelson, Nan, St. Paul.
Nichols, Florence E., Minneapolis.
Nordbye, Gunnar H., Granite Falls.
Oak, Emma J., Hot Springs, S. D.
Olson, Lydiana J., Minneapolis.
Oredalen, Mary, Kenyon.
Ostlund, Haddon A., Minneapolis.
Parmele, Margaret, Minneapolis.
Pattee, Dorothy, Minneapolis.
Pepper, Dorothy S., Minneapolis.
Phillips, Mary Grace, Minneapolis.
Porter, Albert G., Willmar.
Powers, Harry W., St. Paul.
Prentice, Ruth E., Minneapolis.
Pressey, Sidney L., St. Paul.
Prosser, Clare C., Minneapolis.
Puffer, Lottie S., Guelph, N. D.
Pullen, D. S., Minneapolis.
Purple, Margaret, Minneapolis.
Ramsland, O., Sacred Heart.
Rarig, Bessie M., Minneapolis.
Raudenbush, Henrietta, St. Paul.
Relf, Frances H., St. Paul.
Remund, Laura, Waseca.
Riebeth, Chester, Minneapolis.
Rinde, Nicholas N.
Roberts, Marie, Minneapolis.
Robinson, Henrietta M., Zumbrota.
Rodeen, Charles, Minneapolis.
Rosholt, Norma, Minneapolis.
Ross, Lillian, Pekin, Ill.
Rushfeldt, Elise, Hawley.
Sawanobori, George, St. Paul.
Schoen, Vera, Minneapolis.
Schonlan, Clement, Houston.
Schow, Jennie E., Minneapolis.
Schulte, Anna M., Minneapolis.

Scott, Marguerite M., Elk River.
Sherwood, Rachel, Minneapolis.
Silloway, Sarah, Minneapolis.
Simpson, Jean, Minneapolis.
Smith, Chauncey G., Superior, Wis.
Smith, Margaret, St. Cloud.
Smith, Mrs. Marie S., Minneapolis.
Sommermeyer, Louise W., Minneapolis.
Sorlien, Theodore, Granite Falls.
Spies, A. Agnes, Graettinger, Ia.
Spies, Marie E., St. Paul.
Stevens, Marjorie P., St. Paul.
Stokes, Ralph S., St. Paul.
Stone, Philip M., Morris.
Stub, Ingolf, St. Paul.
Sullivan, Frank J., St. Cloud.
Sullivan, Henry H., St. Cloud.
Tenner, Mrs. Dora, Minneapolis.
TerLouw, William, Pella, Ia.
Thompson, Ida B., Grandy.
Thuras, Albert, Minneapolis.
Tideman, C. G., St. Paul.
Tomlinson, Bessie A., Minneapolis.
Traxler, Marion, Minneapolis.
Trenerry, Mabel E., Hibbing.
Tribbey, Ruth E., Minneapolis.
Trimble, Alice, Minneapolis.
Turner, Alice M., Minneapolis.
Underhill, R. H., Stillwater.
Underleak, Bessie, Chatfield.
Van Etten, Gerard, Minneapolis.
Voelker, James M., Winona.
Wagner, Archibald F., Minneapolis.
Walle, Marguerite E., St. Paul.
Walter, Wilmot, Sioux Falls, S. D.
Warner, Amos E., St. Paul.
Webster, Florence P., Minneapolis.
Weller, Mildred L., Minneapolis.
Wheeler, H. Meryl, St. Paul.
White, Hope, Winnebago.
Wilk, Harry, Minneapolis.
Wilkinson, Eva M., Minneapolis.
Williams, Clarence, Minneapolis.
Willis, Hazel M., Minneapolis.
Winsted, Huldah L., Valley City, N. D.
Witchie, Leila, Minneapolis.
Witte, Fred W., Sioux Falls, S. D.
Wood, Stella, Minneapolis.
Young, Arthur D., Mankato.
Young, Edith, Shawnee, Okla.
Zellar, Enza, St. Paul.

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The University of Minnesota Bulletin

The School of Chemistry

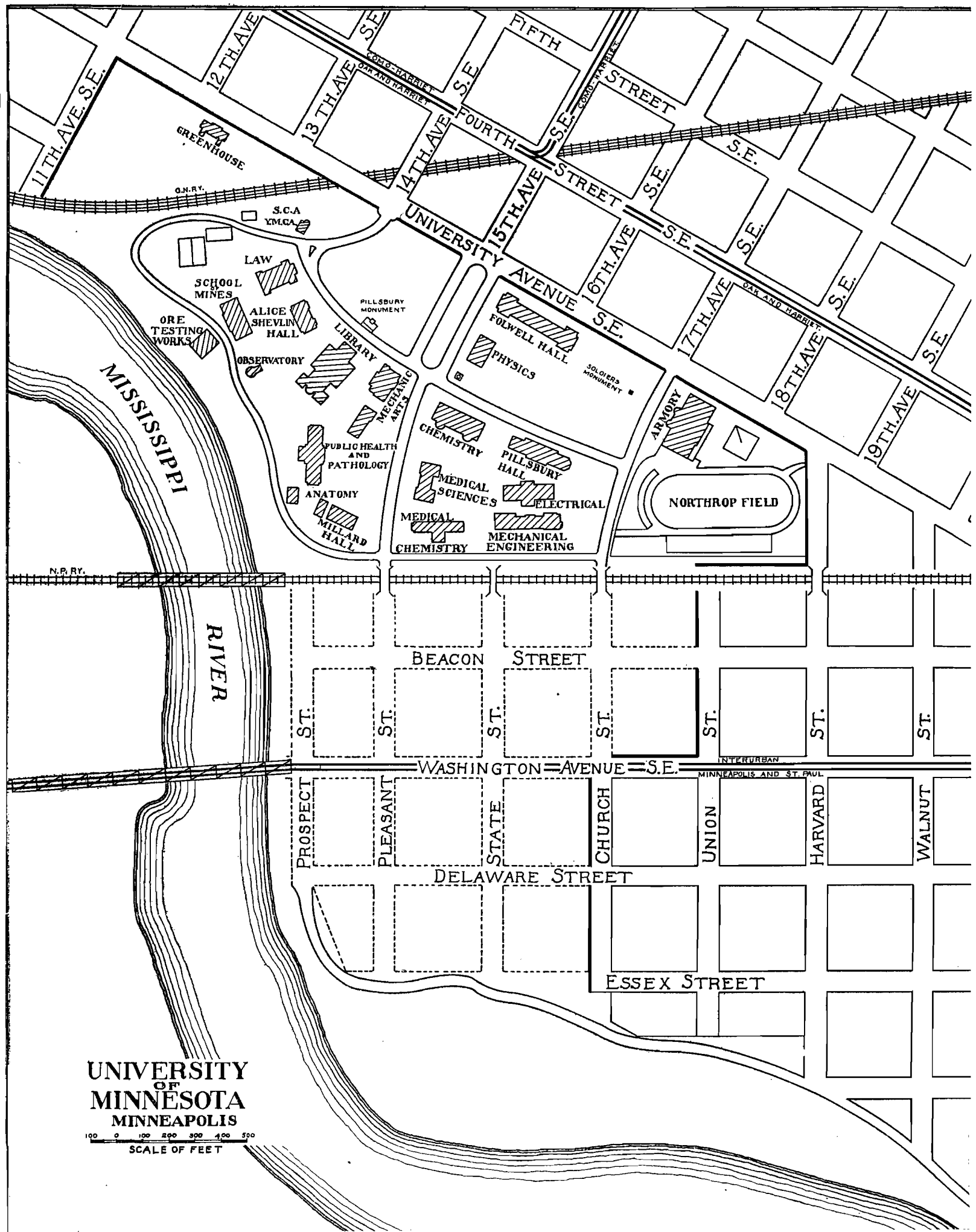
1909-1910

Volume XII July 15, 1909 No. 6

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 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.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Y.M.C.A.
LAW
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ALICE SHEVLIN HALL
ORE TESTING WORKS
OBSERVATORY
LIBRARY
PILLSBURY MONUMENT
MECHANIC ARTS
PUBLIC HEALTH AND PATHOLOGY
ANATOMY
MILLARD HALL
FOLWELL HALL
PHYSICS
SOLDIERS MONUMENT
CHEMISTRY
PILLSBURY HALL
MEDICAL SCIENCES
ELECTRICAL
MEDICAL CHEMISTRY
MECHANICAL ENGINEERING
ARMORY
NORTHROP FIELD
MISSISSIPPI RIVER
BEACON STREET
WASHINGTON AVENUE S.E.
INTERURBAN
MINNEAPOLIS AND ST. PAUL
PROSPECT ST.
PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
WALNUT ST.
DELAWARE STREET
ESSEX STREET
UNIVERSITY OF MINNESOTA
MINNEAPOLIS
100 0 100 200 300 400 500
SCALE OF FEET

Program of Entrance Examinations

1909–10

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The School Year for 1910-11 will begin Tuesday September 13

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 SCHOOL OF AGRICULTURE
- THE DAIRY SCHOOL
- THE SHORT COURSE FOR FARMERS
- THE SHORE COURSE FOR TEACHERS
- THE SCHOOL OF TRACTION ENGINEERING
- THE FORESTRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

- THE TRAINING SCHOOL FOR NURSES

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

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ERNEST B. PIERCE, B. A., REGISTRAR

JAMES T. GEROULD, B. A., LIBRARIAN

C. D. DECKER, PURCHASING AGENT

J. D. BREN, CASHIER

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JOHN F. DOWNEY, M.A., C. E., DEAN OF THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

*FREDERICK S. JONES, M.A., DEAN OF THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

JOHN W. OLSEN, B.S., DEAN AND DIRECTOR OF THE DEPARTMENT OF AGRICULTURE

WILLIAM S. PATTEE, LL.D., DEAN OF THE COLLEGE OF LAW

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., DEAN OF THE COLLEGE OF MEDICINE AND SURGERY

ALFRED OWRE, D.M.D., M.D., DEAN OF THE COLLEGE OF DENTISTRY

FREDERICK J. WULLING, Phm.D., LL.M., DEAN OF THE COLLEGE OF PHARMACY

WILLIAM R. APPLEBY, M.A., DEAN OF THE SCHOOL OF MINES

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HENRY T. EDDY, C.E., Ph.D., LL.D., DEAN OF THE GRADUATE SCHOOL

ADA L. COMSTOCK, M.A., DEAN OF WOMEN

*Resigned.

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
PRESIDENT CYRUS NORTHROP

The College of Science, Literature and the Arts
DEAN JOHN F. DOWNEY
PROFESSOR H. F. NACHTRIEB
PROFESSOR J. C. HUTCHINSON
PROFESSOR CARL SCHLENKER
PROFESSOR NORMAN WILDE

The College of Engineering and the Mechanic Arts
DEAN FREDERICK S. JONES
PROFESSOR GEORGE D. SHEPARDSON

The College and School of Agriculture
DEAN JOHN W. OLSEN
PROFESSOR HARRY SNYDER
PROFESSOR SAMUEL B. GREEN

The College of Law
DEAN WILLIAM S. PATTEE
PROFESSOR HENRY J. FLETCHER

The College of Medicine and Surgery
DEAN F. F. WESBROOK
PROFESSOR THOMAS G. LEE

The College of Dentistry
DEAN ALFRED OWRE

The College of Pharmacy
DEAN FREDERICK JOHN WULLING

The School of Mines
DEAN WILLIAM R. APPLEBY

The School of Chemistry
DEAN GEORGE B. FRANKFORTER

The College of Education
DEAN GEORGE F. JAMES

The Graduate School
DEAN HENRY T. EDDY

The Dean of Women
ADA L. COMSTOCK

The University Library
JAMES T. GEROULD

General Alumni Association
DAVID P. JONES

The University Library
JAMES T. GEROULD

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

School of Chemistry

FACULTY

Cyrus Northrop, LL. D., President
George B. Frankforter, M. A., Ph. D., Dean and Professor of Chemistry
William R. Appleby, M.A., Professor of Metallurgy
George N. Bauer, Ph. D., Professor of Mathematics
William E. Brooke, B.C.E., M.A., Professor of Mathematics and Mechanics
Oscar Burkhard, M.A., Assistant Professor of German
William H. Bussey, Ph.D., Assistant Professor of Mathematics
Peter Christianson, B.S., E.M., Professor of Assaying
Frederic Clements, Ph.D., Professor of Botany
Hans Dalaker, B.S., Assistant Professor of Mathematics
Ira H. Derby, B.A., Assistant Professor of Chemistry
John F. Downey, M.A., C.E., Professor of Mathematics
Henry T. Eddy, C.E., Ph.D., LL.D., Professor of Mathematics and Mechanics
Henry A. Erikson, E.E., Assistant Professor of Physics
John J. Flather, Ph.B., M.E., Professor of Mechanical Engineering
John H. Gray, Ph.D., Professor of Economics
Christopher W. Hall, M.A., Professor of Geology and Mineralogy
Arthur Edwin Haynes, M.S., M.Ph., Sc.D., Professor of Engineering Mathematics
Everhart P. Harding, M.S., Ph.D., Assistant Professor of Chemistry
Frederick S. Jones, M.A., Professor of Physics
Hans Juergensen, Assistant Professor of German
William H. Kavanaugh, M.E., Professor of Experimental Engineering
William Kirchner, B.S., Professor of Drawing and Descriptive Geometry
John V. Martenis, M.E., Assistant Professor of Machine Design
John G. Moore, B.A., Professor of German
Burt L. Newkirk, Ph.D., Assistant Professor of Mathematics and Mechanics
Edward E. Nicholson, M.A., Assistant Professor of Chemistry
Levi B. Pease, B.Sc.Chem., M.S., Professor of Metallurgy

EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
CARL OTTO ROSENDAHL, Ph.D., Assistant Professor of Botany
GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering
CHARLES F. SIDENER, B.S., Professor of Chemistry
EDWARD SIGERFOOS, Ph.B., Capt. U.S.A., Professor of Military Science
FRANK W. SPRINGER, E.E., Professor of Electrical Engineering
JOSEPHINE E. TILDEN, M.S., Assistant Professor of Botany
CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., Professor of Mining Engineering
MATHILDA WILKIN, M.L., Assistant Professor of German
JOHN ZELENY, B.S., Ph.D., Professor of Physics
ANTHONY ZELENY, M.S., Ph.D., Assistant Professor of Physics

INSTRUCTORS

WALTER BADGER, B.A., B.S. Chem., Instructor in Chemistry
LILIAN COHEN, M.A., Instructor in Chemistry
LOUIS J. COOKE, M.D., Director of the Gymnasium
OSCAR W. FIRKINS, M.A., Instructor in Rhetoric
FRANCIS C. FRARY, M.S., Instructor in Chemistry
FRANK F. GROUT, B.S., Instructor in Mineralogy
JOHN A. HANDY, Ph.C., Instructor in Chemistry
ALOIS F. KOVARIK, B.A., Instructor in Physics
JAMES E. MANCHESTER, Sc.D., Instructor in Mathematics
PETER PETERSON, Instructor in Foundry Practice
RAYMOND V. PHELAN, Ph.D., Instructor in Economics
EDWARD QUIGLEY, Instructor in Forge Work
WILLIAM H. RICHARDS, Instructor in Shop Work
WILLIAM T. RYAN, E.E., Instructor in Electrical Engineering
S. CARL SHIPLEY, B.S., Instructor in Machine Work
C. F. SHOOP, B.S., Instructor in Mechanical Engineering
RICHARD WISCHKAEMPER, Instructor in German
JAMES ZIMMERMAN, B.A., Instructor in Chemistry
WILLIAM METHLEY, Lecture Assistant

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 25th, 1909 or for second semester's work after February 12th, 1910.

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

I. Students will be admitted to the freshman class on passing the regular entrance examinations.

II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special recommendation of the department of mathematics.

III. Graduates of any Minnesota State high school will be admitted to the course in Analytical Chemistry without entrance examinations provided:

(1) That the school maintain a full four-year course of high school work.

(2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.

Applicants for admission to the Applied course must conform to the mathematics requirements mentioned below, but as regards other subjects, will be admitted on the same terms as students in the Analytical course.

IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to that committee not later than Tuesday of examination week.

V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examinations in all subjects, as provided in sections I and II unless excused by vote of the faculty; and persons wishing to present reasons for such excuse should report to

the enrollment committee not later than Tuesday of examination week.

VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.

VII. 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.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing September 6th, in School of Chemistry Building, room 5, at 9 o'clock a. m.

ENTRANCE EXAMINATIONS IN MATHEMATICS
(APPLIED COURSE)

Every applicant for admission to the freshman class of the Applied Course, whether a graduate of a high school or not, must either

(a) present State High School Board certificates for each of the mathematical subjects required for admission, or

(b) take the entrance examinations in said subjects at the University.

No applicant will be admitted who fails to obtain credit in one of these two ways in all of the mathematical subjects required for admission.

Students proposing to enter this course should be thoroughly prepared in mathematics, since the prosecution of the work depends so largely upon the preliminary training in this subject.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS

Required of all:

ENGLISH, four credits, including:
(a) Classics (b) Principles of composition
(c) Practice in written expression

ALGEBRA, elementary, one credit
ALGEBRA, higher, one-half credit
GEOMETRY, plane, one credit
GEOMETRY, solid, one-half credit
CHEMISTRY, one credit

In addition to the above named required subjects, for which no substitutes will be accepted, the student shall present evidence of having completed work in any of the following subjects, entitling him to eight year-credits:

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

GERMAN
Grammar, one credit
Literature, one credit

FRENCH
Grammar, one credit
Literature, one credit

SPANISH
Grammar, one credit
Literature, one credit

NORWEGIAN-SWEDISH
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
PHYSICS, one credit
CHEMISTRY, 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
COMMERCIAL GEOGRAPHY, one half or one credit
BUSINESS SUBJECTS, accepted only as parts of a well defined course
- History of commerce, one half credit
- Economic History of England, one half credit
- Economic History of the United States, one half credit
- Elementary economics, one half credit
- Business law, one half credit
- Elementary bookkeeping, one half credit
- Advanced bookkeeping and business practice, one credit
- Stenography and typewriting, two credits
- Business spelling and correspondence, one half credit

MANUAL SUBJECTS, accepted only as parts of a well defined course
- Freehand drawing, two credits
- Mechanical drawing, two credits
- Shop work, two credits
- Modeling and wood carving, one credit
- Domestic art and science, two credits

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth:* Milton's *Paradise Lost*, Carlysle's essay on *Burns*. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whule.

A less critical knowledge of other standard or classis works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in

class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

Elementary Algebra (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

Higher Algebra, First Part (one-half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below, they are not prepared to pursue successfully at the University the second part of higher algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

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

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

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

Caesar (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

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

Virgil (one year). Six books of the Aeneid, or five of the Aeneid and one of the Metamorphosis of Ovid, or the Eclogues. The student should be familiar

with the life of Virgil and an account of his times and writings. A correct rythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

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

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

(3) From two to three hundred German idioms.

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

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

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

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

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

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate into easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

ANCIENT HISTORY (one year)

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterward to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

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

Senior American History (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

American Government (one-half year). This should be a study of our government, national, state and local as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the constitution of the United States, the constitution of Minnesota, and a local city or village charter.

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

Commercial Geography (one-half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemental by map and assigned readings.

BUSINESS SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A BUSINESS COURSE

Business Subjects: The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to the University on the same footing as the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units fur admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent should embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work; first, courses dealing with the history, description, theory and law of business, including the history of commence, commercial geography, elementary economics and business law; second, courses dealing with the technique of business The latter may be further subdivided into the mathematics of business, including business arithmetic, bookkeeping and business practice; and the language of business, including stenography, typewriting and business correspondence.

History of Commerce (one-half or one year). The history of commerce forms the natural introduction to the study of present economic conditions. It would be well to give special attention to the economic history of England and the United States. The work should be based on a text book, supplemented by carefully

directed map work and assigned readings. This should be preceded by a year course of medieval and modern European history.

Economic History of the United States (one-half year). A study of American history with special attention to the economic factor. It should be based on some text book such as Wright, Coman or Nogart and supplemented by collateral reading, especially in books such as Semple and Brigham on geographic influences.

This course will naturally follow the one on English history and may take the place of the usual political American history.

Economic History of England (one-half year). A study of English history with special reference to causes and effects of her economic development. It should be based on some of the smaller economic histories such as Cheyney, Price or Cunningham and McArthur

This course, where given, will naturally follow the courses in general European history, and may take the place of the usual political English-history.

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

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

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

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

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

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

SPELLING AND BUSINESS CORRESPONDENCE (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to most prominent industries of the locality.

MANUAL SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A MANUAL TRAINING COURSE

In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school, should offer all of the subjects indicated. Not to exceed twenty-five per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, business subjects, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

Owing to the facts that drawing and shop work do not require outside preparation, it is not fair that they should be credited by the schools on the same basis as the academic subjects. It is therefore suggested that half the credits be allowed: that is to say, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject.

FREEHAND DRAWING (two credits)
MECHANICAL DRAWING (two credits)
JOINERY (one-half credit)
WOOD TURNING AND CABINET MAKING (one-half credit)
PATTERN MAKING AND FORGE SHOP (one-half credit)
MACHINE SHOP, INCLUDING CHIPPING
FILING AND WORK ON THE IRON LATHE (one-half credit)
DRILL PRESS AND IRON PLANER
CLAY MODELLING (one-half credit)
WOOD CARVING (one-half credit)
DOMESTIC ART, INCLUDING CAREFULLY GRADED EXERCISES IN SEWING (one credit)
DOMESTIC SCIENCE, INCLUDING PRACTICAL COOKERY, AND HOUSEHOLD ECONOMY (one credit)

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 subjects.

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.

ADVANCED CREDIT

(COURSE IN APPLIED CHEMISTRY)

Advanced credit for work done in manual training in the high schools is allowed under the following conditions:

(a) The courses in drawing and shop work in the high schools must be approved by the corresponding departments in the College of Engineering.

(b) Students presenting two or three year credits in wood-work from such courses will receive an advanced credit in the first semester freshman shop.

(c) Students presenting three year credits from such courses in drawing will receive an advanced credit of the second semester freshman drawing.

(d) Students presenting four year credits from such courses in shop will receive an advanced credit of the first semester freshman and one-half semester sophomore shop.

(e) Students presenting four year credits from such courses in drawing will receive an advanced credit of the first and second semester freshman drawing, not including descriptive geometry.

GENERAL STATEMENT

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 8:30 o'clock; a general assembly of the faculty and students is held each day at 10:25 o'clock, at which there are

brief and simple religious exercises. Work extends through six days of the week.

FEES

All students in the college, who are residents of the state, 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. Save in the case of the first registration, the incidental fee is increased 25 cents for each day's delay in registration, beginning with the day set for recitations to begin. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage.

EQUIPMENT

BUILDINGS. The two buildings occupied by the School contain six large laboratories and about twenty smaller ones, well equipped for carrying on a wide range of work.

LIBRARY. The chemical library contains complete sets of many 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 collections of coals and petroleums are 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 become expert photo-engravers may specialize in this work during the senior year.

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.

Courses of Study

ANALYTICAL CHEMISTRY

FRESHMAN YEAR

FIRST SEMESTER

CHEMISTRY 3, five hours, Assistant Professor Nicholson, Mr. Frary, and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Bauer, Assistant Professor Bussey
MINERALOGY 1, six hours, Professor Hall, Mr. Grout
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

SECOND SEMESTER

CHEMISTRY 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Bauer, Assistant Professor Bussey
*METALLURGY 1, twelve hours, Professor Appleby, Professor Christianson, Professor Pease
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour, (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

*Women must take Mineralogy 2 instead of Metallurgy 1

SOPHOMORE YEAR

First Semester

††Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
Chemistry 4, eleven hours, Professor Sidener and Assistants
Economics 1, three hours, Professor Robinson, Mr. Phelan
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen, Burkhard and Mr. Wischkaemper
Chemistry 8, six hours, Assistant Professor Harding
Military Drill, three hours, Captain Edward Sigerfoos, U.S.A.

Second Semester

††Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
Chemistry 4, four hours, Professor Sidener and Assistants
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
Political Science 1, three hours, Professor Schaper, Mr. Allin
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
Military Drill, three hours, Captain Sigerfoos, U.S.A.

JUNIOR YEAR

First Semester

†Chemistry 9, five hours, Assistant Professor Nicholson
Chemistry 10, six hours, Professor Sidener
Geology 1, three hours, Professor Hall
*Metallurgy 3, three hours, Professor Christianson
Mineralogy 5, six hours, Mr. Grout
Physics 1, three hours, Professor John Zeleny
Physics 2, two hours, Mr. Kovarik

Second Semester

†Chemistry 7, two hours, Miss Cohen
Chemistry 6, two hours, Assistant Professor Derby
Chemistry 13, two hours, Mr. Frary
Chemistry 11, six hours, Professor Sidener and Assistants

CHEMISTRY 12, four hours, Professor Sidener and Assistants
*METALLURGY 4, three hours, Professor Christianson
PHYSICS 3, three hours, Professor John Zeleny
PHYSICS 4, two hours, Mr. Kovarik

SENIOR YEAR

FIRST SEMESTER

CHEMISTRY 16, four hours, Mr. Frary
CHEMISTRY 18, seven hours, Assistant Professor Derby
CHEMISTRY 19, five hours, Assistant Professor Harding
†CHEMISTRY 15, six hours, Assistant Professor Harding
CHEMISTRY 14, four hours, Professor Frankforter
*METALLURGY 5, four hours, Professor Pease
THESIS

SECOND SEMESTER

CHEMISTRY 20, two hours, Professor Frankforter
CHEMISTRY 21, five hours, Mr. Frary
CHEMISTRY 22, five hours, Mr. Frary
CHEMISTRY 23, four hours, Assistant Professor Harding
†CHEMISTRY 15, six hours, Assistant Professor Harding
*METALLURGY 6, four hours, Professor Pease
THESIS

*This course is not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee.

†Students wishing to specialize in the chemistry of iron and steel or in photo-engraving may elect special subjects along these lines in place of subjects marked thus above.

††Students may substitute Animal Biology 1 for Botany

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

The degree bachelor of arts will be conferred upon any student who completes the work prescribed in the first four years of the following course, provided that at least one long course shall be chosen from each of the following groups.

(a) English, French, German, Greek, Latin, Rhetoric.
(b) Animal Biology, Astronomy, Botany, Chemistry, Mineralogy, Physics.
(c) History, Philosophy, Political Science and Sociology

A long course means an amount of work equivalent to not less than six hours per week in one department for one year.

The degree of bachelor of science in chemistry will be conferred upon the completion of the fifth year of the course.

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

FIRST YEAR

First Semester

Chemistry 3, five hours, Assistant Professor Nicholson, Mr. Frary and Assistants
Drawing 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Mathematics 3a, five hours, Professor Bauer, Assistant Professor Bussey
Mineralogy 1, six hours, Professor Hall, Mr. Grout
Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
Military Drill, three hours, Captain Edward Sigerfoos, U.S.A.
Physical Culture, one hour, (for men), Dr. Cooke, or
Physical Culture, three hours, (for women), Miss Butner

Second Semester

*Metallurgy 1, twelve hours, Professor Appleby, Professor Christianson, Professor Pease
Chemistry 3, five hours, Assistant Professor Nicholson, Mr. Frary and Assistants
Drawing 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Mathematics 3a, five hours, Professor Bauer, Assistant Professor Bussey
Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
Military Drill, three hours, Captain Edward Sigerfoos, U.S.A.
Physical Culture, one hour, (for men), Dr. Cooke, or
Physical Culture, three hours, (for women), Miss Butner

SECOND YEAR

First Semester

†Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors

*Women must take Mineralogy 2, instead of Metallurgy 1.

CHEMISTRY 4, eleven hours, Professor Sidener and Assistants
ECONOMICS 1, three hours, Professor Robinson, Mr. Phelan
GERMAN 1 or 4, five or three hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
CHEMISTRY 8, six hours, Assistant Professor Harding
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.

SECOND SEMESTER

†Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
CHEMISTRY 4, four hours, Professor Sidener and Assistants
CHEMISTRY 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
POLITICAL SCIENCE 1, three hours, Professor Schaper, Mr. Allin
GERMAN 1 or 4, five or three hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.

THIRD YEAR

FIRST SEMESTER

*GERMAN 4, three hours, Professor Moore
PHYSICS 1, three hours, Professor John Zeleny
PHYSICS 2, two hours, Mr. Kovarik
ELECTIVES in College of Science, Literature and the Arts, eight or nine hours.

SECOND SEMESTER

CHEMISTRY 13, two hours, Mr. Frary
*GERMAN 4, three hours, Professor Moore
PHYSICS 3, three hours, Professor John Zeleny
PHYSICS 4, two hours, Mr. Kovarik
ELECTIVES IN COLLEGE OF SCIENCE, LITERATURE AND THE ARTS eight hours.

†Or Animal Biology 1.
*Those who have taken German 4, may take French, Spanish or German 7.

FOURTH YEAR

First Semester

Chemistry 9, five hours, Assistant Professor Nicholson
Chemistry 19, five hours, Assistant Professor Harding
Chemistry 10, six hours, Professor Sidener
Geology 1, three hours, Professor Hall
*Metallurgy 3, three hours, Professor Christianson
Mineralogy 5, three hours, Mr. Grout

Second Semester

Chemistry 7, two hours, Miss Cohen
Chemistry 6, two hours, Assistant Professor Derby
Economics (elective), three hours, Professor Gray
Chemistry 11, six hours, Professor Sidener and Assistants
Chemistry 12, four hours, Professor Sidener and Assistants
*Metallurgy 4, three hours, Professor Christianson

FIFTH YEAR

First Semester

Chemistry 16, four hours, Mr. Frary
Chemistry 18, seven hours, Assistant Professor Derby
Chemistry 15, six hours, Assistant Professor Harding
*Metallurgy 5, four hours, Professor Pease
Chemistry 14, four hours, Professor Frankforter
Thesis

SECOND SEMESTER

Chemistry 20, two hours, Professor Frankforter
Chemistry 21, five hours, Mr. Frary
Chemistry 22, five hours, Mr. Frary
Chemistry 15, six hours, Assistant Professor Harding
*Metallurgy 6, four hours, Professor Pease
Chemistry 23, four hours, Assistant Professor Harding
Thesis

*This course is not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee.

APPLIED CHEMISTRY
(Chemical Engineering.)

FRESHMAN YEAR

Chemistry 3, five hours, Assistant Professor Nicholson, Mr. F. C. Frary
Drawing 1 and 3, seven hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Mathematics 1 and 2, five hours, Professor Haynes, Assistant Professor Newkirk, Mr. H. D. Frary
Mechanical Engineering 1 and 2, six hours, Mr. Richards, Mr. Shipley, Mr. Quigley
Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 4, eleven hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rowley, Mr. Rose
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
Mathematics 3, four hours, Professor Haynes, Professor Brooke
Physics 5, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SECOND SEMESTER

Chemistry 4, four hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rowley, Mr. Rose
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
Mathematics 4, four hours, Professor Haynes, Professor Brooke
Mechanical Engineering 4, six hours, Mr. Shipley
Physics 6, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

FIRST SEMESTER

Chemistry 14, four hours, Professor Frankforter
Economics 1, three hours, Professor Robinson, Mr. Phelan

Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis
Mineralogy 1, six hours, Professor Hall and Mr. Grout
Physics 7, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SECOND SEMESTER

Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
Mathematics 6, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 12, six hours, Assistant Professor Martenis
Physics 8, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SENIOR YEAR

FIRST SEMESTER

Chemistry 19, five hours, Assistant Professor Harding
Electrical Engineering 5, four hours, Mr. Ryan
Experimental Engineering 1, four hours, Professor Kavanaugh, Mr. Shoop
Mathematics 7, four hours, Professor Eddy, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 13, ten hours, Professor Flather, Assistant Professor Martenis
Metallurgy 3, three hours, Professor Christianson

SECOND SEMESTER

Chemistry 11, six hours, Professor Sidener and Assistans
†Elective, two or three credits
Electrical Engineering 5, four hours, Mr. Ryan
†Experimental Engineering 2, four hours, Professor Kavanaugh, Mr. Shoop
Mechanical Engineering 14a, four hours, Professor Flather, Assistant Professor Martenis
Mechanical Engineering 20, three hours, Professor Flather
Metallurgy 4, three hours, Professor Christianson

†Students wishing to specialize in Electrochemistry, Gas Engineering or Sugar Technology, may elect special subjects in place of subjects marked thus.

POST SENIOR YEAR

FIRST SEMESTER

Chemistry 9, five hours, Assistant Professor Nicholson
Chemistry 16, four hours, Mr. Frary
Chemistry 18, seven hours, Assistant Professor Derby
†Elective, two or three credits
Mechanical Engineering 19, one hour, Mr. Shoop
Political Science 16, two hours, Professor Schaper, Mr. Allin
Thesis, six hours

SECOND SEMESTER

†Chemistry 15, six hours, Assistant Professor Harding
Chemistry 17, four hours, Mr. Frary
Chemistry 22, five hours, Mr. Frary
†Elective, two or three credits
Political Science, 6, two hours. Mr. Allin
Thesis, six hours

APPLIED CHEMISTRY

Order of Studies for Classes Graduating 1910–1911–1912

SOPHOMORE YEAR
(Class of '12 only)

FIRST SEMESTER

Chemistry 4, eleven hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Economics 1, three hours, Professor Robinson, Mr. Phelan
Mathematics 3a, five hours, Professor Brooke
Physics 5, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SECOND SEMESTER

Chemistry 4, four hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner

†Students wishing to specialize in Electrochemistry, Gas Engineering or Sugar Technology, may elect special subjects in place of subjects marked thus.

Political Science 1, three hours, Professor Schaper, Mr. Allin
Mathematics 4, five hours, Professor Brooke
Physics 6, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

(Classes '11 and '12)

FIRST SEMESTER

Chemistry 14, four hours, Professor Frankforter
Electrical Engineering 5, four hours, Mr. Ryan
Experimental Engineering 1, four hours, Professor Kavanaugh, Mr. Shoop
Metallurgy 3, three hours, Professor Christianson

Also Class of '11 will take

Chemistry 10, six hours, Professor Sidener
Mathematics 7, three hours, Professor Downey
Physics 7; five hours, Assistant Professor A. Zeleny

But Class of '12 will take instead

Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis
Physics 7, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SECOND SEMESTER

Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
Electrical Engineering 5, four hours, Mr. Ryan
Metallurgy 4, three hours, Professor Christianson

Also Class of '11 will take

Chemistry 11, six hours, Professor Sidener and Assistants

But Class of '12 will take instead

Mathematics 6, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk

SENIOR YEAR
(Classes of '10, '11, '12)

FIRST SEMESTER

Chemistry 16, four hours, Mr. Frary
Chemistry 19, five hours, Assistant Professor Harding
Thesis, six hours

Also Class of '10 will take

Chemistry 14, four hours, Professor Frankforter
Mathematics 7a′, five hours, Professor Eddy
Metallurgy 3, three hours, Professor Christianson

But Class of '11 will take, instead

Chemistry 9, five hours, Assistant Professor Nicholson
Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis

But Class of '12 will take, instead

Chemistry 10, six hours, Professor Sidener
Chemistry 9, five hours, Assistant Professor Nicholson
Mathematics 7, four hours, Professor Eddy, Assistant Professor Brooke, Assistant Professor Newkirk

SECOND SEMESTER

Chemistry 17, four hours, Mr. Frary
Thesis, six hours

Also Class of '10 will take

Chemistry 11, six hours, Professor Sidener, and Assistants
Mathematics 8′, five hours, Professor Eddy, Professor Brooke, Assistant Professor Newkirk
Metallurgy 4, three hours, Professor Christianson

But Class of '11 will take, instead

Chemistry 19, five hours, Assistant Professor Harding
Chemistry 22, five hours, Mr. Frary
Mathematics 6′, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Elective, two or three credits

But Class of '12 will take, instead

Chemistry 11, six hours, Professor Sidener and Assistants
Chemistry 22, five hours, Mr. Frary
Elective, two or three credits

ANIMAL BIOLOGY

CHARLES P. SIGERFOOS, Ph.D., Professor of Zoology
JOHN C. BROWN, M.A., Assistant Professor of Animal Biology
HAL DOWNEY, M.A., Assistant Professor of Animal Biology
OSCAR W. OESTLUND, M.A., Ph.D., Assistant Professor of Animal Biology
CHARLES E. JOHNSON, B.A., Assistant in Animal Biology

1. GENERAL ZOOLOGY — PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS OESTLUND, BROWN, DOWNEY, AND MR. JOHNSON
Six credits (six hours per week) — Both semesters
Open to all; the laboratory fee is three dollars per semester.
This course is a comparative study of the principles of structure, physiology and development in the 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 the cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's MANUAL OF ZOOLOGY.

2. MORFOLOGY OF INVERTEBRATES — PROFESSOR SIGERFOOS AND MR. JOHNSON
Six credits (six hours per week) — Both semesters
Open to those who have completed course one; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.
The object of this course is to familiarize the student with the methods and principles of zoology thru an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course one.

For other courses open as electives, see the bulletin of the College of Science, Literature and the Arts.

BOTANY

FREDERIC CLEMENTS, Ph.D., Professor of Botany
CARL OTTO ROSENDAHL Ph.D., Assistant Professor of Botany
JOSEPHINE E. TILDEN, M.S., Assistant Professor of Botany
FREDERICK K. BUTTERS, M.S., Instructor in Botany
NED L. HUFF, M.A., Instructor in Botany

1. GENERAL BOTANY — PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL, MR. HUFF, MR. BUTTERS
Six credits (three hours laboratory, three lectures per week) — First and second semesters
Open to all.

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

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

2. ADVANCED BOTANY — PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL

Six credits (three hours laboratory, three lectures per week) — First and second semesters

Open to students who have completed course one.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissues and of reproduction; and the general relations of the plant to the physical factors of its home. Lectures and quizzes, laboratory, greenhouse and field work.

13. INDUSTRIAL BOTANY — ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) — Both semesters.

Open to technical students who have completed 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 — PROFESSOR CLEMENTS

Three credits (six hours per week) — Both semesters

Open to those who have completed 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
CHARLES F. SIDENER, B.S., Professor of Chemistry
IRA H. DERBY, B.A., Assistant Professor of Chemistry
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
WALTER BADGER, B.A., Instructor in Chemistry
LILIAN COHEN, M.A., Instructor in Chemistry
FRANCIS C. FRARY, M.S., Instructor in Chemistry
JOHN A. HANDY, Ph.C., Instructor in Chemistry
JAMES ZIMMERMAN, B.A., Instructor in Chemistry

FOR UNDERGRADUATES

1. GENERAL CHEMISTRY — MISS COHEN, MR. BADGER AND ASSISTANTS

Six credits (two lectures, four hours laboratory per week) — First and second 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.

2. ADVANCED GENERAL CHEMISTRY — PROFESSOR FRANKFORTER, MISS COHEN, MR. BADGER AND ASSISTANTS

Six credits (two lectures, four hours laboratory per week) — First and second semesters

Prerequisite,—Entrance credit in chemistry

The course includes besides descriptive and metallurgical chemistry, an introduction to physical and organic chemistry.

3. QUALITATIVE ANALYSIS — ASSISTANT PROFESSOR NICHOLSON, MR. FRARY AND ASSISTANTS

Six credits (one lecture, 4 hours laboratory per week) — First and second semesters

Prerequisite,—Course 1 or 2.

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 — PROFESSOR SIDENER AND ASSISTANTS

Six credits (one lecture, ten hours laboratory per week) — First semester

Two credits (one lecture, two hours laboratory per week) — Second semester

Prerequisite,—Course 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 stoechiometric calculations with laboratory work in volumetric analysis, second semester.

5. ORGANIC CHEMISTRY — PROFESSOR FRANKFORTER, ASSISTANT PROFESSOR DERBY, MR. HANDY AND ASSISTANTS

Nine credits (three lectures, twelve hours laboratory per week) — Second semester

Prerequisite,—Course 3.

This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.

6. THEORETICAL CHEMISTRY — ASSISTANT PROFESSOR 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 (one lecture and one recitation per week) — Second semester

Prerequisite,—Course 5.

This course includes a full historical discussion of alchemy and chemistry.

8. INORGANIC PREPARATIONS — ASSISTANT PROFESSOR HARDING

Three credits (six hours laboratory) — First semester

Prerequisite,—Course 3

The preparation of inorganic salts, supplemented by Thorpe's Inorganic Preparations.

9. SUGAR CHEMISTRY — ASSISTANT PROFESSOR 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 — PROFESSOR SIDENER
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.

11. IRON AND STEEL ANALYSIS — PROFESSOR SIDENER AND ASSISTANTS
Three credits (six hours laboratory per week) — Second semester
Prerequisite,—Course 4
The course includes the rapid determination of iron by the various methods as well as the determination of the associated elements, sulphur, phosphorus, silicon, manganese and carbon.

12. MINERAL ANALYSIS — PROFESSOR SIDENER
Two credits (four hours laboratory per week) — Second semester
Prerequisite,—Course 4
The course includes the analysis of building stones and some of the most important minerals.

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 — PROFESSOR FRANKFORTER
Two credits (four hours laboratory per week) — First semester
Prerequisite,—Course 4
The course includes an exhaustive discussion of the chemical and sanitary properties of water.

15. FOOD ANALYSIS — ASSISTANT PROFESSOR HARDING
Three credits (six hours laboratory per week) — First and second semester
Prerequisite,—Course 5
The course includes the chemical analysis of the various food products and the detection of the common adulterants.

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, and the testing of commercial chemical products.

17. INDUSTRIAL CHEMISTRY — MR. FRARY
Continuation of course 16. — Second semester

18. PHYSICAL CHEMISTRY — ASSISTANT PROFESSOR DERBY
Four credits (one lecture, six hours laboratory per week) — First semester
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 — ASSISTANT PROFESSOR 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 — PROFESSOR FRANKFORTER
Two credits (two hours per week) — Second semester
Prerequisite,—Course 5
A thorough quiz in general organic and inorganic chemistry.

21. PHOTOCHEMISTRY — MR. FRARY
Three credits (one lecture, four hours laboratory per week) — Second semester
Prerequisite,—Course 5
The course includes a study of the compounds affected by the chemical rays of light, and a discussion of developers and fixers, photo-engraving, photo-reliefs and color-photography.

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 electrochemical processes.

23. MICROCHEMISTRY — ASSISTANT PROFESSOR 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 — ASSISTANT PROFESSOR DERBY
Three credits — Second semester
This course has to do with the phenomena associated with the various radioactive 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
Two credits (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.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, M.E., Professor of Drawing and Descriptive Geometry
NORMAN W. ROSE, M.E., Instructor in Drawing
FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing

1. DRAWING — MR. ROSE, MR. ROWLEY
Three credits (six hours per week) — First semester
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.

2. DRAWING — MR. ROSE, MR. ROWLEY
Two credits (four hours per week) — Second semester
Preparation courses 1 and 3 D.
Continuation of course 1.

3. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
One credit (one hour per week) — First semester
Open to students pursuing course 1 D.
Projection-central 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.

4. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Two credits (two hours per week) — Second semester
Preparation, course 1, 3 D.
Continuation of course 3.

5. DRAFTING — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (six hours per week) — First and second semester
Preparation courses 1, 2, 3, 4 D.
Graphics, machine drafting, structural drafting, and topography. Instruction in drafting room methods.

6. ELEMENTS OF ARCHITECTURE — PROFESSOR KIRCHNER
Three credits — First semester
Preparation course, 5 D.
The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.

7. TECHNICAL DRAWING — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (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

8. DESCRIPTIVE GEOMETRY AND APPLICATIONS

9. PROJECTIVE GEOMETRY

ECONOMICS AND POLITICAL SCIENCE

ECONOMICS

JOHN H. GRAY, Ph.D., Professor of Economics
EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
RAYMOND V. PHELAN, Ph.D., Instructor in Economics

1. ELEMENTS OF ECONOMICS — PROFESSOR ROBINSON, MR. PHELAN
Three credits (three recitations per week) — First and second semester

A thorough course in the elements of economic theory, with special reference to present-day economic and social problems.

McVey's Outline 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.

2a. ECONOMIC GEOGRAPHY — PROFESSOR ROBINSON
Three credits (three hours per week) — First semester
Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces: (1) a brief survey of the history of commerce prior to the modern period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and, (5) a more detailed consideration of the natural resources, chief industries, commercial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text-book, supplemented by lectures, reports on special topics, and quiz.

22. MATERIALS OF COMMERCE — MR. COULTER
Three credits (three hours per week) — First semester
Prerequisite,—Course 2a.

A study of the principal wares of commerce with reference to their sources, uses and industrial processes.

Text with collateral reading, lectures and visits of inspection.

5a. MONEY AND BANKING — MR. PHELAN
Three credits (three hours per week) — Repeated each semester
Prerequisite, course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

11. THE MODERN BUSINESS CORPORATION — PROFESSOR GRAY
Three credits (three recitations per week) — Second 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 various phases.

Text-books: Ripley, Trusts, Pools and Corporations; Meade's Trust Finance; Wyman's Case.

Lectures, class discussions and reports.

20a. THE PRINCIPLES OF ACCOUNTING
Three credits (three recitations per week) — First and second semester
Prerequisite,—Course 1.

The theory and practice of accounting, with a view to general business efficiency. Methods employed in manufacturing, mercantile, banking and railway accounting. Analysis of industrial, bank and railway reports.

Lectures and exercises.

21. ELEMENTS OF BUSINESS LAW

Three credits (three recitations per week) First or second semester

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 every-day business affairs.

Assigned readings, lectures and quizzes.

19. BUSINESS ORGANIZATION

Three credits (three recitations per week) Second semester

Prerequisite,—Course 1.

A study of the internal organization and management of large scale industry, covering typical manufacturing and mercantile concerns.

Based on Sparling, Introduction to Business Organization, with lectures, assigned readings and discussions.

For other courses in Economics open as electives see Bulletin of the College of Science, Literature and the Arts.

POLITICAL SCIENCE

WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
CEPHAS D. ALLIN, M.A., L.L.B., Instructor in Political Science

1. AMERICAN GOVERNMENT PROFESSOR SCHAPER AND MR. ALLIN

Three credits (three hours per week) Repeated 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.

16. AMERICAN GOVERNMENT PROFESSOR SCHAPER, MR. ALLIN

Two credits, (two hours per week) First semester

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. ENGINEERING LAW MR. ALLIN

Two credits (two hours per week) Second semester

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

WILLIAM T. RYAN, E.E., Instructor in Electrical Engineering

5. ELECTRIC POWER — MR. RYAN
Three credits (four hours per week) — First and second semesters
Prerequisite,—Courses 5, 6, Physics.
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. Textbook: Franklin and Esty, Elements of Electrical Engineering Practice.

EXPERIMENTAL ENGINEERING

WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
C. F. SHOOP, B.S., Instructor in Mechanical Engineering

1. MATERIALS TESTING LABORATORY — PROFESSOR KAVANAUGH, MR. 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 — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) — Second semester
Open to those pursuing course M. E. 20.
Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

GEOLOGY AND MINERALOGY

CHRISTOPHER W. HALL, M.A., Professor of Geology and Mineralogy
FRANK F. GROUT, B.S., Instructor in Geology and Mineralogy

GEOLOGY

1. GENERAL GEOLOGY — PROFESSOR HALL
Three credits (three hours laboratory, three lectures per week) First semester
Comprises: (1) Geodynamics, in which are set forth phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Lectures and conferences illustrated by photographs, maps, profiles, and lantern slides.

12. APPLIED GEOLOGY — MR. GROUT
Three credits (three hours laboratory, three lectures per week) — First semester
Prerequisite,—Course 1.
An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic va lue

including coal, mineral oil and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief summary of the nature and distribution of ore deposits. Text-book and reference reading.

MINERALOGY

1. ELEMENTS OF MINERALOGY — PROFESSOR HALL, MR. GROUT
Three credits (three hours laboratory, three lectures per week)
First semester

Open to all students.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and economic minerals; the basis of classifications.

(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.

2. DESCRIPTIVE MINERALOGY — PROFESSOR HALL, MR. GROUT
Three credits (three hours laboratory, three lectures per week)
Second semester

Open to all students.

(a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal axes. Thesis.

(b) Laboratory work; includes quantitative blowpipe analysis, crystal measurement, the sight determination of minerals, and reference reading.

4. OPTICAL MINERALOGY — MR. GROUT
Three credits (three hours laboratory, three lectures per week)
Second semester

Open to juniors or seniors.

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 stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

5. THE MORPHOLOGY OF MINERALS — MR. GROUT
Three credits (three hours laboratory, three lectures per week)
First semester

Open to juniors or seniors.

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.

GERMAN LANGUAGE AND LITERATURE

JOHN G. MOORE, B.A., Professor of German
OSCAR BURKHARD, M.A., Assistant Professor of German
HANS JUERGENSEN, Assistant Professor of German
RICHARD WISCHKAEMPER, Instructor in German

1. BEGINNING — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD AND MR. WISCHKAEMPER

Ten credits (five hours per week) First and second semesters

Open to all who do not present German for entrance.

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.

3. SCIENTIFIC INTERMEDIATE ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD

Six credits (three hours per week) First and second semesters

Open to students who have completed course 1.

First semester—Hodge's German Science Reader (or equivalent). Second semester—Brandt and Day's German Scientific Reading. This course aims to give the student a reading knowledge of German for use in scientific studies.

This course may be supplemented by course 5. To follow this course students may elect course 7 or course 6, but must not elect course 4.

4. CLASSIC PROSE AND POETRY PROFESSOR MOORE, ASSISTANT PROFESSOR BURKHARD AND MR. WISCHKAEMPER

Six credits (three hours per week) First and second semesters

Open to students who have presented German for entrance.

Not open to students who have credit for course 2 or course 3.

First semester—Meissner's Aus deutschen Landen; Goethe's Gedichte. Second semester—Schrakamp's Beruhmte Deutsche, Heine's Buch der Lieder. Review of German grammar throughout the year. This course may be supplemented by course 5

7. ADVANCED SCIENTIFIC READING ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD

Six credits (three hours per week) First and second semesters

Open to students who have taken course 3 or course 4.

Reading of monographs and periodicals.

MATHEMATICS

(College of Science, Literature and Arts, for students in analytical course and class of 1911 in applied course.)

JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
GEORGE N. BAUER, Ph.D., Professor of Mathematics
WILLIAM H. BUSSEY, Ph.D., Assistant Professor of Mathematics
HANS DALAKER, B.S., Instructor in Mathematics
JAMES E. MANCHESTER, Sc.D., Instructor in Mathematics
ROYAL R. SHUMWAY, B.A., Instructor in Mathematics

3a. HIGHER ALGEBRA FOR CHEMISTS PROFESSOR BAUER
Five credits (five hours per week) First and second semesters

7. INTEGRAL CALCULUS PROFESSOR DOWNEY
Three credits (three hours per week) First semester

Open to those who have completed courses 3 to 6 inclusive.

Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volume.

MATHEMATICS AND MECHANICS

(For students in the course in Applied Chemistry)

HENRY T. EDDY, C.E., Ph.D., LL.D., Professor of Mathematics and Mechanics

WILLIAM E. BROOKE, B.C.E., M.A., Professor of Mathematics and Mechanics

ARTHUR EDWIN HAYNES, M.S., M.Ph., Sc.D., Professor of Engineering Mathematics

BURT L. NEWKIRK, Ph.D., Assistant Professor of Mathematics and Mechanics

HOBART D. FRARY, M.S., Instructor in Mathematics

The ability to understand and apply mathematical processes readily is regarded as an 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 up 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 PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

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. PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

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 PROFESSOR HAYNES, PROFESSOR BROOKE

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 — PROFESSOR HAYNES, PROFESSOR BROOKE

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 — PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Three credits (three hours per week) — First semester

Required of all juniors. Integration; rectification, quadrature, cubature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.

6. ANALYTICAL MECHANICS — PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

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 — PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Prerequisite,—Course 6.

Four credits (four times per week) — First semester

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 — PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Prerequisite,—Course 6.

Four credits (four times per week) — Second semester

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 — PROFESSOR EDDY

Three credits (three times per week) — First semester

Prerequisite, course 8. 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.

FOR CLASS OF 1910 ONLY:

7a′. APPLIED MECHANICS — PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Five credits (five hours per week) — First semester

Prerequisites the same as for course 7′. The principles of statics and dynamics, and the mechanics of the materials of construction.

8′. HYDRAULICS AND PUMPING MACHINERY — PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Five credits (five hours per week) — Second semester

Required of all juniors. Prerequisite course 7′ or 7a′. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.M.E., Professsor of Mechanical Engineering
JOHN V. MARTENIS, M.E., Assistant Professor of Machine Design
PETER PETERSON, Instructor in Foundry Practice
EDWARD QUIGLEY, Instructor in Forge Work
WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Work
S. CARL SHIPLEY, B.S., Instructor in Machine Work
C. F. SHOOP, B.S., Instructor in Mechanical Engineering

SHOP WORK

1. CARPENTRY AND PATTERN MAKING — MR. RICHARDS
Four credits (six hours per week, twenty-four weeks) — First and second semester
Required of all freshmen.
Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.

2. BLACKSMITHING — MR. SHIPLEY, MR. QUIGLEY
Two credits (six hours per week, twelve weeks) — First or second semester
Required of all freshmen.
Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.

4. MACHINE AND BENCH WORK — MR. SHIPLEY
Three credits (six hours per week) — First or second semester
Chipping, filing, machine work. Lectures and practice.

MACHINE DESIGN

11. PRINCIPLES OF MECHANISM — ASSISTANT PROFESSOR MARTENIS
Three credits (three hours per week, lectures and recitations) — First semester
Preparation: course M. 4.
The transmission of motion without consideration of the strength of parts. Gear wheels, linkages, belts, screws, epicyclic trains, parallel motions, quick-return movements.

12. KINEMATICS AND ELEMENTARY MACHINE DESIGN — ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) — Second semester
Preparation: course M. 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 — PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Five credits (ten hours per week) — First semester
Open only to students pursuing course M. 7.
Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures, and drawing-room practice.

14a. MACHINE DESIGN PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Two credits (four hours per week) Second semester
Open only to those pursuing course 20.
Continuation of course 13. Rope driving; bevel gears, spiral gears.

STEAM ENGINEERING AND PRIME MOVERS

19. STEAM BOILERS ASSISTANT PROFESSOR MARTENIS
One credit (one hour per week) First semester
Senior year. Open only to students pursuing course M. 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 PROFESSOR FLATHER
Three credits, (three hours per week) Second semester
Senior year, preparation: course M. 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. HERRICK
Two credits (two hours per week) Second semester
Senior year. Open to students pursuing course C. 6.
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 of Metallurgy
PETER CHRISTIANSON, B.S., E.M., Professor of Assaying
LEVI B. PEASE, B.Sc.Chem., M.S., Professor of Metallurgy

1. ASSAYING PROFESSOR APPLEBY AND ASSISTANTS
Eight credits (four lectures and eight laboratory hours per week)
Second semester
Open to students completing Mineralogy 1.
Determination of values of ores, metallurgical products and bullion.

3. GENERAL METALLURGY AND METALLURGY OF IRON
PROFESSOR CHRISTIANSON
Three credits (three lectures per week) First semester
Open to students completing 1.
Combustion, fuels, refractory material and furnaces. Lectures and recitations on metallurgy of iron.

4. METALLURGY OF WROUGHT IRON AND STEEL — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — Second semester
Open to students completing 3.
Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. METALLURGY OF THE BASE METALS — PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 4.
Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved in refining methods.

6. METALLURGY OF THE PRECIOUS METALS — PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 5.
Gold, silver and platinum. Methods and principles of cyanidation, chlorination, amalgamation, and lixiviation as applied to treatment of above.

MILITARY SCIENCE AND TACTICS

EDWARD SIGERFOOS, Ph.B., Captain U. S. A., Commandant

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of four battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about $15, and is as neat and economical dress as the student can obtain.

Drill is required of all men in the freshmen and sophomore classes.

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, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

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.

Junior and senior—Theoretical instruction—Advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

PHYSICAL CULTURE

For Men

DR. COOKE AND MR. FOSTER

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 culture 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 freshmen 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

Miss Butner and Miss Matson

The course in physical culture is offered to the women of the University as a regular part of their work in the freshman year, and may be taken in any of the following years. A full year of work, in addition to the work required in this department, counts as a two-hour credit in the second semester of the senior year. The work consists of systematic exercises for the development of all parts of the body. Women pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse waist and bloomers, with the regulation gymnasium shoes. All suits must be of black material.

It is a common observation that students often enter the University with an imperfect physical development because of an excessive use of some muscles, while others are weakened through disuse. This occasions attitudes and movements that are unseemly in appearance and unhealthful in their general effect. The purpose of this course, therefore, is to develop a strong and symmetrical physique with a graceful and easy carriage. A physical examination is made of each student and physical measurements are taken in the fall and again in the spring.

In addition to the regular class work, sports and pastimes are open to all young women of the University. These include basket ball, battle ball, numerous other ball games, and also running games, all of which tend to cultivate the play instinct and give the nerve stimulus that comes from natural play.

PHYSICS

Frederick S. Jones, M.A., Professor of Physics
John Zeleny, B.A., Ph.D., Professor of Physics
Anthony Zeleny, M.S., Ph.D., Assistant Professor of Physics
Henry A. Erikson, E.E., Assistant Professor of Physics
Alois F. Kovarik, B.A., Instructor in Physics

1. General Physics — Professor John Zeleny
Three credits (three recitations per week) — First semester
Open to sophomores, juniors and seniors.

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 — Mr. Kovarik

One credit (two hours laboratory work per week) — First semester

Open to sophomores, juniors and seniors.

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 — Professor John Zeleny

Three credits (three recitations per week) — Second semester

Open to sophomores, juniors and seniors.

Light, electricity and magnetism. This is the second part of a general course in physics. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, and radiation and the electrical constitution of matter are discussed and illustrated.

4. General Laboratory Practice — Mr. Kovarik

One credit (two hours laboratory work per week) — Second semester

Open to sophomores, juniors and seniors.

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 — Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik.

Four credits, (three recitations, one lecture or two hours laboratory) — First semester

Open to those who have completed course M. 1, 2.

The course consists of a thorough drill in the elementary principles of mechanics. 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 — Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

Four credits (one lecture, two recitations and two hours laboratory) — Second semester

Open to those who have completed course 5.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. Electrokinetics — Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik.

Four credits (one lecture, two recitations and two hours laboratory) — First semester

Open to those who have completed course 6.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory) Second semester

Open to those who have completed course 5. Required of juniors.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

FOR CLASSES GRADUATING IN 1910-1911

The mathematics of the freshmen year is required as preparation for all courses in this department.

7′. ELECTRICAL MEASUREMENTS ASSISTANT PROFESSOR A. ZELENY

Three credits (four hours laboratory, one lecture per week) First semester

Open to juniors and seniors.

The course aims to give a thorough, practical knowledge of electrical instruments and of the fundamental electrical measurements. The system of electrical units is developed theoretically and experimentally.

RHETORIC

OSCAR W. FIRKINS, M.A., Instructor in Rhetoric
CHARLES W. NICHOLS, M.A., Instructor in Rhetoric
HELEN GRIFFITH, B.A., Assistant in Rhetoric
NELLIE A. WHITNEY, Assistant in Rhetoric

1. (a). RHETORIC MR. FIRKINS, MR. NICHOLS, MISS GRIFFITH, MISS WHITNEY

Six credits (three hours per week) First and second semesters

Open to all freshmen who have passed the entrance test in English.

This course includes the study of formal rhetoric, the writing of compositions, and the study and analysis of masterpieces of prose.

2. (a). RHETORIC MR. FIRKINS

Six credits (three hours per week) First and second semesters

Open to students who have completed course 1, and to sophomores of whom, at entrance, rhetoric was not required.

The course consists of a study of the short story in the first semester, and of the essay and forms of public address in the second semester. The writing of compositions and the keeping of a note book form a greater part of the work.

Students

SENIORS, 10.

Bacon, Charles B., St. Paul.
Barnaby, William E., Minneapolis.
Dresser, Eva, Minneapolis.
Kueffner, Otto K., St. Paul.
Morey, George W., Minneapolis.
Nye, Lillian, Minneapolis.
Roehrich, Victor H., St. Paul.
Selvig, Walter, Willmar.
Sterling, Faith, Minneapolis.
Walker, George Warren, Minneapolis.

JUNIORS, 17.

Bicknell, Henry R., Minneapolis.
Daniels, Farrington, Minneapolis.
De Witt, Joseph H., Red Wing.
Dietrichson, J. Gerhard, Menomonie, Wis.
Gutsche, Frank C., Glencoe.
Johnson, Einer, Minneapolis.
Johnston, William W., Minneapolis.
Kepner, Ben Hur, Appleton.
Mitchell, Donald F., Minneapolis.
Peterson, Andrew P., Lamberton.
Rockwood, Ralph H., Madelia.
Smith, Carolyn, Minneapolis.
Smith, Sheldon H., St. Paul.
Stone, G. Harwood, Omro, Wis.
Taylor, Carl H., Minneapolis.
Tronson, Carl, Benson.
Woollett, Guy, Minneapolis.

SOPHOMORES, 7.

Baker, Russell E., Minneapolis.
Callaway, Roy S., Minneapolis.
Dunn, Lewis E., Minneapolis.
Guffin, Roy, Minneapolis.
Halvorson, Henry A., Minneapolis.
Leavenworth, Frank M., Minneapolis.
Wanless, Lynn A., Anoka.

FRESHMEN, 27.

Birkholz, Emil, Minneapolis.
Blase, Henry G., St. Paul.
Brooks, Loren R., Minneapolis.
Bush, Clarence A., Minneapolis.
Cantwell, William F., Minneapolis.
Cohen, Jacob G., Minneapolis.
Curtis, Carolyn, White Bear.
Daniels, Elmer A., Pine Island.
Dean, Graham W., Eau Claire, Wis.
Frisch, Leonard H., Minneapolis.
Gardner, Charles A., Minneapolis.
Hall, Otis W., Elk River.
Hare, Heber R., St. Paul.
Harshaw, John R., Minneapolis.
Hoffmann, Henry J., St. Paul.
Karatz, Lucian, Minneapolis.
McLeod, John R., Minneapolis.
Martin, Edmund W., Winona.
Mitchell, Ralph W., Minneapolis.
Nesse, Charles O., Mabel.
Newman, Loretto, St. Paul.
Parkin, Guy G., Pine Island.
Schmidt, George H., New Ulm.
Spriestersbach, David O., St. Paul.
Williams, Perry S., St. Paul.
Wendel, J. H., Minneapolis.
Young, Arthur Donald, Mankato.

UNCLASSED, 19.

Arnold, Henry M., Minneapolis.
Bolton, John B., Minneapolis.
Buswell, Arthur M., Minneapolis.
Cornog, Jay, Minneapolis.
Ferriss, B[illegible] Paul.
Finke, [illegible] rles City, Iowa.
H[illegible] ville.
[illegible] is.
[illegible] olis.
[illegible] nt.
Olson, A. Orlando, North St. Paul.
Pettijohn, Earl, St. Paul.
Robinson, Rhea B., Minneapolis.
Schroeder, William F., Lester Prairie.
Shima, Rynjen, Minneapolis.
Starr, Elizabeth, Minneapolis.
Stone, Wylie W., Benson.
Stoppel, Ernest A., Rochester.
Thayer, Allan C., Minneapolis.

The University of Minnesota Bulletin

The College of Engineering and the Mechanic Arts

1909-1910

Volume XII · July 19, 1909 · No. 7

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

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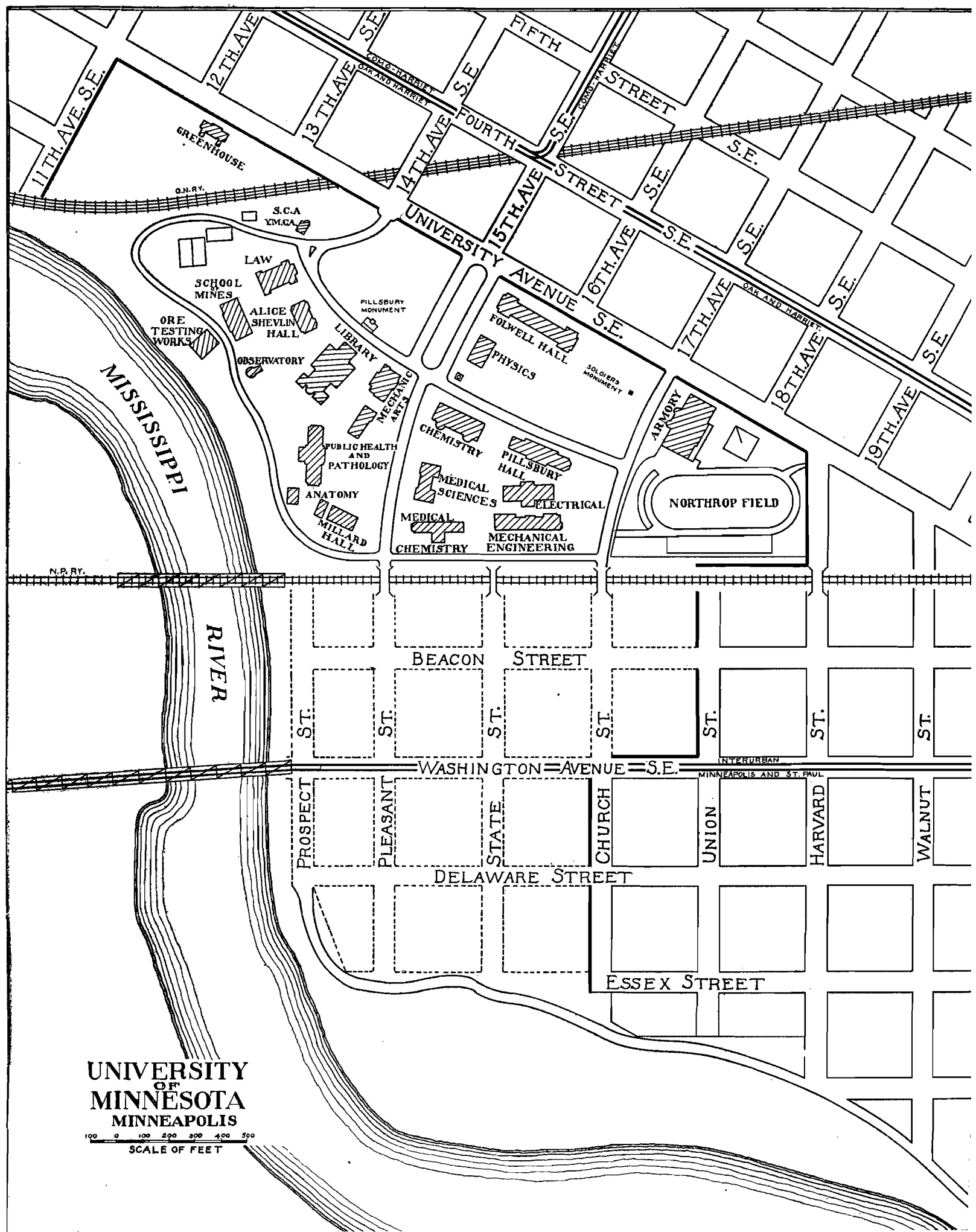
UNIVERSITY OF MINNESOTA
MINNEAPOLIS
SCALE OF FEET
100 0 100 200 300 400 500
MISSISSIPPI RIVER
11TH. AVE. S.E.
12TH. AVE. S.E.
13TH. AVE. S.E.
14TH. AVE. S.E.
15TH. AVE. S.E.
16TH. AVE. S.E.
17TH. AVE. S.E.
18TH. AVE. S.E.
19TH. AVE. S.E.
FIFTH STREET S.E.
FOURTH STREET S.E.
UNIVERSITY AVENUE S.E.
BEACON STREET
WASHINGTON AVENUE S.E.
DELAWARE STREET
ESSEX STREET
PROSPECT ST.
PLEASANT ST.
STATE ST.
CHURCH ST.
UNION ST.
HARVARD ST.
WALNUT ST.
COMO-HARRIET
OAK AND HARRIET
G.N. RY.
N.P. RY.
INTERURBAN
MINNEAPOLIS AND ST. PAUL
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S.C.A
Y.M.C.A.
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LIBRARY
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MECHANIC ARTS
PUBLIC HEALTH AND PATHOLOGY
ANATOMY
MILLARD HALL
FOLWELL HALL
PHYSICS
SOLDIERS MONUMENT
CHEMISTRY
PILLSBURY HALL
MEDICAL SCIENCES
ELECTRICAL
MEDICAL CHEMISTRY
MECHANICAL ENGINEERING
ARMORY
NORTHROP FIELD

CALENDAR FOR 1909-1910

1909

JULY

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

AUGUST

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

SEPTEMBER

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

OCTOBER

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

NOVEMBER

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

S.	M.	T.	W.	T.	F.	S.
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1910

JANUARY

S.	M.	T.	W.	T.	F.	S.
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FEBRUARY

S.	M.	T.	W.	T.	F.	S.
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27	28	..	..	..	..	..
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MARCH

S.	M.	T.	W.	T.	F.	S.
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APRIL

S.	M.	T.	W.	T.	F.	S.
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24	25	26	27	28	29	30
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MAY

S.	M.	T.	W.	T.	F.	S.
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JUNE

S.	M.	T.	W.	T.	F.	S.
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..	..	..	..	..	..	..

University Calendar

1909-1910

THE UNIVERSITY YEAR

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.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration
Sept.	14	Tuesday	First semester begins
Oct.	4	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	6	Monday	University Council meeting
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	22	Saturday	Semester examinations begin
Jan.	29	Saturday	Semester examinations close
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	19	Saturday	Easter recess of one week, begins 5:40 P. M.
April	4	Monday	University Council meeting
May	5	Thursday	Board of Regents meeting
May	30	Monday	Decoration Day, holiday
May	31	Tuesday	Semester examinations begin
June	4	Saturday	Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	University Council meeting
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

The School Year for 1910-11 will begin Tuesday, September 13

Program of Entrance Examinations

1909–10

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2 P. M.	Higher Algebra
Sept.	10	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The School Year for 1910-11 will begin Tuesday September 13

PROGRAM—CONDITION EXAMINATIONS

TUESDAY,	September 7,	9:00–12:00	Mathematics and Mechanics.
		2:00–5:00	Civil Engineering Subjects.
WEDNESDAY,	September 8,	9:00–12:00	Chemistry and Astronomy.
		2:00–5:00	Drawing and Descriptive Geometry.
THURSDAY,	September 9,	9:00–12:00	Mechanical and Engineering Subjects.
		2:00–5:00	Physics and Experimental Engineering Subjects.
FRIDAY,	September 10,	9:00–12:00	Electrical Engineering Subjects
		2:00–5:00	English.
THURSDAY,	January 13,	2:00–5:00	English, Physics and Experimental Engineering Subjects.
FRIDAY,	January 14,	4:00–5:35	Chemistry.
SATURDAY,	January 16,	2:00–5:00	Mechanical Engineering Subjects.
			Civil Engineering Subjects.
			Electrical Engineering Subjects
			Drawing Subjects and Astronomy.
MONDAY,	January 17,	2:00–5:00	Mathematics, Mechanics, Steam Turbines, and Stresses.

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 SCHOOL OF AGRICULTURE
- THE DAIRY SCHOOL
- THE SHORT COURSE FOR FARMERS
- THE SHORE COURSE FOR TEACHERS
- THE SCHOOL OF TRACTION ENGINEERING
- THE FORESTRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

- THE TRAINING SCHOOL FOR NURSES

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. JOHN A. JOHNSON, ST. PETER The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. THOMAS WILSON, ST. PAUL	1915
The HON. A. E. RICE, WILLMAR	1915
The HON. B. F. NELSON, MINNEAPOLIS	1910
The HON. PIERCE BUTLER, ST. PAUL	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS	1910
The HON. S. M. OWEN, MINNEAPOLIS	1913
The HON. W. J. MAYO, ROCHESTER	1913
The HON. HENRY B. HOVLAND, DULUTH	1914

C. D. DECKER, MINNEAPOLIS,
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL. D., President
ERNEST B. PIERCE, B. A., Registrar
JAMES T. GEROULD, B. A., Librarian
C. D. DECKER, Purchasing Agent
J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C. E., Dean of the College of Science, Literature and the Arts

*FREDERICK S. JONES, M.A., Dean of the College of Engineering and the Mechanic Arts

JOHN W. OLSEN, B.S., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, 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

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ADA L. COMSTOCK, M.A., Dean of Women

*Resigned.

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University
President Cyrus Northrop

The College of Science, Literature and the Arts
Dean John F. Downey — Professor H. F. Nachtrieb
Professor J. C. Hutchinson — Professor Carl Schlenker
Professor Norman Wilde

The College of Engineering and the Mechanic Arts
Dean Frederick S. Jones — Professor George D. Shepardson

The College and School of Agriculture
Dean John W. Olsen — Professor Harry Snyder
Professor Samuel B. Green

The College of Law
Dean William S. Pattee — Professor Henry J. Fletcher

The College of Medicine and Surgery
Dean F. F. Wesbrook — Professor Thomas G. Lee

The College of Dentistry
Dean Alfred Owre

The College of Pharmacy
Dean Frederick John Wulling

The School of Mines
Dean William R. Appleby

The School of Chemistry
Dean George B. Frankforter

The College of Education
Dean George F. James

The Graduate School
Dean Henry T. Eddy

The Dean of Women
Ada L. Comstock

The University Library
James T. Gerould

General Alumni Association
David P. Jones

The University Library
James T. Gerould

University Council Committees

The University Auditing Committee

PROFESSORS RASTALL, FLETCHER, SIGERFOOS, SPRINGER, WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, JUERGENSEN, RANKIN, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLDS, VAN BARNEVELD, WEST, J. T. GEROULD

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 municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being 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 College of Engineering and the Mechanic Arts

FACULTY.

CYRUS NORTHROP, LL.D., President.
FREDERICK S. JONES, M.A., Dean.

FREDERICK H. BASS, B.S. 429 Union St., S. E.
Assistant Professor Municipal and Sanitary Engineering (12 M.A.)

WILLIAM E. BROOKE, B.C.E., M.A. 405 Oak St., S. E.
Professor of Mathematics and Mechanics (21 M.A.)

CHARLES W. BENTON, M.A., Litt.D., 516 Ninth Ave., S.E.
Professor of French (201 F.H.)

FREDERICK E. CLEMENTS, PH.D. 800 Fourth St., S.E.
Professor of Botany (36 P.H.)

FRANK H. CONSTANT, C.E. 1801 University Ave.
Professor of Structural Engineering (22 M. A.)

ALVIN S. CUTLER, C.E. 529 Oak St., S. E.
Assistant Professor of Railway Engineering (12 M.A.)

HENRY T. EDDY, C.E., Ph.D., LL.D. 916 Sixth St., S. E.
Professor of Mathematics and Mechanics (11 M.E.)

HENRY A. ERIKSON, E.E., Ph. D. 220 Church St., S. E.
Assistant Professor in Physics (22 Ph.)

JOHN J. FLATHER, Ph.B., M.M.E. 315 Eleventh Ave., S. E.
Professor of Mechanical Engineering (12 M.E.)

GEORGE B. FRANKFORTER, M.A., Ph.D. 525 River Road, S. E.
Professor of Chemistry (5 Ch.)

EVERHART P. HARDING, M.S., Ph.D. 1316 Sixth St., S. E.
Assistant Professor of Chemistry (13 Ch.)

ARTHUR EDWIN HAYNES, M.S., M.Ph., S.D. 703 River Road S. E.
Professor of Engineering Mathematics (18 M.A.)

FREDERICK S. JONES, M.A. 712 Tenth Ave., S. E.
Professor of Physics (15 Ph.)

WILLIAM H. KAVANAUGH, M.E. 118 State St., S. E.
Professor of Experimental Engineering (9 M.A.)

WILLIAM H. KIRCHNER, B.S. 217 Beacon St., S. E.
Professor of Drawing and Descriptive Geometry (20 M.A.)

FRANCIS P. LEAVENWORTH, M.A. 317 Seventeenth Ave., S. E.
Professor of Astronomy (124 F.H.)

JOHN V. MARTENIS, M.E. 217 Harvard St., S. E.
Assistant Professor of Mechanical Engineering (21 M.E.)

JOHN G. MOORE, B.A. 2810 University Ave., S. E.
Professor of German (209 F.H.)

HENRY F. NACHTRIEB, B.S. 905 Sixth St., S. E.
Professor of Animal Biology (38 P.H.)

BURT L. NEWKIRK, Ph.D. 1016 29th Ave., N. E.
Assistant Professor of Mathematics and Mechanics (17 M.A.)

EDWARD E. NICHOLSON, M.A. 914 Seventh St., S. E.
Assistant Professor of Chemistry (9 Ch.)

EDWARD VAN DYKE ROBINSON, Ph.D. 1213 Seventh St., S. E.
Professor of Economics (18 Lib.)

WILLIAM T. RYAN, E.E. Oak St., S. E.
Assistant Professor of Electrical Engineering (14 E.E.)

MARIA L. SANFORD 1050 Thirteenth Av., S. E.
Professor of Rhetoric and Elecution (311 F.H.)

FREDERICK W. SARDESON, Ph.D. 414 Harvard St., S. E.
Assistant Professor of Geology (23 P.H.)

WILLIAM A. SCHAPER, M.A., Ph.D. 625 Fulton St., S. E.
Professor of Political Science (16 Lib.)

GEORGE D. SHEPARDSON, M.A., M.E. 717 River Road S. E.
Professor of Electrical Engineering (30 E.E.)

S. CARL SHIPLEY, B.S., M.E. 209 State St., S. E.
Superintendent of Shops (18 M.E.)

CHARLES F. SIDENER, B.S. 1320 Fifth St., S. E.
Professor of Chemistry (26 Ch.)

EDWARD SIGERFOOS, Captain 5th U. S. Infantry, Ph.B., LL.B.
Professor of Military Science 328 Tenth Ave. S. E.

FRANK W. SPRINGER, E.E. 1206 Fifth St., S. E.
Professor of Electrical Engineering (15 E.E.)

FRANK F. WESBROOK, M.A., M.D., C.M. 906 Fifth St., S. E.
Professor of Pathology and Bacteriology (I.P.H.)

ANTHONY ZELENY, M.S., Ph.D. 321 Church St., S. E.
Professor of Physics (32 Ph.)

JOHN ZELENY, B.A., Ph.D. 810 Sixth St., S. E.
Professor of Physics (20 Ph.)

INSTRUCTORS

EDWARD P. BURCH, E.E. 1729 James Ave., So.
Lecturer in Electric Railway Engineering (30 E.E.)

HOBART D. FRARY, M. E. 3108 Garfield Ave., S.
Instructor in Engineering Mathematics (17 M. A.)
CARL A. HERRICK, M.E. 3232 Irving Ave., S.
Instructor in Mechanical Engineering (22 M.E.)
ALOIS F. KOVARIK, B.A. 1523 Seventh St., S. E.
Instructor in Physics (17 Ph.)
O. B. NELSON, C. E. 1827 Fourteenth Ave., S.
Instructor in Civil Engineering and Drawing (M.A.)
WILLIAM B. NEWHALL, M.E. 2702 Humboldt Ave., S.
Instructor in Structural Engineering and Surveying (22 M.A.)
CHARLES W. NICHOLS, M.A. 313 8th Ave., S. E.
Instructor in English (311 F.H.)
PETER PETERSON, 710 Nineteenth Ave., S.
Instructor in Foundry Practice (M.E.)
EDWARD QUIGLEY, 2442 15th Ave., S.
Instructor in Forge Work (M.E.)
WILLIAM H. RICHARDS, 2555 Emerson Ave., S.
Instructor in Carpentry and Pattern Work (28 M.E.)
NORMAN W. ROSE, M.E. 412 Washington Ave., S. E.
Instructor in Drawing (M.A.)
FRANK B. ROWLEY, B.S., M.E. 311 Harvard S., S. E.
Instructor in Drawing and Descriptive Geometry (26 M.A.)
C. F. SHOOP, B. S. 1916 14th Ave., N.
Instructor in Experimental Engineering (9 M.A.)
HENRY UBRICH, 602 Buchanan St., N. E.
Instructor in Carpentry (M.E.)

ASSISTANTS

HARRY W. DIXON, Engineer 1800 4th St., S.E.
L. W. MCKEEHAN, B.S., Assistant in Physics 1306 7th St., S. E.
CHARLES P. CLARKE, B.S., Assistant in Drawing 209 State St., S. E.
FRED R. GRANT, Assistant in Electrical Engineering 614 E. 22nd St.

STANDING COMMITTEES

Enrollment—PROFESSORS CONSTANT, HAYNES, SPRINGER
Curriculum—PROFESSORS EDDY, FLATHER, CONSTANT, BASS, JONES, SHEPARDSON
Degrees—PROFESSORS JONES, FLATHER, SHEPARDSON
Catalogue—PROFESSOR KIRCHNER
Military Affairs and Athletics—PROFESSORS BROOKE, HAYNES, SIGERFOOS
Students' Work—PROFESSORS JONES, NEWKIRK, CUTLER, SHEPARDSON, KAVANAUGH, BROOKE
Graduate Studies and Degrees—PROFESSOR EDDY
Program—PROFESSORS KIRCHNER AND BASS

Non-Resident Lecturers

CIVIL ENGINEERING

Geo. L. Wilson, Engineer, T. C. R. T. Co., Minneapolis.
L. T. Blanchard, Statistician, U. S. Reclamation Service, Washington.
Frank Nay, General Auditor, C. R. I. & P. R. R., Chicago.
J. A. L. Waddell, Consulting Engineer, Kansas City.
J. T. Fanning, Consulting Engineer, Minneapolis.
D. C. Morgan, Engineer, State Railroad and Warehouse Commission, St. Paul.
L. R. Clausen, Superintendent, C. M. & St. P. Ry., Milwaukee.

ELECTRICAL ENGINEERING

Edward P. Burch, Consulting Engineer, Minneapolis. "Speed-torque Characteristics of Steam Locomotives." "Speed-torque Characteristics of Electric Locomotives." "Advantages and Problems of Electric Traction for Heavy Railway Service." "Cost of Steam and Water Power for Railway Service." "Power Plants and Transmission Lines." "Plans for complete Electrification of a Steam Railway."

Fred G. Dustin, City Electrical Inspector, Minneapolis. "Safety in Electrical Construction."

John H. Schumacher, Electrical Engineer, Minneapolis Electrical Equipment Co. "Modern Interior Electrical Construction and Estimation of Cost."

Admission

Fifteen year credits* of high school work, chosen from the following list, are required for admission to this college. The first six subjects, amounting to eight year-credits, are required of all students and substitutes cannot be accepted. Of the remaining seven year-credits at least two year-credits must be chosen from one of the language groups. Two half year-credits are equivalent to one year-credit. The ground to be covered for each credit is given in the syllabus on page 19.

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 year
Caesar, four books, one credit
Cicero, six orations, one credit
Virgil, six books, one credit

GREEK

Grammar, one credit
Anabasis, one credit

GERMAN

Grammar, one credit
Literature, one credit

*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 double recitation periods must be devoted to the work or only a half-credit will be granted.

FRENCH
- Grammar, one credit
- Literature, one credit

SPANISH
- 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
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
COMMERCIAL GEOGRAPHY, one half or one 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 17. Whenever admission is by examination, the candidate must pass examinations for the credits from group one, required for entrance to this college, and in addition sufficient credits from the list of electives in group two, 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 presented 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

*A mark of "passed" is accepted for work done prior to September, 1909.

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 years' 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 required for admission, or

(b) take the entrance examinations in said subjects at the University.

Beginning with Sept. 1911, 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.

No applicant will be admitted who fails to obtain credit in all of the mathematical subjects required for admission.

Students proposing to enter this college should be thoroughly prepared in mathematics, since the prosecution of the work depends so largely upon the preliminary training in this subject.

EXAMINATION IN ENGLISH

Every person admitted to this college will be examined in reading, writing, spelling and composition, and all who fail to obtain a grade of seventy-five per cent are required to pursue a course of instruction to be provided. No person shall ever receive a diploma or other certificate of merit or proficiency until he has passed such examination and obtained the specified credit.

TIME AND PLACE OF EXAMINATION

Entrance examinations are held only at the beginning of the college year (Tuesday, Sept. 7th). Applicants should present themselves to the registrar who will furnish them with application blanks and directions 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 the 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 3 for program of examinations.

ENTRANCE CONDITIONS

No applicant will be admitted who is deficient in more than one year credit. The deficiency becomes an entrance condition and must be made up before the student passes into the sophomore class. But no applicant will be admitted to the college with an entrance condition in mathematics.

Students are strongly advised to enter without entrance conditions if possible, since the work of the freshman year is arduous, requiring the full time and energy of the students to get the greatest benefit from it. It is very important that the candidate be fully prepared in the entrance requirement in chemistry.

MANUAL TRAINING

Credit for work done in manual training in the high schools is allowed under the following conditions:

(a) The course in drawing and shop work in the high schools must be approved by the corresponding departments in the college.

(b) The year credit must be that defined on page 15.

(c) Students presenting two or three year credits in wood-work from such courses will receive an advanced credit in one semester's work in carpentry.

(d) Students presenting three year credits from such courses in drawing will receive an advanced credit of the second semester freshman drawing.

(e) Students presenting four year credits from such courses in shop will receive an advanced credit in freshman carpentry and one semester sophomore machine shop.

(f) Students presenting four year credits from such courses in drawing will receive an advanced credit of the first and second semester freshman drawing, not including descriptive geometry.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

ENGLISH (four years)

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

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth;* Milton's *Paradise Lost;* Carlyle's essay on *Burns.* In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, besides the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

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

(c) Not less than one hour each week throughout the four years of the high

school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

HIGHER ALGEBRA, FIRST PART (one-half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below, they are not prepared to pursue successfully at the University the second part of higher algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

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

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

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

CAESAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse aid the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

CICERO (one year). Any six orations from the following list. AGAINST CATILINE, POET ARCHIAS, LIGARIUS, MARCELLUS, MANILIAN LAW (to count as two orations), the fourteenth PHILLIPIC. The student should also be familiar with the life of Cicero.

VIRGIL (one year). Six books of the AENEID, or five of the AENEID and one of the METAMORPHOSES of Ovid, or the ECLOGUES. The student should be familiar with the life of Virgil and an account of his times and writings. A correct rhythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year:

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

(2) A vocabulary of a thousand words of every day use; facility in combining these words into simple sentences. As a means to this, 100 to 150 pages of

easy narrative prose and poetry should be read, from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.

(3) From two to three hundred German idioms.

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

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

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

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

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

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate into easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

ANCIENT HISTORY (one year)

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterwards to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

ENGLISH HISTORY (one-half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

SENIOR AMERICAN HISTORY (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

AMERICAN GOVERNMENT (one-half year). This should be a study of our government, national, state and local as it is organized and actually operated today Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the constitution of the United States, the constitution of Minnesota, and a local city or villge charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments. their organizations and functions; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

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

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

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

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

BOTANY (one or one-half year). Schools which give one-half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxonomy should be the aim of the course.

ZOOLOGY (one or one-half year). The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relations to one another and their environments. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc. In short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love of nature, train the power of observation toward accuracy and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out along the lines indicated above.

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under the best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

Astronomy (one-half year). An elementary course in general astronomy as presented in any good modern text-book.

Geology (one-half year). These subdivisions should receive special attention: physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals modifying the earth; and a brief survey of historical geology.

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

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

Drawing (one or one half year). One full year of the work usually provided in the manual training course of high schools will satisfy the requirement for a half-year entrance credit Two years or more of high school work will be accepted for a one-year entrance credit.

Shop Work (one or one half year). One full year of the work usually provided in the manual training course of high schools will satisfy the requirement for a half-year entrance credit. Two years or more of high school work will be accepted for a one-year entrance credit.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this University, subject to the approval of the department concerned. In bringing certificates from other institutions, the records must be on the official blanks 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 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 who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult departments concerned in determining the credit to be given.

UNCLASSED STUDENTS

Unclassed 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 persons 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.

GRADUATION

Students completing the course of study to the satisfaction of the faculty of the college are entitled to receive the professional degree. 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 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 Friday, June 3rd, upon a good quality of paper, 8½ by 11 inches, leaving a margin 1½ inches wide at the left for binding and a margin about 1¼ inches wide on the other sides.

The original drawings, tracings, negatives, etc., are to be placed in the department files. Clear prints therefrom are to accompany the manuscript. The thesis shall be bound in black cloth and leather and shall be deposited in the department 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.

In determining the standing of any student in any subject, the result of his daily work in that subject shall be combined with the result of the final examination in the ratio of two to one.

SUBJECTS TO BE REPEATED. Any student in the College of Engineering whose average for the year is below passing grade will be required on reentering the University to pursue again all the subjects of the year in which he has not passed with credit.

Students who receive a condition or failure in 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 shall 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.

CONDITIONS AND FAILURES. 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 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 for the program for such examinations, but can take no subjects which require this work as a prerequisite, until the condition has been removed. It is provided that if a student attempts 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

THE UNIVERSITY YEAR

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

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 by this society. It is devoted to the publication of articles upon engineering subjects by professors and students.

THE MINNESOTA SECTION OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS meets monthly in St. Paul and Minneapolis alternately. Students of the College of Engineering are welcome at these meetings.

STUDENTS' LOAN FUND

A fund has been established by the students to give financial assistance to worthy members of the college. The nucleus of this fund has been contributed by the students.

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 graduate 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 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 essay 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.

Fees and Expenses

A registration fee of fifteen dollars per semester, payable in advance, is required of all the residents of the state who register in this college. Non-residents are charged double this fee, or thirty dollars per semester. No reduction is made for late entrance or for leaving before the end of the semester. In addition to this fee students who take laboratory work are charged a sum sufficient to cover the cost of material and breakage. The fees are as follows:

Freshman Year

First Semester	
Shop work	$4.50
Second Semester.	
Shop work	$4.50

Sophomore Year

First Semester.	
Shop work	$4.50
Physics	3.00
Chemistry	5.00
Animal Biology or Botany	3.00
Second Semester.	
Chemistry	5.00
Shop work	4.50
Physics	3.00
Animal Biology or Botany	3.00

FOR CLASSES GRADUATING IN 1910 AND 1911

Junior Year

First Semester.	
Shop work	$4.50
Materials Testing Laboratory	6.00
Electrical Laboratory	1.50
Physics	3.00
Second Semester.	
Electric Power	$3.00
Steam Laboratory	3.00
Hydraulic Laboratory	3.00
Experimental Laboratory	4.50
Electrical Laboratory	6.00

SENIOR YEAR

FIRST SEMESTER.	
Electrical Laboratory	$3.00
Electric Power	3.00
Experimental Laboratory	4.50
Fuel and Gas analysis	5.00
SECOND SEMESTER.	
Electrical Laboratory	$4.50
Electric Power	3.00
Gas Engine Laboratory	6.00

A fee of 25 cents per day is charged for each day of delayed registration.

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 twenty-five per cent should be added to make them safe.

Board can be had at prices ranging from three dollars per week to as high as the student can afford to pay. In private families board ranges from four to five dollars. Furnished rooms vary in price from eight to twenty dollars per month.

BUILDINGS AND EQUIPMENT

As an integral part of the University of Minnesota, the College of Engineering and the Mechanic Arts enjoys the advantages of the resources of the institution to the fullest extent. In addition to the University libraries and laboratories in which engineering students receive instruction, three buildings are devoted exclusively to the work of this college. The Mechanic Arts Building is occupied by the Departments of Mathematics and Drawing and also affords temporary quarters for the Departments of Civil, Municipal and Experimental Engineering. The Mechanical Engineering Department has an entire building devoted to its special work and the Electrical Engineering Department together with the University Light and Power Plant occupies a third building.

At the last session of the Legislature a bill was passed appropriating $700,000 for special University purposes. Of this, $450,000 was designated as purchase money for additional land and $250,000 for the erection of a main engineering building and laboratory. It is hoped that these buildings will be completed during the coming year.

For information concerning methods of work and the equipment of the various departments the following condensed statements are offered.

LIBRARIES AND READING ROOMS

The reference libraries of the several departments are well supplied with technical literature. The civil engineering library comprises over one thousand volumes; the library of the department of mathematics and mechanics numbers eighteen hundred volumes of choice mathematical and scientific works; the departments of mechanical engineering, electrical engineering and of physics have excellent collections of standard works which number over fourteen hundred volumes; the chemistry library contains over five hundred technical works; the drawing department has a collection of two hundred volumes relating to drawing, architecture and design. The above libraries comprising upwards of four thousand volumes and including many works which are the private property of professors, are accessible to the students.

In addition to the above are the libraries ot 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 draft.

In addition to this apparatus a three-stage Foster super-heater has recently been installed. This is arranged to superheat simultaneously 3500 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 4500 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 forthe 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. Munzel 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-amperehour 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.

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 the electrical engineering department of instruction is eighty feet long by sixty feet wide with two stories and full basement. In the basement are electro-chemical laboratory, shop, battery room, toilet and stock rooms. On the first floor are the dynamo laboratory, high tension laboratory, research laboratories, instrument rooms and offices. On the second floor are laboratories for photometry, photography, meter and lamp testing; and rooms for recitations, draughting, 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 current and constant potential 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, fans, 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 115-115 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 wide variety of arc and incandescent lamps and meters with all 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 recently contributed by the Minneapolis Street Railway Company is being installed on a suitable testing rack and will provide facilities for investigating and demonstrating traction problems.

THE DEPARTMENT LIBRARY contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being col-

lected and bound. These, with the files in the general and other department libraries 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 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 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 necessity of careful design and construction.

INSTRUCTION. The course 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 junior and 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 University electric light and power plant, which is in the same building, affords opportunity to observe commercial conditions at close range.

All engineering students are strongly advised to spend their vacations in factories, repair shops, electric light and railway stations, etc., in order to obtain commercial experience, and appreciate the relations of their technical training and actual work.

It is the aim to train 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 least amount of drudgery.

The regular instructing force is supplemented by competent non-resident lecturers.

LABORATORY WORK. In the more advanced 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 and size, 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.

DESIGN. The electrical engineers have drawing and design in common with the mechanical engineers in the first three years. A large number of numerical problems are given during the course. During the junior and senior years, electro-magnets and mechanism, dynamos and motors, lines, switches, switchboards and plants are designed. Complete working drawings and specifications for some special problems are elaborated. A file of about six hundred blueprints and drawings in the department library in addition to those in other departments is available to the students.

EXPERIMENTAL ENGINEERING

THE LABORATORY, in which the experimental research of the college is conducted, has been considerably enlarged and its equipment greatly increased. Three universal testing machines of 50,000 pounds, 100,000 pounds and 200,000 pounds capacity, and five transverse and torsion testing machines are provided for determining strength, ductility, resilience and other characteristics of the various materials used in engineering work under the various stresses. Several forms of absorption and transmission dynamometers are available for determining the power generated by engines or other motors, or absorbed by shafting or machinery; coal and gas calorimeters for determining the heating value of fuels, and apparatus for the analysis of flue gases.

The laboratory is also provided with machines for determining the lubricating qualities of oils and the relative values of metals used for journals and bearings. There is in the laboratory a 35 horse-power boiler and a high pressure boiler capable of carrying a working pressure of 300 pounds, with the necessary gages, calorimeters, tanks and pyrometers for making complete duty trials; several automatic steam engines equipped with condensers, indicators, brakes, scales and thermometers, which are employed to determine the efficiency in the use of steam under various conditions assumed or found in actual practice, and for valve setting and indicator work.

The operation and economy of other heat engines are illustrated by an Otto gas engine of five horse-power, a White gasoline engine of eight horse-power, Rider and Ericsson hot air engines, a pulsometer, and

several steam and power pumps. The laboratory also contains Pelton and Turk water motors, a water ram, injectors, weirs, nozzles, meters and other pieces of apparatus and instruments which an engineer is called upon to use in the course of his professional work.

In addition to the above, the equipment of the University power and lighting plant, described elsewhere, is available for the purposes of laboratory instruction.

A constantly increasing quantity of commercial testing is being done in connection with the regular work which brings the student into actual contact with the engineering world and affords him valuable experience and data for his future work.

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 covers a clear span of twelve feet, 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 saw, 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 3½x3½x5 feet, and one 3½x7x6 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 LIBRARY of the department 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 reading room is amply supplied with both the 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 offers 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 proven to be of great value in supplementing the class room work.

MUNICIPAL AND SANITARY ENGINEERING

The department is provided with the usual equipment for giving instruction in class-room, laboratory, and field, including a collection of drawings, photographs and models. The Engineering Department of the State Board of Health is in a position to furnish 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. Optional work in the application of hydraulic principles to problems of water power, river and harbor improvement is offered.

RAILWAY ENGINEERING

The aim of this department is to give the student a thorough working knowledge of railroad work, 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 department has 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 Experimental Engineering laboratory 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 is located on the first floor of the Mechanic Arts building. It contains all of the more important books and American and foreign periodicals relating to civil engineering. There are complete sets of the leading technical journals, proceedings and transactions of the engineering societies, and federal and state reports.

INSPECTION TOURS. The professional work in the several departments 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.

Courses of Study

Figures at the left indicate credit hours; figures at the right indicate the course number. Letters at the right are abbreviations for the various courses, as follows:

Animal Biology	A. B.
Astronomy	A.
Botany	B.
Chemistry	C.
Civil Engineering	C. E.
Drawing and Descriptive Geometry	D
Economics	Ec.
Electrical Engineering	E. E.
English	E.
Experimental Engineering	Ex. E.
French and Spanish	F.
Geology and Mineralogy	G. M.
German Language and Literature	G.
Mathematics and Mechanics	M.
Mechanical Engineering	M. E.
Military Science	M. S.
Pathology and Bacteriology	P. B.
Physics	P.
Political Science	P. S.

CIVIL, MECHANICAL AND ELECTRICAL ENGINEERING

FRESHMAN YEAR

5	Mathematics, M. 1, 2.	Professor Haynes, Assistant Professor Newkirk, Mr. Frary
4	English, E. 1.	Professor Sanford, Mr. Nichols
4	Drawing, D. 1, 3, 2, 4.	Professor Kirchner, Mr. Rowley, Mr. Rose Mr. Clark
3	Shop M. E. 1, 2.	Mr. Shipley, Mr. Richards, Mr. Quigley
3	Modern Language, G. 1 or 4 or F. 1, 3 or 11.	Professor Moore, Professor Benton
3	Drill, M. S. 1.	Captain Sigerfoos

CIVIL ENGINEERING

SOPHOMORE

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Assistant Professor Erikson, Mr. Kovarik, Mr. McKeehan

3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language, G. 3 or 7; F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Animal Biology or Botany, A. B. 1 or B. 1.	Professor Nachtrieb, Professor Clements
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 4.	Professor Sidener
3	Surveying, C. E. 1.	Assistant Professor Bass, Mr. Cutler
3	Economics, Ec. 1.	Professor Robinson, Assistant Professor Rastall, Mr. Coulter
3	Architecture, D. 6.	Professor Kirchner

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 8.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Surveying, C. E. 2.	Assistant Professor Bass, Mr. Cutler
3	Astronomy, A. 1.	Professor Leavenworth
3	Transportation, Ec. 8.	Professor Robinson
3	Highways, C. E. 7.	Assistant Professor Bass

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
4	Surveying, C. E. 3.	Assistant Professor Bass, Mr. Cutler, Mr. Nelson
2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Geology, G. M. 1.	Assistant Professor Sardeson

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 21.	Professor Constant, Mr. Newhall
4	Railway Engineering, C. E. 9.	Mr. Cutler
2	Engineering Law, P. S. 6.	Mr. Allin
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop
3	Electric Power, E. E. 4.	Mr. Ryan

POST SENIOR YEAR

First Semester

5	Structural Design, C. E. 22.	Professor Constant, Mr. Newhall
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass, Mr. Newhall
5	Masonry, C. E. 25.	Professor Constant
4	Railway Engineering, C. E. 10.	Mr.Cutler
3	Experimental Laboratory, Ex. E. 8	Professor Kavanaugh
	or	
3	Water Analysis, C. 6.	Professor Frankforter
	or	
3	Railway Structures, C. E. 11.	Mr. Cutler

Second Semester

5	Structural Design, C.E. 23.	Professor Constant
4	Municipal Engineering, C. E. 6.	Assistant Professor Bass
3	Reinforced Concrete, C. E. 26.	Professor Constant
5	Thesis.	
4	Swing Bridges, C. E. 24.	Professor Constant
	or	
4	Bacteriology, P. B. 1.	Professor Wesbrook
	or	
4	Railway Economics, C. E. 12.	Mr. Cutler

MECHANICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

3	Mathematics, M. 5, 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7, 8.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 4, 7.	Professor Sidener, Assistant Professor Harding
3	Economics, Ec. 1, 8.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Mechanism and Kinematics, M. E. 11, 12.	Assistant Professor Martenis
4	Shop, M. E. 5, 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2	American Government, P. S. 13.	Professor Schaper, Mr. Allin
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
5	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
1	Boilers, M. E. 19.	Assistant Professor Martenis
3	Electric Power, E. E. 5.	Mr. Ryan

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Experimental Laboratory, Ex. E. 4.	Professor Kavanaugh, Mr. Shoop
2	Engineering Law, P. S. 6.	Mr. Allin
3	Steam Engines, M. E. 20.	Professor Flather
3	Machine Design, M. E. 14.	Professor Flather, Assistant Professor Martenis
2	Gas Engines, M. E. 21.	Mr. Herrick
3	Electric Power, E. E. 5.	Mr. Ryan

POST SENIOR YEAR

First Semester

3	Thermodynamics, M. 9.	Professor Eddy
3	Experimental Laboratory, Ex. E. 6.	Professor Kavanaugh
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Machine Design, M. E. 15.	Professor Flather, Mr. Herrick
	or	
4	Railway Design, M. E. 25.	Professor Flather
3	Heating and Ventilation, M. E. 23.	Assistant Professor Martenis
	or	
2	Railway Technology, M. E. 24.	Assistant Professor Martenis
2	Thesis	
	or	
2	Electrical Engineering, E. E. 10.	Professor Springer
3	Elective	

Second Semester

5	4 Turbines, M. 10, 11.	Professor Eddy
	1 Specifications, M. E. 28.	Professor Flather
	or	
5	3 Railway Problems and Administration, Ec. 9.	Professor Robinson
	2 Railway Mech. Eng., M. E. 26.	Professor Flather
4	Machine Design, M. E. 16.	Professor Flather and Mr. Herrick
	or	
4	Railway Design, M. E. 25.	Professor Flather, Assistant Professor Martenis

2	Mechanical Engineering, M. E. 22.	Professor Flather
	or	
2	Locomotive Testing, M. E. 27.	Professor Flather
3	Gas Engine Laboratory, Ex. E. 9.	Professor Kavanaugh
3	Elective.	
3	Thesis.	

ELECTRICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 11.	Assistant Professor Martenis
3	Economics, Ec. 1.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Chemistry, C. 4.	Professor Sidener
4	Shop, M. E. 5.	Mr. Shipley

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
5	Physics, P. 8, 9.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 12.	Assistant Professor Martenis
3	Economics, Ec. 9A.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Applied Electricity, E. E. 1.	Professor Shepardson
3	Shop, M. E. 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk

2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
5	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Engineering Law, P. S. 6.	Mr. Allin
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
3	Steam Engines, M. E. 20.	Professor Flather
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

POST SENIOR YEAR

First Semester

2	Alternating Currents, E. E. 6.	Professor Shepardson
3	Thermodynamics, M. 9.	Professor Eddy
2	Electrical Engineering Practice, E. E. 7, 8 or 9,	Professor Shepardson, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 14.	Mr. Ryan
2	Experimental Laboratory, Ex. E. 7.	Professor Kavanaugh
2	Thesis.	Professor Shepardson
3	Elective.	

Second Semester

3	Alternating Currents, E. E. 6.	Professor Shepardson
3	Electrical Engineering Practice, E. E. 8 10, 11, 12.	Professor Shepardson, Professor Springer, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 15.	Mr. Ryan
2	Telephony, E. E. 12. or	Professor Shepardson
2	Water Turbines, M. 10.	Professor Eddy
3	Thesis.	Professor Shepardson
3	Elective.	

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.

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

CIVIL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7'.	Professor Eddy

3	Elective.	
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr.Shoop
4½	Curves and Earthworks, C. E. 9.	Mr. Cutler
3	Field Work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall

Second Semester

5	Mechanics, M. 8′.	Professor Eddy
3	Structural Details, C. E. 21.	Mr. Constant
3	Stresses, C. E. 20, 21.	Professor Constant, Mr. Newhall
5	Railway Engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Assistant Professor Sardeson
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 25.	Professor Constant
2	Experimental Laboratory, Ex. E. 8.	Professor Kavanaugh
	or	
2	Railway Economics, C. E. 11.	Mr. Cutler
3	Electric Power, E.E. 4.	Mr. Ryan
5	Structural Design, C. E. 22.	Professor Constant
2	Political Science, P. S. 16.	Professor Schaper
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass
	Thesis.	

Second Semester

5	Structural Design, C. E. 23.	Professor Constant
3	Reinforced Concrete, C.E. 26.	Professor Constant
2	Transportation, Ec. 8.	Professor Robinson
3	Sanitary Engineering, C. E. 6.	Assistant Professor Bass
2	Contracts and Specifications, M. E. 28.	Professor Flather
5	Thesis.	

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

MECHANICAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a′.	Professor Eddy, Assistant Professor Newkirk
3	Physics, P. 2.	Professor A. Zeleny
3	Stresses, C. E.20.	Professor Constant
4	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr.Herrick
2	Experimental Lab., Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2½	Shop, M. E. 5.	Mr. Shipley
	Electric Power, E. E. 5.	Mr.Ryan

Second Semester

5	Mechanics, M. 8′.	Professor Eddy, Assistant Professor Newkirk
3	Steam Engines, M. E. 20.	Professor Flather
4	Machine Design, M. E. 14.	Professor Flather, Assistant Professor Martenis
2	Gas Engines and Producers, M. E. 21.	Mr. Herrick
3	Experimental Lab. Ex. E. 2, 3.	Professor Kavanaugh, Mr. Shoop
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis
3	Electric Power, E. E. 5.	Mr. Ryan

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9′.	Professor Eddy
2	Water Turbines, M. 10*.	Professor Eddy
	or	
2	Railway Mech. Eng., M. E. 24.	Assistant Professor Martenis
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Steam Engine Design, M. E. 15.	Professor Flather
	or	
4	Gas Engine Design, M. E. 15.	Professor Flather, Mr. Herrick
3	Fuel and Gas Analysis, C. 7.	Assistant Professor Harding
2	Political Science, P. S. 16.	Professor Schaper
3	Experimental Lab., Ex.E. 6.	Professor Kavanaugh
	0 to 2 Elective. Subject to approval of department.	
	Thesis.	

Second Semester

2	Steam Turbines, M. 11′.	Professor Eddy
	or	
2	Railway Engineering, M. E. 25.	Professor Flather
	or	
2	Power Plant Design, M. E. 18.	Professor Flather
2	Contracts and Spec., M. E. 28.	Professor Flather
2	Transportation, Ec. 8.	Professor Robinson
4	Machine Design, M. E. 16.	Professor Flather, Mr. Herrick
	or	
4	Railway Design, M. E. 25	Professor Flather
4	Gas Engine Lab., Ex.E. 9.	Professor Kavanaugh
	2 to 4 Elective.	(As approved by Department)
3	Thesis.	

*This course in the Water Turbines is a prerequisite to the course in Steam Turbines in the second semester, and all students desiring to take the latter course should not omit Water Turbines in the first semester. Senior Mechanical Engineers wishing to take Railway Mechanical Engineering may be allowed to substitute Railway Technology for Water Turbines but may, nevertheless, elect Water Turbines in preparation for Steam Turbines as an elective in the second semester. Senior Electrical Engineers may elect Water Turbines as preparation for Steam Turbines in the second semester if they desire to take Steam Turbines as an elective.

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

ELECTRICAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a′.	Professor Brooke
3	Physics, P. 2.	Professor A. Zeleny
3	Stresses, C. E. 20.	Professor Constant
2	Electrical Machinery, E. E. 2.	Professor Springer
1	Electrical Laboratory, E. E. 17.	Professor Springer
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis
4	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
2	Experimental Laboratory, Ex. E. 1	Professor Kavanaugh, Mr. Shoop

Second Semester

5	Mechanics, M. 8′.	Professor Brooke
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Steam Engines, M. E. 20.	Professor Flather
2	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
2	Electrical Design, E. E. 14.	Mr. Ryan
4	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9′.	Professor Eddy
3	Alternating Currents, E. E. 6.	Professor Shepardson
2	Electrical Engineering Practice, E. E. 7 to 12.	Professor Shepardson, Mr. Ryan
2	Political Science, P. S. 16.	Professor Schaper
4	Electrical Laboratory, E. E. 18.	Professor Springer
3	Experimental Laboratory, Ex. E. 7.	Professor Kavanaugh
3	Elective.*	
	Thesis.	

Second Semester

3	Alternating Currents, E. E. 6.	Professor Shepardson
2	Electrical Engineering Practice, E. E. 7 to 12.	Professor Shepardson, Professor Springer Mr. Ryan, Mr. Burch
2	Contracts and Spec., M. E. 28.	Professor Flather
2	Transportation, Ec. 8.	Professor Robinson
3	Electrical Design, E. E. 15.	Mr. Ryan
3	Electrical Laboratory, E.E 18.	Professor Springer
3	Elective.*	
3	Thesis.	

MUNICIPAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7′.	Professor Eddy
3	Physics, P. 2 or Elective	
2½	Curves and Earthwork, C. E. 9.	Mr.Cutler
2½	Water Analysis, C. 6.	Professor Frankforter
2	Experimental Lab., Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Field Work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall

Second Semester

5	Mechanics, M. 8′.	Professor Eddy
3	Structural Details, C. E. 20, 21.	Professor Constant, Mr. Newhall
3	Stresses, C. E. 21.	Professor Constant, Mr. Newhall
5	Railway Engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Professor Sardeson
2	Hydraulic Lab., Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 25.	Professor Constant
2	Experimental Lab., Ex. E. 8.	Professor Kavanaugh
3	Electric Power, E. E. 4.	Mr. Ryan
5	Structural Design, C. E. 22.	Professor Constant
2	Political Science, P. S. 16.	Professor Schaper
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass

Second Semester

3	Biology, B. 13.	Assistant Professor Tilden
4	Bacteriology, P. B. 1.	Professor Wesbrook
5	Sanitary Engineering, C. E. 6.	Assistant Professor Bass
2	Transportation, Ec. 8.	Professor Robinson
2	Contracts and Spec., M. E. 28.	Professor Flather
3	Thesis.	

COURSE IN SCIENCE AND TECHNOLOGY

JUNIOR YEAR

First Semester

5	Mechanics, M. 7′.	Professor Eddy
3	Physics, P. 2.	Professor Zeleny
3	Drawing, D. 5.	Professor Kirchner
4	Technical Work.	
4	Elective Work.	

Second Semester

5	Mechanics, M. 8′.	Professor Eddy
3	Drawing, D. 5.	Professor Kirchner
5	Technical Work.	
7	Elective Work.	

SENIOR YEAR

12	Elective.
8	Technical Work.

Courses of Instruction

ANIMAL BIOLOGY

PROFESSOR NACHTRIEB, PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY

1. GENERAL ZOOLOGY — PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY

Six credits (four hours laboratory, two lectures per week) — First and second semesters

Open to sophomores, C. E. course.

This course is a comprehensive 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 follows a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom; and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes and laboratory work. Text-book required, Hertwig's Manual of Zoology.

ASTRONOMY

PROFESSOR LEAVENWORTH, MR. BURNS

1. GENERAL ASTRONOMY — PROFESSOR LEAVENWORTH

Three credits (three hours per week) — Second semester

Open to juniors, C. E. course. Preparation: course M 4.

A study of the general principles of astronomy illustrated by lantern slides and telescopic observations. Lectures, recitations, problems in practical astronomy.

BOTANY

PROFESSOR CLEMENTS, ASSISTANT PROFESSOR TILDEN, ASSISTANT PROFESSOR ROSENDAHL, MR. HUFF

1. GENERAL BOTANY — PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL

Six credits (four hours laboratory, two lectures per week)

Open to sophomores, C. E. course. — First and second semesters

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

11. INDUSTRIAL BOTANY — ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) — Both semesters

Open to technical students who have completed 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.

13. WATER SUPPLY BOTANY — ASSISTANT PROFESSOR TILDEN
Three credits (six hours per week) — Second semester
Open to those who have completed course 1.

A technical course for municipal, sanitary and reclamation engineers involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.

14. TIMBER AND TIMBER DISEASES — MR. HUFF
Three credits (six hours per week) — First semester
Open to those who have completed course 1.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work, and references.

CHEMISTRY

PROFESSOR FRANKFORTER, PROFESSOR SIDENER, ASSISTANT PROFESSOR NICHOLSON, ASSISTANT PROFESSOR HARDING

3. QUALITATIVE ANALYSIS — ASSISTANT PROFESSOR NICHOLSON
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. CHEMISTRY OF MATERIALS OF ENGINEERING — PROFESSOR SIDENER
Three credits (one lecture or recitation and four hours laboratory per week) — First semester
Required of all juniors. Preparation: course 3.

Includes technical analysis of materials of engineering, with special references to iron and steel. Lectures and laboratory work.

5. VOLUMETRIC ANALYSIS — PROFESSOR SIDENER
First semester
Three credits. Preparation: course 3.

6. WATER ANALYSIS — PROFESSOR FRANKFORTER
Three credits — First 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.

7. FUEL AND GAS ANALYSIS — ASSISTANT PROFESSOR HARDING
The work includes an exhaustive chemical examination of fuels and the common gases, with a determination of their light and heat efficiencies. Lectures and laboratory work

CIVIL ENGINEERING

HYDRAULIC, MUNICIPAL AND SANITARY ENGINEERING; SURVEYING

ASSISTANT PROFESSOR BASS, MR. CUTLER, MR. NELSON

1. SURVEYING — ASSISTANT PROFESSOR BASS, MR. CUTLER
Three credits, (six hours per week) — First semester
Required of juniors, 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 coördinate 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.

2. SURVEYING AND TOPOGRAPHY — MR. CUTLER, MR. NEWHALL
Three credits, (six hours per week) — Second semester
Required of seniors, C. E. course.
Hydrographic, mining and municipal surveying. Use of plane-table, barometers: aneroid and mercurial. Determination of meridian by solar observation. Computation of earthwork.

3. TOPOGRAPHY — ASSISTANT PROFESSOR BASS, MR. NEWHALL, MR. NELSON
Four credits, (eight hours) — Second 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.

4. SURVEYING — ASSISTANT PROFESSOR BASS
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.

5. HYDRAULIC ENGINEERING — ASSISTANT PROFESSOR BASS
Four credits, (eight hours per week) — First semester
Post senior C. E. course.
Lectures and recitations followed by field problems in municipal water supply. Water power, irrigation, land drainage and river and harbor improvements.

6. MUNICIPAL ENGINEERING — ASSISTANT PROFESSOR BASS
Four credits, (eight hours per week) — Second semester
Post senior C. E. course.
A continuation of course 5 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, garbage disposal, heating and ventilating of public buildings, are also reviewed.

7. HIGHWAYS AND PAVEMENTS — ASSISTANT PROFESSOR 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.

THESIS — ASSISTANT PROFESSOR BASS
Five credits, (ten hours per week) — Second semester
Post senior year.

Excellent opportunities are offered for experimental work through the connection of the department with the State Board of Health.

RAILWAY ENGINEERING

MR. CUTLER, MR. NELSON

9. RAILWAY ENGINEERING — MR. CUTLER, MR. NELSON
Four credits, (eight hours per week) — Second semester
Required of seniors, C. E. course.

Study of mathematics of curves and earthwork, with application to problems in location and construction. Especial emphasis is laid upon the execution in the field of practical problems. Text book required—Railroad Curves and Earthwork, Allen.

10. RAILWAY ENGINEERING — MR. CUTLER, MR. NELSON
Four credits (eight hours per week) — First semester
Post senior, C. E. course.

A continuation of course 9 with application to problems of the railroad spiral, switches, turnouts, overhaul, etc. A preliminary and final location survey is made of about four miles of relocation, including profiles, maps, mass diagrams, descriptions of right-of-way, and estimate of cost. Text-books,—Railroad Curves and Earthwork, Allen; Railroad Spiral, Searles.

11. RAILWAY STRUCTURES — MR. CUTLER
Three credits, (six hours per week) — First semester
Post 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. Text-book—Track and Track Work, Tratman.

12. RAILWAY ECONOMICS — MR. CUTLER
Four credits, (four hours per week) — Second 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, yards and stations, valuation of railroad property. Text-book, —Economics of Railroad Construction, Webb.

STRUCTURAL ENGINEERING

PROFESSOR CONSTANT, MR. NEWHALL

20. STRESSES IN FRAMED STRUCTURES — PROFESSOR CONSTANT, MR. NEWHALL
Three credits, (three 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. STRESSES IN FRAMED STRUCTURES — PROFESSOR CONSTANT, MR. NEWHALL
Three credits, (three hours per week) — Second semester
Continuation of course 20, with special reference to stresses in bridge trusses under moving loads. Recitations, problems and plates. Burr and Falk's "Influence Lines"

22. STRUCTURAL DESIGN — PROFESSOR CONSTANT
Five credits, (ten hours per week) — First semester
Post senior. Open to students who have completed courses 20 and 21
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. Merriman and Jacoby's Roofs and Bridges, Part III. Standard specifications.

23. STRUCTURAL DESIGN — PROFESSOR CONSTANT
Five credits, (ten hours per week) — Second semester
Post senior.
Continuation of course 22. With special reference to the design of steel railway bridges and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.

24. SWING BRIDGES — PROFESSOR 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. Merriman and Jacoby's Roofs and Bridges, Part IV. Reference works on machine design. Students intending to take this course are advised to elect machine design, M. E. 13, first semester, senior year.

25. MASONRY CONSTRUCTION — PROFESSOR 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, bricks, cement and concrete. Recitations and lectures, two hours per week; drawing room work, six hours per week. Fowler's Deep Foundations; Taylor and Thompson's Concrete and Reinforced Concrete; Howe's Retaining Walls for Earth; and current periodical engineering literature.

26. REINFORCED CONCRETE — PROFESSOR CONSTANT
Three credits, (six hours per week) — Second semester
Post senior. Preparation: course 25.
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

PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE, MR. CLARK, MR. NELSON

1. DRAWING — MR. ROSE, MR. CLARK, MR. NELSON
Three credits, (six hours per week) — First semester
Required of all freshmen, in conjunction with course 3.

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.

2. DRAWING — MR. ROSE, MR. CLARK, MR. NELSON
Two credits, (four hours per week) — Second semester
Required of all freshmen. Preparation: courses 1, 3.
Continuation of course 1.

3. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER
One credit, (one hour per week) — First semester
Required of all freshmen. Open to students pursuing course 1.

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.

4. DESCRIPTIVE GEOMETRY — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Two credits, (two hours per week) — Second semester
Required of all freshmen.
Preparation, courses 1, 3.
Continuation of course 3.

5. DRAFTING — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
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.

6. ELEMENTS OF ARCHITECTURE — PROFESSOR 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.

7. TECHNICAL DRAWING — PROFESSOR KIRCHNER, MR. NELSON
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

10. DESCRIPTIVE GEOMETRY AND APPLICATIONS
11. PROJECTIVE GEOMETRY
12. PERSPECTIVE

ECONOMICS

PROFESSOR GRAY, PROFESSOR ROBINSON, ASSISTANT PROFESSOR RASTALL, MR. PHELAN, MR. COULTER

1. ELEMENTS OF ECONOMICS — PROFESSOR ROBINSON, ASSISTANT PROFESSOR RASTALL, MR. PHELAN, MR. COULTER

Three credits, (three hours per week) First or second semester

A thorough course in the elements of economic theory, with special reference to present day economic and social problems.

McVey's Outline and a text-book, supplemented by lectures and problems, with a weekly quiz.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION PROFESSOR ROBINSON

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 ocean commerce.

Lectures, assigned readings and discussions.

9. RAILWAY PROBLEMS AND ADMINISTRATION PROFESSOR ROBINSON

Three credits, (three hours per week) Second semester

Required, post senior year, railway M. E. course, preparation: course 9 A.

An advanced course devoted to the study of railway problems and administration, including: (1), conditions effecting economy of operation; (2), passenger and goods traffic; (3), economic principles underlying the making of railway rates; (4), competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5), the great railway systems of the United States; (6), regulation by the states and the federal government; (7), government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings and special topics.

ELECTRICAL ENGINEERING

PROFESSOR SHEPARDSON, PROFESSOR SPRINGER, MR. RYAN, MR BURCH, MR. GRANT

1. APPLIED ELECTRICITY PROFESSOR SHEPARDSON

Three credits, (three hours per week) Second semester

Required of juniors E. E. course.

Preparation: course P. 5.

Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

2. ELECTRICAL MACHINERY PROFESSOR SPRINGER

Six credits, (six hours per week) First and second semesters

Preparation: courses E. E. 1, P. 5, 6, and M. 5, 6.

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 seniors, C.E. course and School of Mines. Preparation: courses P. 5, 6.

Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting. Twenty-four lectures and recitations and forty-eight

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 P. 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: Franklin and Estey, Elements of Electrical Engineering Practice.

6. ALTERNATING CURRENTS PROFESSOR SHEPARDSON
Four and 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: Lyndon, Storage Battery Engineering.

8. ELECTRICAL ENGINEERING PRACTICE. Lighting PROFESSOR SHEPARDSON
One credit, (one hour per week) First 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
Two credits, (two hours per week) First or 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, switch board 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) 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 Text-book: Gotshall, Electric Railway Economics.

11. ELECTRICAL ENGINEERING PRACTICE. Transmission PROFESSOR SHEPARDSON
One credit, (one hour per week) Second semester
Post senior year. Preparation: courses 1, 2, 5.

Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current; constant potential and alternating systems; design of line; study of particular plants.

12. ELECTRICAL ENGINEERING PRACTICE. Telegraph and telephone
PROFESSOR 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 telegraph and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.

13. ELECTROCHEMISTRY PROFESSOR 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 P. 1, 2, E. E. 1, 2, and M. E. 13.
Problems in designing circuits, electro-magnets and dynamos; complete working drawings and specifications to accompany each design.

15. ELECTRICAL DESIGN MR. RYAN
Three credits, (six hours per week) Second semester
Post senior year. Preparation: courses 6, 14.
Design of a transformer, switchboard and other problems.

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 PROFESSOR SPRINGER
Six credits, (six hours per week) First and second semesters
Senior year. Preparation: courses P. 5, 6, and E. E. 1, 2.
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 PROFESSOR 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 PROFESSOR SHEPARDSON, PROFESSOR 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 PROFESSOR SPRINGER
Application of measurements to electrical engineering practice.
Lectures and laboratory.

21. POWER PLANT OPERATION — ASSISTANT PROFESSOR RYAN, ASSISTANT PROFESSOR MARTENIS, MR. DIXON

One or two credits, (equivalent to two or four hours per week) — First or second semester

Post senioı year, elective.

Practice in operation and care of gas producer, gas engine, boilers, engines, turbines, dynamos, battery, switchboards and auxiliary apparatus of the University lighting plant.

22. JOURNAL READING — PROFESSOR 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 — PROFESSOR 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 — PROFESSOR 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 — PROFESSOR SHEPARDSON, PROFESSOR EDDY

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 — PROFESSOR 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 class room 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, fuel and gas analysis, electro-chemical analysis.

Civil engineering—Short course in surveying for seniors; masonry and construction, structural details; hydraulic engineering; railway economics.

Drawing—Advanced work.

Electrical engineering—Any courses not taken as required work (except 3, 4, and 5)

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, experimental laboratory, 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.

ENGLISH

PROFESSOR SANFORD, MR. NICHOLS

1. ENGLISH — PROFESSOR SANFORD, MR. NICHOLS
Eight credits, (four hours per week) — First and second semesters
Required of all freshmen.

This course is planned with special reference to the needs of engineering students. Two hours a week will be given to the study of English composition, and two hours to the study of a general survey of English literature. Essays will be required every week.

While in the study of literature one object will be the general broadening of the mind by an acquaintance with the masterpieces of English prose and poetry, especial attention will be given to the work of those writers who have handled scientific subjects with clearness and power.

EXPERIMENTAL ENGINEERING

PROFESSOR KAVANAUGH, MR. SHOOP

1. MATERIALS TESTING LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — First semester
Required of seniors. Open to those pursuing course M. 7.

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 — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — Second semester
Required of senior E. E. Open to those pursuing course M. E. 20.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

3. HYDRAULIC LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — Second semester
Required of senior C. E. Open to those pursuing course M. 8.

Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps and other hydraulic apparatus.

4. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Three credits — Second semester
Required of senior M. E. Open to those pursuing courses M. 8 and M. E. 20.
Special modification of courses 2 and 3.

5. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Two credits — Second semester
Required of senior miners.

Special modification of courses covering work in hydraulic measurements, gas and steam engine and boiler testing.

6. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Three credits — First semester
Required of post senior M. E. Preparation: course 4.
Calibration of dynamometers and measurement of power.
Testing lubricating value of oils. Tests of injectors and ejectors. Tests of of steam-turbines, steam-engines and boilers, and complete power and lighting plants.

7. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Two credits — First semester
Required of post senior E. E. Preparation: courses M. 8 and M. E. 20.
Hydraulic measurements. Tests of water motors, rams, steam and power pumps. Measurement of power. Tests of gas and steam engines, boilers and complete power and lighting plants.

8. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Three credits — First semester
Elective for post seniors. Preparation: course 1. Tests of the properties of cements, concrete and reinforced concrete. Strength of beams, columns, joints and framed structures.

9. GAS ENGINE LABORATORY — PROFESSOR KAVANAUGH
Three credits — Second semester
Required of post senior M. E. Preparation: courses M. E. 21 and Ex. E. 6. A continuation of course 6, also tests of gas, gasoline and hot-air engines; gas producers, air compressors, automobile and locomotive testing and special work.

10. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Two or four credits — Second semester
Elective for post seniors. Special research work and commercial tests.

FOR CLASSES GRADUATING IN 1910 AND 1911

1. MATERIALS TESTING LABORATORY; two credits. Required of juniors — First semester
2. STEAM LABORATORY; two credits. Required of juniors, E. E. and School of Mines. — Second semester
3. HYDRAULIC LABORATORY; two credits. Required of juniors, C. E.
4. EXPERIMENTAL LABORATORY; three credits. Required of juniors, M. E. — Second semester
5. EXPERIMENTAL LABORATORY; two credits. Required of seniors, School of Mines. — Second semester
6. EXPERIMENTAL LABORATORY; three credits. Required of seniors, M. E. — First semester
7. EXPERIMENTAL LABORATORY; three credits. Required of seniors, E. E. — First semester
8. EXPERIMENTAL LABORATORY; two credits; (elective) — First semester
9. GAS ENGINE LABORATORY; four credits, required of seniors, M.E. — Second semester
10. EXPERIMENTAL LABORATORY; two or four credits (elective) — Second semester

Description and prerequisites of the above courses as previously stated.

FRENCH AND SPANISH

PROFESSOR BENTON, PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN, MR. MELOM

1. BEGINNING — PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN

Six credits (three hours per week) — First and second semesters
Open to freshmen.
Fraiser and Squair's *French Grammar and Reader*, modern texts.

2. INTERMEDIATE FRENCH — PROFESSOR ANDRIST

Six credits (three hours per week) — First and second semesters
Prequisite, course 1.
Francois, *Advanced French Prose Composition:* modern texts will be read, including some of the works of Merimee, Daudet, Scribe, etc.

3. ADVANCED FRENCH GRAMMAR AND COMPOSITION — PROFESSOR ANDRIST

Six credits (three hours per week) — First and second semesters
Open to all who enter the University with two years of French.
Francois' *Introduction to French Composition:* readings from modern authors, including selections from Coppee, Feuillet, and Sandeau.

5. THE CLASSICAL PERIOD OF FRENCH LITERATURE — PROFESSOR BENTON

Six credits (three hours per week) — First and second semesters
Open to those who have completed course 2 or 3.
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, etc. Compositions.

11. BEGINNING SPANISH — MR. MELOM

Six credits (three hours per week) — First and second semesters
Monsanto and Languellier *Spanish Course-Josselyn.* Worman, First Spanish Book. Bransby's Spanish Reader.

12. INTERMEDIATE SPANISH — MR. MELOM

Six credits (three hours per week) — First and second semesters
Open to those who have completed F. 11.
First semester; Loiseaux, Spanish Composition. Brownell, *El Payaro Verde.*
Second semester: Gray's *Fortuna:* Alcaro's *El Captain Veneno.*

GEOLOGY AND MINERALOGY

PROFESSOR HALL, ASSISTANT PROFESSOR SARDESON

1. GEOLOGY — ASSISTANT PROFESSOR SARDESON

Three credits (three hours per week) — First semester
Required of seniors C. E. course.

A condensed course in physical and historic geology, for civil engineers. Geodynamics, structural geology, physiography, stratigraphic and historical geology are treated successively. Excursions to typical localities will supplement work done in the class room. Lectures and references.

GERMAN LANGUAGE AND LITERATURE

PROFESSOR MOORE, ASSISTANT PROFESSOR JUERGENSEN, ASSISTANT PROFESSOR BURKHARD, MR. WISCHKAEMPER

1. BEGINNING — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. 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 — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. WISCHKAEMPER

Six credits (three hours per week) — First and second semesters

Prerequisite, course 1.

This course is arranged to meet the peculiar needs of engineering students.

Text: Merckel's *Bilder aus der Ingenieurtechnik.*

4. PROSE AND POETRY — PROFESSOR MOORE, ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. WISCHKAEMPER

Six credits (three hours per week) — First and second semesters

Open to all who enter the University with two years of German.

Meissner's *Aus deutschen Landen:* Goethe's *Gedichte:* Heine's *Buch der Lieder.* Geography, history and legend. Review of German grammar throughout the year. This course may be supplemented.

7. ADVANCED SCIENTIFIC READING — ASSISTANT PROFESSORS 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 — ASSISTANT PROFESSOR JUERGENSEN

Two credits (two hours per week)

Open to graduate students, and by permission of the department, to undergraduates who have completed course 7 or 9.

1909–10, the literature of evolution (Haeckel, Reinke et al).

1910–11, Psychology and philosophy (Windt etc).

MATHEMATICS AND MECHANICS

PROFESSOR EDDY, PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

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 PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR FRARY

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 PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

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 PROFESSOR HAYNES, PROFESSOR BROOKE.

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 PROFESSOR HAYNES, PROFESSOR BROOKE

Four credits (four hours per week) Second ster

Required of all sophomores. Differentiation and integration, expa n in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing.

5. CALCULUS AND MECHANICS PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Three credits (three hours per week) First semester

Required of all juniors. Integration; rectification, quadrature, cubature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.

6. ANALYTICAL MECHANICS PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

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 PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Prerequisite, course 6.

Four credits (four times per week) First semester

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 PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Prerequisite, course 6.

Four credits (four times per week) Second semester

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 — PROFESSOR EDDY
Three credits (three times per week) — First semester
Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8. 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 — PROFESSOR EDDY
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 — PROFESSOR EDDY
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.

12. REFRIGERATING MACHINERY — PROFESSOR EDDY
Two credits (two hours per week) — Second semester
Open to those who have had course 10. The course will be given when a sufficient number apply.
Ammonia compression and absorption machines, compressed air, carbonic acid, etc.

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. Differential Equations.
14. Analytical Statics and Potential Functions
15. Spherical Harmonics
16. Theory of Electricity and Magnetism
17. Analytical Theory of the Conduction of Heat
18. Theory of Elasticity and Sound
19. Electro-magnetic Theory of Light
20. Hydrodynamics and Fluid Motion
21. Dynamics of Rigid Bodies
22. Elliptic Functions
23. Theory of Functions of the Complex Variable
24. Directional Calculus, Vector Analysis, Determinants
25. Kinetic Theory of Gases

FOR CLASSES GRADUATING 1910, 1911

7′. STRENGTH AND RESISTANCE OF MATERIALS — PROFESSOR EDDY
Five credits, (five hours per week) — First semester
Required of all juniors in the civil engineering course. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics of the two preceding years. Bars, beams, shafts,

columns, reinforced concrete, hollow cylinders and spheres, rollers and plates and the general theory of internal stress.

7a′. APPLIED MECHANICS PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Five credits, (five hours per week) First semester
Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as for course 7′. The principles of statics and dynamics, and the mechanics of the materials of construction.

8′. HYDRAULICS AND PUMPING MACHINERY PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Five credits, (five hours per week) Second semester
Required of all juniors. Prerequisite, course 7′ or 7a′. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

9′. THERMODYNAMICS OF STEAM AND GAS ENGINES PROFESSOR EDDY
Three credits, (three hours per week) First semester
Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8′. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including the use of steam tables, entropy diagrams, etc.

10′. WATER TURBINES PROFESSOR EDDY
Two credits, (two hours per week) First 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 PROFESSOR EDDY
Two credits, (two hours per week) Second semester
Open to all who have had courses 9′ and 10′. Various types of turbines, velocity, impulse and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.

12′. REFRIGERATING MACHINERY PROFESSOR EDDY
Two credits (two hours per week) Second semester
As previously stated.

MECHANICAL ENGINEERING

PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS, MR. SHIPLEY, MR. RICHARDS, MR. HERRICK, MR. PETERSON, MR. QUIGLEY, MR. UBRICH

SHOP WORK

1. CARPENTRY AND PATTERN MAKING MR. RICHARDS
Four credits (six hours per week, twenty-four weeks)
First and second semesters
Required of all freshmen.
Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.

2. BLACKSMITHING MR. SHIPLEY AND MR. QUIGLEY
Two credits (six hours per week, twelve weeks) First and second semesters

Required of all freshmen.
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.
Moulding, 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 5.
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 — PROFESSOR FLATHER
Two credits (two hours per week) — Second semester
Senior elective.
Shop and factory organization and management; cost systems.

10. POWER PLANT OPERATION — ASSISTANT PROFESSOR MARTENIS, ASSISTANT PROFESSOR RYAN, MR. DIXON
One credit (equivalent to two hours per week) — First or second semester
Elective, post senior year.
Operation and maintenance of gas producers, gas engines, boilers, engines, steam turbines and accessory apparatus. Smoke prevention.

MACHINE DESIGN

11. PRINCIPLES OF MECHANISM — ASSISTANT PROFESSOR MARTENIS
Three credits (three hours per week, lectures and recitations) — First semester
Required of juniors, M. E. and E. E. courses. Preparation: course M. 4.
The transmission of motion without consideration of the strength of parts. Gear wheels, linkages, belts, screws, epicyclic trains, parallel motions, quick-return movements.

12. KINEMATICS AND ELEMENTARY MACHINE DESIGN
ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) Second semester
Required of juniors, M. E. and E. E. courses. Preparation: course M 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 PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Five credits (ten hours per week) First semester
Required of seniors, M. E. and E. E. courses. Open only to students pursuing course M. 7.
Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures and drawing-room practice.

14. MACHINE DESIGN PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) Second semester
Required of seniors, M. E. course. Open only to those pursuing course 20.
Continuation of course 13. Rope driving; bevel gears, spiral gears. Also 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 PROFESSOR FLATHER
Four credits (eight hours per week) First semester
Required, post senior year, M. E. course. Preparation: courses 14, 19.
Steam engine. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details.
Gas engine. An alternative course in gas engine design is offered those who have completed course 21.

16. MACHINE DESIGN PROFESSOR FLATHER
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 PROFESSOR 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 special tools for manufacturing interchangeable parts; jigs and milling fixtures.

18. ENGINEERING DESIGN PROFESSOR 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; power distribution, dynamos and motors; pumps, shafting, piping and accessory plant.

STEAM ENGINEERING AND PRIME MOVERS

19 STEAM BOILERS ASSISTANT PROFESSOR MARTENIS
One credit (one hour per week) First semester

Senior year. Open only to students pursuing course M. 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 — PROFESSOR FLATHER
Three credits, (three hours per week) — Second semester
Senior year. Preparation: course M. 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. HERRICK
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 MECHANICAL ENGINEERING — PROFESSOR FLATHER
(a) Two credits (two hours per week) — First semester
Post senior. Preparation: course M. 8.

Measurement of power. 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. Preparation: course M. 8.

Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. MECHANICAL ENGINEERING — ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) — First semester
Elective. Post senior year.

Heating and ventilation. 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 preparethemselves for special work in railway engineering.

24. RAILWAY TECHNOLOGY — ASSISTANT PROFESSOR MARTENIS
Two credits (four hours per week) — First semester
Post senior. 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 PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Eight credits (eight hours per week) First and second semesters
Post senior. Preparation: course 24.
(a) Of link and valve motions. Continuation of course 12, with special applications of the Stephenson link.
(b) Of locomotives and car details.
(c) Of the locomotive boiler.
(d) Of assembled parts.

26. LOCOMOTIVE CONSTRUCTION PROFESSOR FLATHER
Two credits (two hours per week) Second semester
Post senior. Preparation: course 24.
Lectures, reading and recitations on design and construction of locomotives, supplementing course 24. 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 PROFESSOR FLATHER
Post senior. Second semester

28. SPECIFICATIONS PROFESSOR 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

Courses offered in:
Engineering design.
Experimental investigation.
Railway engineering.

PHYSICS

PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK, MR. MCKEEHAN

5. MECHANICS OF SOLIDS AND FLUIDS PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK MR. MCKEEHAN
Four credits, (three recitations, one lecture or two hours laboratory) First semester
Open to those who have completed courses M. 1, 2.

Required of sophomores.

The course consists of a thorough drill in the elementary principles of mechanics. 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 — PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) — Second semester

Open to those who have completed course 5.

Required of sophomores.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS — PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory) — First semester

Open to those who have completed course 6. Required of juniors.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT — PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory) — Second semester

Open to those who have completed course 5. Required of juniors.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

9. ADVANCED ELECTRICAL MEASUREMENTS — PROFESSOR A. ZELENY

One credit (two hours laboratory work) — Second semester

Open to those who have completed course 7.

Required of juniors, E. E. course.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities.

FOR CLASSES GRADUATING IN 1910–1911

The mathematics of the freshman year is required as preparation for all courses in this department.

2. ELECTRICAL MEASUREMENTS — PROFESSOR A. ZELENY

Three credits (one lecture or recitation and four hours laboratory per week)
First semester

3. ADVANCED LABORATORY WORK — PROFESSOR JOHN ZELENY
Open to those who have completed course 2.

MILITARY SCIENCE AND TACTICS

1. MILITARY DRILL — CAPTAIN SIGERFOOS
(Three hours per week) — First and second 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 instruction in military drill and administration the students are organized into a corps of cadets, consisting of four battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled 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, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

2. MILITARY SCIENCE — CAPTAIN SIGERFOOS
(Two hours per week) — Second semester
Optional with the seniors and juniors.

Junior, senior—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 soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company and battalion manoeuvers, 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 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.

PATHOLOGY AND BACTERIOLOGY

PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL

1. BACTERIOLOGY — PROFESSOR WESBROOK
(Four credits) — Second semester
Post senior C. E. course, optional.
Brief course in general bacteriology. Preparation of media and study of cultures, especially those of pathogenic bacteria found in water and sewage.

POLITICAL SCIENCE

PROFESSOR SCHAPER, MR. ALLIN

16. AMERICAN GOVERNMENT — PROFESSOR SCHAPER, MR. ALLIN
Two credits, (two hours per week) — First semester
Required of all seniors.
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. ENGINEERING LAW — MR. ALLIN
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.

Students

SENIOR CLASS—72

CIVIL ENGINEERS—17

James A. Childs, St. Paul.
Jay T. Ellison, Monticello.
William Elsberg, Minneapolis.
Frank F. Esser, Ellsworth.
F. Wm. Fiske, Jr., St. Paul.
Fred. A. Hubbard, Minneapolis.
Henry A. Hubbard, Spencer, Ia.
Simon Ingberg, Hendrum.
Robert Jaques, Duluth.
Lawrence W. King, Minneapolis.
John B. Mitchell, Minneapolis.
Edward S. Nelson, St. Paul.
Frederick T. Paul, Minneapolis.
Fred W. Sheffield, Crookston.
George M. Shepard, Kenyon.
Samuel A. Siverts, Morris.
Ell Torrance, Minneapolis.

MECHANICAL ENGINEERS—21

Charles B. Beery, Minneapolis.
John B. Bieri, Minneapolis.
Zingel Birnberg, St. Paul.
Frederick W. Buck, Duluth.
John E. Buhl, Graceville.
Donald M. Forfar, Minneapolis.
Charles E. Holmgren, Breckenridge.
Frank J. Kircher, Hudson, Wis.
George A. Kircher, Hudson, Wis.
William R. Knopp, St. Paul.
Edwin M. Lambert, Young America.
Walter J. Mark, St. Paul.
John E. Morris, Minneapolis.
Malcolm B. Moyer, Minneapolis.
Frank L. Nemec, Montgomery.
Willis Shippam, Minneapolis.
William H. Souba, Hopkins.
Howard M. Starrett, Minneapolis.
Carl D. Udell, Minneapolis.
Wilbur S. Williams, Minneapolis.
Harris H. Wright, Minneapolis.

ELECTRICAL ENGINEERS—29

Walter C. Beckjord, St. Paul.
Alvah E. Brockway, Luverne.
Rollo J. Cobban, Luverne.
Clovis M. Converse, St. Paul.
Ralph M. Davies, Minneapolis.
Joel A. Fitts, Minneapolis.
Frank R. Fleming, St. Paul.
Lester H. Gadsby, Minneapolis.
Fred R. Grant, Windom.
Clayton Harris, Minneapolis.
Albert J. Hitzker, Winona.
Mark L. Hopkins, Minneapolis.
James W. Hornibrook, Tower.
Barney G. Japs, Hopkins.
Herman R. Johnson, Minneapolis.
Eugene V. Kaplan, Owatonna.
George A. Kruschke, Duluth.
Charles G. Lindelef, Rush City.
Lauren F. McKenzie, Glencoe.
Frederic E. Murrish, Minneapolis.
Orson B. Poore, Bird Island.
James W. Powles, St. Paul.
Archer R. Robison, Windom.
Marcus H. Stillman, Austin.
Milo E. Todd, Minneapolis.
Leslie E. Turner, Minneapolis.
Theodora Vita, New Prague.
Benjamin B. Walling, Chicago, Ill.
Fred. M. Williams, Minneapolis.

MUNICIPAL ENGINEERS—1

Sidney R. Okes, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Charles P. Clarke, Elysian.
Lindsley B. Curtiss, Minneapolis.
Arthur B. Fruen, Minneapolis.
Arthur O. Olsen, Minneapolis.

JUNIOR CLASS—81

CIVIL ENGINEERS—27

Ben W. Adams, Pine Island.
Hans Asleson, Minneapolis.
Joseph G. Bazil, Montgomery.
Ole M. Bolme, Sperry, N. D.
Otto E. Brownell, Ely.
Berton L. Chapman, Westbrook,
Philip L. Dahlquist, Minneapolis.
J. Walter Dickinson, St. Paul.
Claes T. Ekman, St. Paul.
Herbert C. Frahm, Rochester.
Conrad G. Fredin, Duluth.
George M. Garen, Minneapolis.
James R. Graham, Fort Worth, Texas,
Rupert V. Hauser, St. Paul.
George W. Jevne, Minneapolis.
Edward W. Leach, Winona.
Edward D. Macmillan, Minneapolis.
Reuben Mark, St. Paul.
Lewis H. Merrill, Hutchinson.
Clyde Methven, Minneapolis.
C. Foerster Meyer, Minneapolis.
Charles L. Motl, Alpha.
George Nason, St. Paul.
Emerson D. Sawyer, Minneapolis.
Ernest Schluter, Hutchinson.
Adolph Sommerfeld, Sleepy Eye.
Wm. D. Timperley, Minneapolis.

MECHANICAL ENGINEERS—24

Armin G. Albrecht, St. Paul.
Wm. B. Atkinson, Barnesville.
John C. Bush, Minneapolis.
Fred R. Comb, Minneapolis.
Robert A. Cone, Minneapolis.
H. C. Cook, Red Wing.
George Du Toit, Minneapolis.
Laurence T. Fleming, Minneapolis.
Jenness B. Frear, Wayzata.
Ole H. Gjerberg, Red Lake Falls.
Frank Johnson, Minneapolis.
Martin S. Larson, Red Wing.
Wallace H. Martin, Willmar.
Bernard A. Meixner, Owatonna.
Paul A. Mencke, St. Paul.
Amos F. Moyer, Montevideo.
Browning Nichols, Jr., Montevideo.
Oscar A. Olstad, Minneapolis.
Harley G. Overholt, Minneapolis.
Maynard W. Pease, Minneapolis.
Willis R. Salisbury, Minneapolis.
Martin Tolstad, Starbuck.
Alvah H. Warren, St. Paul.
Donald M. Wesbrook, Minneapolis.

ELECTRICAL ENGINEERS—28

Oscar P. Anderson, Wells.
Oscar V. Anderson, Hudson, Wis.
Roy H. Ashworth, Mankato.
Vernon S. Beck, Minneapolis.
Wilfred E. Conley, Lake Mills, Ia.
Raymond E. Dahlstrom, St. Paul.
Leon R. Drinkall, Spring Valley.
Raymond V. Duffy, Kalispell, Mont.
Walter J. Finke, Charles City, Ia.
Earl L. Grinols, Minneapolis.
Herbert E. Hagstrom, Minneapolis.
Christian Hansen, St. Paul.
Byron P. Hustad, Minneapolis.
Clarence M. Jesperson, Minnetonka Beach.
Leonard T. Johnson, Minneapolis.
Eliot B. Josephson, Red Wing.
Arvid G. Landeen, Garfield.
Phinney O. Larson, Fosston.
Jesse I. Layman, Minneapolis.
C. Hugo Nelson, Minneapolis.

Henry N. Peterson, Monticello.
Ray R. Phelps, St. Paul.
Harry A. Reid, Mankato.
Ernest E. Skytte, St. Paul.
Joseph H. Soulek, Montgomery.
Henry G. Stahlmann, St. Paul.
Lester A. Stover, Minneapolis.
Theodore Swenson, St. Paul.

MUNICIPAL ENGINEERS—1

Alfred H. Moe, Duluth.

SCIENCE AND TECHNOLOGY—1

Hadwen C. Barney, Minneapolis.

SOPHOMORE CLASS—118

CIVIL ENGINEERS—43

John W. Adams, Jr., St. Paul.
Arthur F. Ainslie, Rochester.
Sidney S. Alwin, New Ulm.
Herbert P. Arnesen, Benson.
Wm. H. Bailey, Minneapolis.
Frank C. Boerner, Duluth.
Thomas J. Buhl, Graceville.
Will P. Cottingham, Minneapolis.
Edward D. Coughlan, Mankato.
George E. Crockard, Britton, S. D.
Ernest B. Croft, Minneapolis.
Thomas H. Curtis, Fairmont.
Axel E. Elfstrom, Willmar.
Edward H. Enger, Minneapolis.
Walker Ferguson, Mankato.
David Fieldman, Duluth.
August L. Flygare, Winthrop.
George Fossen, Fergus Falls.
Marion H. Goodnow, Minneapolis.
Kenneth D. Hauser, St. Paul.
Ralph M. Hodnett, St. Paul.
Michael J. Hoffman, St. Paul.
Wm. Raleigh Hosfield, Faribault.
Karl L. Hullsiek, St. Paul.
C. Arthur Johnson, Minneapolis.
Paul Johnson, Minneapolis.
Rolland A. Judson, Crookston.
Ingwald Kvitrud, Minneapolis.
Robert L. Latham, Minneapolis.
Howard C. Libby, New London, Wis.
George A. Maney, Minneapolis.
George C. Mattison, Minneapolis.
Benjamin A. Pratt, Minneapolis.
Alfred G. Ranney, St Paul.
Lewis M. Roth, St. Paul.
Irving H. Russell, Minneapolis.
Sigvel J. Siverson, Minneapolis.
Sidney H. Smith, Mitchell, S. D.
Randall D. Stanton, St. Paul.
William B. Tuttle, Minneapolis.
Arthur C. Walby, Minneapolis.
Benjamin O. Wold, Barron, Wis.
Henry E. Wolff, St. Paul.

MECHANICAL ENGINEERS—19

Marvin C. Barnum, Minneapolis.
Ira L. Bishop, Mapleton.
Harry S. Bronson, St. Paul.
William P. Brown, Yankton, S. D.
George Christensen, Robbinsdale.
Vernon G. Dickey, Princeton.
Julian P. Farnam, Minneapolis.
Ralph M. Hoffman, Minneapolis.
Walter F. Kasper, Owatonna.
James C. Markoe, St. Paul.
Robert C. Oram, Willmar.
Leo. E. Owens, Minneapolis.
Porteus B. Palmer, St. Paul
Lars Rand, Minneapolis.
Lester M. Sears, Minneapolis.
Jack Sneve, St. Paul.
Russell W. Watrous, St Paul.
Guy L. Willits, Minneapolis.
Joseph C. Woodman, Minneapolis.

ELECTRICAL ENGINEERS—51

Arthur R. Anderson, Willmar.
Fred A. Andert, Morris.

Earl M. Bill, Minneapolis.
Peter P. Bisek, New Prague.
George W. Blossom, Minneapolis.
Herbert Brunkow, Delano.
Robert P. Burrows, St. Paul.
Allan C. Butterworth, Minneapolis.
Ernest F. Carpenter, Redwood Falls.
J. Philip Carson, St. Paul.
Sprague L. Chapin, Luverne.
Arthur G. Chapman, Minneapolis
Charles S. Chapman, Lanesboro.
Charles S. Demarest, Minneapolis.
Albert P. Dorrance, St. Paul.
Lynn A. Emerson, Elmore.
Benjamin Ferriss, St. Paul.
Peter W. Forsberg, Minneapolis.
Harry Frederickson, Minneapolis.
Milton L. Guderian, Alexandria.
Walter B. Gunderson, Minneapolis.
Maurice J. Hansen, Hopkins.
Fred W. Hjelm, Minneapolis.
Herbert Huevelmann, New Ulm.
Howard R. Hush, Minneapolis.
George W. Hyser, Minneapolis.
Henry C. James, St. Paul.
John Ewald Johnson, Minneapolis.
William C. Koch, St. Paul.
John P. Lane, Minneapolis.
Roy P. Lutzi, Minneapolis.
Ira C. McCoy, Rochester.
C. Elliott Magraw, St. Paul.
Oscar Markuson, Fertile.
Albert H. Mittag, Elizabeth.
Walter H. Nebel, Braham.
Fred C. Nelson, Chatfield.
Raymond J. O'Brien, St. Paul.
Joseph H. Pengilly, Osseo.
James C. Peterson, Elbow Lake.
Leland E. Purves, Eyota.
Clyde Richley, Minneapolis.
Louis F. Riegel, Rochester.
William G. Shane, Gladstone.
Fred R. Stinchfield, Robbinsdale.
Will V. Stinson, Minneapolis.
Harry C. Streich, Winona.
William A. Walker, Moorhead.
Harvey E. Webb, Aberdeen, S. D.
Glenn Wilson, Dover.
Charles N. Young, St. Paul.

MUNICIPAL—1

Hal R. West, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Joseph S. Bookwalter, Minneapolis.
Paul E. Klopsteg, Henderson.
Frank J. Robischon, Sauk Centre.
Christian B. Thvedt, Minneapolis.

FRESHMAN CLASS—155

CIVIL ENGINEERS—55

Arthur E. Anderson, Goodhue.
Harvey B. Anderson, Hopkins.
Thomas W. Barnard, Minnetonka Beach.
John Bathhurst, Minneapolis.
Wm. J. Bingen, Webster, S. D.
George H. Boland, St. Paul.
Arthur D. Cambell, Anoka.
William N. Carey, St. Paul.
Harold S. Chapin, St. Paul.
Edward G. Chilton, Frazee.
Elmer F. Cummings, Luverne.
Robert E. Cummings, St. Paul.
Allan H. De Wolf, Bonners Ferry, Idaho.
Grover W. Dimond, Minneapolis.
Frank A. Donaldson, Rochester.
Harry Edwards, St. Paul.
Robert A. Fruen, Minneapolis.
Ernest A. Gatje, Rochester.
Marcus Giertsen, Minneapolis.
Edward L. Haberle, Minneapolis.
Frederick W. Hoorn, Red Wing.
Robert D. Jorgens, Minneapolis.
Raymond J. Kapphahn, Brandon.
Frank Kaufman, St. Paul
Charles R. Knox, Fairmont.
Joseph J. Kriz, Hopkins.
Ralph B. Lake, Fergus Falls.
Laurence La Plant, Anoka.
John A. McCree, St. Paul.
William E. McCrum, Thief River Falls.
Dale R. McEnary, Minneapolis.
William J. McHale, Preston.
Rufus H. Milne, Crookston.
Clarence C. Pagenhart, Rochester.
Carl H. Parks, Montevideo.
Raymond A. Pease, Minneapolis.

Roland O. Peteler, Minneapolis.
Barney J. Peterson, Alvarado.
Conrad N. Peterson, Lyle.
Hewitt Richmond, Minneapolis.
Chester F. Robbins, Verndale.
James W. Routh, Duluth.
Loiel S. Ryan, Little Falls.
John S. Siverts, Morris.
Niels C. Sorenson, Monticello.
Willard A. South, Blue Earth.
M. Edwin Souther, Colman, S. D.
Norman H. Stevens, St. Paul.
Hjalmer S. Swenson, Willmar.
Irving E. Torgerson, Lanesboro.
Grover Umbehocker, Princeton.
Reginald Van Cleve, Minneapolis.
Oscar H. Wangaard, Minneapolis.
Arthur Welin, Argyle.
George R. Zieske, Sleepy Eye.

MECHANICAL ENGINEERS—34

Fred G. Acomb, Minneapolis.
Laurence D. Barnard, Minneapolis.
Eugene C. Becker, Hope, N. D.
Ernest W. Bolmgren, Minneapolis.
James S. Brodie, St. Paul.
Eugene C. Crane, Minneapolis.
Earl M. Darrow, Minneapolis.
Arthur T. Dinsmore, Minneapolis.
Willis F. Geib, St. Paul.
Warren W. Getchell, Minneapolis.
Charles F. Haglin, Jr., Minneapolis.
Leon R. Hartman, Minneapolis.
Raymond M. Helm, Rockford, Ill.
Arthur C. Hubbell, St. Paul.
John Huseby, Cloquet.
Milton W. Johnson, Stillwater.
Clifford N. Lockwood, Chaska.
Guy A. McGlone, Minneapolis.
Charles L. Melvin, Moline, Ill.
Martin A. Mikesh, Spillville, Ia.
Clinton K. Moore, Minneapolis.
Harold S. Morton, Minneapolis.
George M. Orr, Afton.
Paul S. Parker, Minneapolis.
Sydney A. Patchin, Rochester.
Emil Ruemmele, Hudson, Wis.
Bert. R. Sausen, Taylors Falls.
Newell E. Storms, Minneapolis.
Harold H. Sullwold, St. Paul.
Ernest M. Tollefson, Minneapolis.
Frederick Layton Tooker, St. Paul.
Harold E. Wade, Fairmont.
Carlyle D. Weston, Minneapolis.
Wm. Albert Yunker, Hecla, S. D.

ELECTRICALS—66

John Arthur Anderson, Hinckley.
Samuel Lee Avis, Jamestown, N. D.
Neil M. Bain, Albany, Ore.
Carl Beede, Minneapolis.
Claude F. Benham, St. Paul.
Eugene F. Bennett, Preston.
Byron H. Bradley, Hudson, Wis.
William E. Brewster, Minneapolis.
Hal E. Brown, Duluth.
Edward S. Byron, Minneapolis.
Paul K. Cesander, Buffalo.
William G. Clark, Stillwater.
Claude C. Clefton, St. Paul.
Allen S. Crawford, Rochester.
Elmer E. Daniels, Pine Island.
Henry Arno Daum, Albert Lea.
Richard M. Falley, Wahpeton, N. D.
Albert E. Fischer, Canby.
William H. Fischer, Winona.
Milton M. Goldstein, Minneapolis.
Mark Grady, Foley.
Errald C. Green, Minneapolis.
Wm. Heckelsmiller, Ellendale, N. D.
Ernest A. Hedenstrom, St. Paul.
Raymond Herrmann, Henderson.
C. Kirk Hillman, St. Paul.
Vern T. Hohans, Winona.
Conrad G. Hovden, Perley.
John A. Hunt, Pine City.
Luther E. Hyde, St. Paul
Wm. H. Jensen, Browns Valley.
Harry Johnson, Red Wing.
Harold W. Keith St. Paul
Lester H. Knapp, Big Lake.
George La Vayea, Jr., Minneapolis.
Claude E. Leak, Brainerd.
Donald R. Loper, Minneapolis.
Robert C. Mathes, Morton.
Elmer W. Merrill, Minneapolis.
Karl J. Mertz, Hastings.
Albertis Montgomery, Minneapolis.
George A. Nelson, Anoka.
Thomas C. O'Connell, Ihlen.
Arthur J. Ogaard, International Falls.

Charles A. Pardee, Minneapolis.
Guy Parkin, Pine Island.
George D. Patterson, Minneapolis.
Andrew M. Peterson, St. Paul.
Milo A. Phillips, Minneapolis.
Theodore D. Ramm, Winona.
Ray L. Reed, Slayton.
John Rehder, Red Wing.
Cyrus K. Rickel, Minneapolis.
Elmer H. Smith, Minneapolis.
Ralph B. Spear, Faribault.
George E. Strong, St. Paul.
Lyman D. Taylor, Duluth.
Jesse L. Thompson, St. Paul.
Frederic C. Toomey, St. Paul.
Neal C. Towle, Minneapolis.
Frank E. Wales, Welcome.
Riese A. Walker, Ellendale, N. D.
Earle A. Weichelsbaum, Excelsior.
Ralph D. Whitney, Princeton.
Leslie W. Wilcox, Hancock.
Gust E. Wingreene, Minneapolis.

UNCLASSED—41

Herbert C. Alden, Minneapolis.
John W. Camp, Wayzata.
Ray L. Cooper, Britton, S. D.
George Cottingham, Minneapolis.
Llewelyn G. Couter, St. Paul.
George A. Darby, Minneapolis.
Clarence Dow, Minneapolis.
Alexander Elston, Minneapolis.
John J. Flaherty, St. Paul.
Walter Griffin, Robbinsdale.
Erick G. Holden, Sioux Falls, S. D.
Fred G. Holliday, Minneapolis.
Lynn R. Johnson, Benson.
Ray H. Kenyon, Minneapolis.
Aloysius Krauser, Minneapolis.
Glenn H. Lanphear, Minneapolis.
Dartt H. Lyford, St. Paul.
Howard W. McClure, Litchfield.
William H. McGinnis, Minneapolis.
Jason A. McLeod, Lake City.
J. Elmer MacMullan, Minneapolis.
Stanton G. Mooney, Minneapolis.
Clarence F. Nagle, Preston.
Martin J. Orbeck, Eau Claire, Wis.
Robert A. Pratt, Minneapolis.
Richard J. Purcell, Minneapolis.
Ivan G. Ringstrom, Wheaton.
Bertram H. Rogers, Minneapolis.
West A. Rolfe, Ada.
Neil T. Ronan, Lewiston.
Harold C. Sather, Lewiston.
Eldreth L. Sawyer, Minneapolis.
Carl W. Schroeder, Minneapolis.
J. Allyn Scott, West Duluth.
William D. Shipman, St. Paul.
Webster H. Stone, Alden.
Hugh W. Sudor, St. Paul.
M. Roy Swedberg, Luverne
Herbert L. Thompson, Hokah
Frederick E. Tydeman, Montevideo.
Harold Worcester, Minneapolis.

Total enrollment.....467