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DEPARTMENT OF MEDICINE

The College of Medicine and Surgery

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., Secretary and Librarian, Department of Medicine.

The College of Dentistry

ALFRED OWRE, D.M.D., M.D., 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 of the College of Medicine and Surgery provide instruction for all students in each of the three colleges, as required, in the following branches:

Gross and microscopic anatomy, physiology, chemistry, pathology, bacteriology and pharmacology.

For the betterment of medical education in Minnesota, it was deemed advisable, after consultation, that the College of Physicians and Surgeons of the Medical Department of Hamline University should merge with the College of Medicine and Surgery of the University of Minnesota. The final formalities were completed at a special meeting of the Board of Regents of the University of Minnesota, held March 4, 1908.

Arrangements were perfected whereby the members of the freshman, sophomore and junior classes of the Medical Department of Hamline University receive their instruction in the University of Minnesota, being required to comply with the rules and regulations which govern the College of Medicine and Surgery of the University of Minnesota. At the end of each year, certificates will be issued by the State University authorities to President Geo. H. Bridgman, D.D., Vice-President J. T. Moore M.D., and Dean C. N. McCollom, M. D., as representing the trustees of the College of Physicians and Surgeons, Medical Department, Hamline University. This arrangement is continued for four years only, for the purpose of enabling the students at that time enrolled in Hamline Medical Department, who satisfactorily complete the requirements for the degree in medicine, to receive the usual degree from Hamline University.

The College of Medicine and Surgery

FACULTY

CYRUS NORTROP, LL.D., President

JOHN W. BELL, M.D., Emeritus Professor of Clinical Medicine and Physical Diagnosis.

CHARLES A. WHEATON, M.D., Emeritus Professor of Surgery.

EXECUTIVE FACULTY

FRANK F. WESBROOK, M.A., M.D., C.M., Dean and Professor and Director of the Department of Pathology and Bacteriology

RICHARD OLDING BEARD, M.D., Professor of Physiology and Director of the Department of Physiology and Pharmacology

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor and Director of the Department of Chemistry.

CHARLES LYMAN GREENE, M.D., Professor and Chief of the Department of Medicine

THOMAS G. LEE, B.S., M.D., Professor and Director of the Department of Anatomy, Secretary of the Faculty, and Librarian, Department of Medicine

JAMES E. MOORE, M.D., Professor and Chief of the Department of Surgery

C. EUGENE RIGGS, A.M., M.D., Professor and Chief of the Department of Nervous and Mental Diseases

PARKS RITCHIE M.D., Professor and Chief of the Department of Obstetrics

ALEXANDER J. STONE, M.D., LL.D., Professor and Chief of the Department of Gynecology

FRANK C. TODD., M.D. Professor and Chief of the Department of Diseases of the Eye, Ear, Nose and Throat.

GENERAL FACULTY

AMOS W. ABBOTT, M.D., Clinical Professor of Diseases of Women

EVERTON J. ABBOTT, A.B., M.D., Clinical Professor of Medicine

HENRY MARTYN BRACKEN, M.D., L.R.C.S., (Edin.), Professor of Preventive Medicine

EDGAR D. BROWN, Phm.D., M.D., Professor of Materia Medica and Pharmacology

A. B. CATES, A.M., M.D., Professor of Obstetrics

JAMES T. CHRISTISON, M.D., Professor of Diseases of Children

A. R. COLVIN, M.D., Clinical Professor of Surgery

J. FRANK CORBETT, M.D., Assistant Professor of Surgical Pathology

WARREN A. DENNIS, B.S., M.D., Clinical Professor of Surgery

IRA H. DERBY, B.S., Assistant Professor of Chemistry

A. W. DUNNING, M.D., Clinical Professor of Nervous and Mental Diseases

FREDERICK A. DUNSMOOR, M.D., Professor of Operative and Clinical Surgery

CHARLES A. ERDMANN, M.D., Professor of Gross and Applied Anatomy

BURNSIDE FOSTER, A.B., M.D., Clinical Professor of Diseases of the Skin and Lecturer upon the History of Medicine

ARTHUR J. GILLETTE, M.D., Professor of Orthopedic Surgery

GEORGE D. HEAD, B.S., M.D., Associate Professor of Medicine

A. C. HEATH, M.D., Clinical Professor in Diseases of the Nose and Throat

H. W. HILL, M.D., Assistant Professor of Bacteriology

CHARLES H. HUNTER, A.M., M.D., Clinical Professor of Medicine

JOHN BLACK JOHNSTON, Ph.D., Professor of Comparative Neurology

WILLIAM A. JONES, M.D., Professor of Nervous and Mental Diseases

FREDERICK LEAVITT, M.D., Clinical Professor of Obstetrics and Clerk of Clinics

J. C. LITZENBERG, B.S., M.D., Clinical Professor of Obstetrics

ARCHIBALD MACLAREN, A.B., M.D., Clinical Professor of Surgery

J. S. MACNIE, M.D., Clinical Professor in Diseases of the Eye and Ear

A. T. MANN, B.S., M.D., Clinical Professor of Surgery and Clerk of Clinics

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

WILLIAM R. MURRAY, A.B., M.D., Professor of Diseases of Nose and Throat

WINFIELD S. NICKERSON, Sc.D., M.D., Assistant Professor of Histology and Embryology

LOUIS N. NIPPERT, M.D., Clinical Professor of Medicine

CHARLES NOOTNAGEL, M.D., Clinical Professor of Medicine and Physical Diagnosis

HENRY J. O'BRIEN, M.D., Clinical Professor of Surgery

ROBERT RETZER, M.D., Assistant Professor of Anatomy

THOMAS S. ROBERTS, M.D., Clinical Professor of Diseases of Children

H. E. ROBERTSON, A.B., M.D., Assistant Professor of Pathology and Bacteriology

JOHN T. ROGERS, M.D., Clinical Professor of Surgery

JOHN L. ROTHROCK, A.M., M.D., Clinical Professor of Diseases of Women
 F. H. SCOTT, M.A., M.D., Ph.D., D.Sc. Assistant Professor of Physiology
 GEORGE E. SENKLER, M.D., Clinical Professor of Medicine
 A. SHIMONEK, M.D., Clinical Professor of Surgery
 HALDOR SNEVE, M.D., Clinical Professor of Nervous and Mental Diseases
 HENRY L. STAPLES, A.M., M.D., Clinical Professor of Medicine
 J. CLARK STEWART, B.S., M.D., Professor of Principles of Surgery
 ARTHUR SWEENEY, M.D., Professor of Medical Jurisprudence
 H. B. SWEETSER, M.D., Clinical Professor of Surgery
 MAX P. VANDER HORCK, M.D., Professor of the Diseases of the Skin and
 Genito-Urinary Organs
 S. MARX WHITE, B.S., M.D., Associate Professor of Medicine
 M. R. WILCOX, M.D., Assistant Professor of Physiology
 LOUIS B. WILSON, M.D., Assistant Professor of Clinical Pathology
 _____, Professor of Homeopathic Materia Medica.
 _____, Professor of Homeopathic Therapeutics.

F. L. ADAIR, M.D., Clinical Instructor in Obstetrics
 CHARLES R. BALL, M.D., Clinical Instructor in Nervous and Mental
 Diseases
 GEO. C. BARTON, M.D., Clinical Instructor in Gynecology
 A. E. BENJAMIN, M.D., Clinical Instructor in Diseases of Women
 HERMAN A. H. BOUMAN, M.D., Clinical Instructor in Physical Diagnosis
 CHARLES H. BRADLEY, M.D., Clinical Instructor in Medicine
 JOHN B. BRIMHALL, M.D., Clinical Instructor in Orthopedic Surgery
 FRANK E. BURCH, M.D., Clinical Instructor in Diseases of the Eye and
 Ear
 R. A. CAMPBELL, M.D., Clinical Instructor in Rhinology and Laryngology
 W. H. CONDIT, B.S., M.D., Clinical Instructor in Therapeutics and Ma-
 teria Medica
 PAUL B. COOK, M.D., Instructor in Genito-Urinary Diseases
 HENRY WIREMAN COOK, A.B., M.D., Instructor in Clinical Medicine
 JOHN GROSVENOR CROSS, B.S., M.D., Clinical Instructor in Medicine
 R. E. FARR, M.D., Clinical Instructor in Surgery
 EDWARD FIDLAR, B.A., M.B., Demonstrator in Pathology and Bacteriology
 CHARLES F. DIGHT, M.D., Lecturer in Pharmacology and Materia Medica
 C. F. DISEN, M.D., Demonstrator in Anatomy
 EMIL S. GEIST, M.D., Clinical Instructor in Orthopedic Surgery
 JAMES GILFILLAN, M.D., Clinical Instructor in Medicine
 JUDD GOODRICH, M.D., Clinical Instructor in Surgery
 ALEX R. HALL, M.D., Clinical Assistant in Medicine
 ARTHUR S. HAMILTON, M.D., Instructor in Pathology of the Nervous
 System

- EARL R. HARE, B.S., M.D., Instructor in Anatomy
 PEDER A. HOFF, M.D., Clinical Instructor in Medicine
 H. W. JONES, M.D., Clinical Instructor in Nervous and Mental Diseases
 ARTHUR A. LAW, M.D., Instructor in Operative Surgery
 JEANETTE M. McLAREN, M.D., Clinical Instructor in Obstetrics
 THOMAS R. MARTIN, A.B., M.D., Demonstrator of Pathology and Bacteriology.
- CHARLES J. MEADE, M.D., Clinical Instructor in Medicine
 L. A. NELSON, M.D., Clinical Instructor in Diseases of Eye and Ear
 HENRY T. NIPPERT, M. D., Clinical Instructor in Medicine
 E. H. PARKER, M.D., Clinical Instructor in Diseases of Nose and Throat
 WALTER R. RAMSEY, M.D., Clinical Instructor in Diseases of Children
 SOREN P. REES, B.S., M.D., Instructor in Physical Diagnosis and Clinical Medicine
- H. P. RITCHIE, Ph.D., M.D., Instructor in Gynecology
 JULIUS PARKER SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children
 WALTER D. SHELDEN, B.S., M.D., Clinical Instructor in Medicine
 CHAS. N. SPRATT, B.S., M.D. Clinical Instructor in Diseases of the Eye and Ear
- THOS. W. STUMM, M.D., Clinical Instructor in Medicine
 S. E. SWEITZER, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases
- C. C. TYRELL, B.A., M.D., Prosector in Anatomy
 HENRY L. ULRICH, B.S., M.D., Instructor in Clinical Microscopy
 J. A. WATSON, M.D., Clinical Instructor in Diseases of Nose and Throat
 ARCHA WILCOX, M.D., Clinical Instructor in Surgery
 H. L. WILLIAMS, M.D., Clinical Instructor in Diseases of Women
 F. R. WRIGHT, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases
- _____, Clinical Assistant in Medicine
 _____, Demonstrator in Pathology and Bacteriology
- JOHN M. ARMSTRONG, M.D., Clinical Assistant in Genito-Urinary Diseases
 WILLIAM H. AURAND, M.D., Clinical Assistant in Medicine
 E. R. BRAY, M.D., Clinical Assistant in Ophthalmology and Otology
 LESLIE O. DART, M. D., Clinical Assistant in Diseases of Children
 E. H. GREEN, A.B., M.D. Clinical Assistant in Surgery
 JOHN E. HYNES, M.D., Clinical Assistant in Medicine
 A. E. LOBERG, M.D., Clinical Assistant in Nervous and Mental Diseases
 JOHN H. MORSE, B.A. M.D., Clinical Assistant in Diseases of Eye and Ear
 JOHN C. STALEY, M.D., Clinical Assistant in Medicine
 H. JOURNEY WELLS, M.D., Clinical Assistant in Diseases of Eye and Ear
 CHAS. B. WRIGHT, A.B., M.D., Clinical Assistant in Diseases of Children

GROUNDS

The twenty-three buildings of the University 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, 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 two sessions of the legislature provision was made for the expenditure of eight hundred thousand dollars in campus enlargement during the course of the years 1907-1910, in addition to fifty thousand dollars previously contributed by private benefactors. Condemnation proceedings are now in progress for the purpose of obtaining the land desired. About forty additional acres situated to the south of the present campus will 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 and twenty acres.

CLINICAL AND LABORATORY FACILITIES

All the clinical facilities of the State of Minnesota are now available all of the medical interests of the state are harmonized, and the highest standards in medical education and development are assured.

The medical group of buildings is located on the University campus overlooking the Mississippi River and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all of the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health, which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the College of Medicine and Surgery, the gift of the late Dr. A. F. and Mrs. Elliott and of Mr. Walter J. Trask, of Los Angeles, Cal., is in process of construction at a cost of about \$160,000. The hospital is being located on a site overlooking the river and will form a part of the new medical group of buildings. This hospital site was purchased by means of a gift of \$50,000 from generous citizens

of Minneapolis to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which intervenes between it and the other University buildings has already been made by the state legislatures's appropriation of \$800,000 for campus extension.

The University clinical building is located across the river within a few hundred yards of the University. It is owned and controlled by the University and is located in a portion of the city best suited for a satisfactory outdoor service.

The Free Dispensary of St. Paul is advantageously located, thoroughly well equipped and manned entirely by this college.

The College of Medicine and Surgery is in intimate relationship with the numerous hospitals, infirmaries and dispensaries of the Twin Cities and also with the medical departments of the various state correctional and charitable institutions for which Minnesota is so justly noted. St. Mary's Hospital, Rochester, St. Mary's Hospital, Duluth, and the Duluth Health Department are in close affiliation with the college through their laboratories.

HOSPITALS

The Twin Cities with a population of over 500,000, through their several hospitals, afford clinical service to the extent of about 2,000 beds. Recently important additions have been made to almost every hospital in the two cities, some of them having doubled their capacity.

The hospital facilities of the University are thus exceptionally good, since they are not limited to one large amphitheatre, where but a few students can closely observe diagnostic and surgical methods, but are divided among a number of hospitals where the various professors care for their clinical cases. This makes it possible to divide the classes into small sections, so that each student has equal opportunities of observation and is in close touch with both teacher and patient.

Pending the completion of the Elliott Memorial Hospital on the University campus the college is using five buildings on the new campus for hospital purposes and for the University Training School for Nurses.

This gives a considerable number of beds in immediate connection with the college, affording excellent opportunities for thorough section work in Medicine and Surgery.

St. Paul City and County Hospital has a capacity of 600 beds and is the largest and most complete of its kind in the northwest. Many of the members of its staff are on the staff of this college and its entire clinical facilities are at the disposal of the college. It enters over 3,000 patients annually, a large proportion of whom are of the emergency order or are

suffering from acute disease. The opportunities for bedside instruction are very great, and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A recent and thoroughly modern fireproof pavilion for contagious diseases is provided, where the students have unexcelled opportunities to study diphtheria, scarlatina, erysipelas, etc. A separate building is provided for midwifery, and senior students see labor cases under the personal supervision of the professor or instructor in obstetrics.

The orthopedic department contains a large number of crippled and deformed children, and houses the State Hospital for Crippled and Deformed Children. All of this work is under the control of the Professor of Orthopedic Surgery of this college.

The City Hospital, Minneapolis, places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital with splendid equipment and has a capacity of 200 beds. During the year 1908, 2,384 patients were treated in the hospital, and 3,664 patients in the out-patient department and hospital dispensary. A new administration building has been recently completed by the city at a cost of \$55,000, and a pavilion for the care of the incurable is planned for early completion. A modern, newly-erected contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases under the direction of the professor of diseases of children. In the City Hospital, bedside and amphitheatre, medical or surgical clinics are conducted daily throughout the year by members of the faculty. Clinics in diseases of the skin, nervous diseases, obstetrics, etc., are likewise given in the hospital throughout the school year. A special feature is made of medical bedside clinics in the wards of the hospital to small sections of senior students, during the year, by members of the faculty.

Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building, only a portion of which is as yet occupied. It has a capacity of over 100 beds. Many members of the faculty are on the staff of the hospital and give clinics.

St. Joseph's Hospital, St. Paul, with 130 beds and one of the finest amphitheatres with every modern device, contributes largely to the clinical instruction. Members of the faculty are on the staff and give clinics there to the students.

Northwestern Hospital, Minneapolis, affords splendid surgical material, available to this college alone. Semi-weekly clinics in surgery are given in its amphitheatre, and in three operating rooms and wards, by members of the faculty. It has a capacity of 100 beds and during 1908 admitted 1,479 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical clinics. Clinics of this college are held in this hospital by many members of its staff who are on the college faculty. Two operating rooms, with conveniences for students, give unusual facilities and a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 115 beds, is housed in a newly-constructed modern building and members of this faculty exclusively utilize the material of the hospital for teaching purposes. During the year about 1000 are treated.

St. Barnabas Hospital, Minneapolis, with a capacity of 100 beds, now being enlarged to 150 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the year, 1,800 patients are treated at this hospital.

St. Mary's Hospital, Minneapolis, also furnishes clinical material for the University. The hospital is located directly across the Mississippi river from the new University Hospital. It has a capacity of 100 beds and treats 1,200 patients during the year.

The Norwegian Hospital, Minneapolis, is immediately across the river from the new University Hospital. Among other things it provides a sanatorium, now completed, for the treatment of tuberculosis.

DISPENSARIES

In its clinical instruction the medical department makes use of two well-organized free dispensaries, each having a large outdoor service. The University clinical building is located across the river from the medical department proper, at 1810 Washington Avenue S. It is a three-story building, 40x150 feet, situated in a thickly populated part of Minneapolis, and receives nearly twelve thousand patients per year. The staff is composed exclusively of the members of the faculty and their assistants and is organized under a chief of staff.

The service is divided into medical, surgical, gynecological, eye and ear, nose and throat, skin and venereal, mental and nervous departments. Senior students are required to attend daily the clinics at the free dispensary. They are drilled in the taking of histories, the making of physical examinations, etc. Sections of senior students are assigned each day to the drug room of the dispensary and to the clinical laboratory, located in the basement of the building. The free dispensary also provides a residence service for senior students, which is elective and open to a limited number of the senior students. Students electing this service are required to reside at the dispensary and attend the emer-

gency, sick and accident calls, under the direction of a resident, graduate, qualified house officer. This appointment is open to the graduates of this college. An obstetrical out-service department is also conducted and obstetrical cases are assigned to sections of senior students. These clinics are conducted under the direction of some member of the obstetrical staff.

The St. Paul Free Dispensary is centrally located in a twenty-room building, 204 W. Ninth Street, and its clinical service is wholly under the control of the staff of University instructors. Over ten thousand patients are treated during the year. The students of the third and fourth years are on duty two days per week at this dispensary and for certain of the clinical divisions attend every day. See pages 87 to 91

LABORATORY BUILDINGS AND EQUIPMENT

Over \$500,000.00 is at present invested in the laboratories and equipment of this college, exclusive of site.

Provision has been made on the recently acquired extension to the University campus of a site of several acres on the bluffs overlooking the Mississippi river, upon which will be erected the new buildings for the college.

Three buildings of this group have already been provided for by legislative appropriation and gift—an Institute of Anatomy costing \$200,000, a Medical Science building for Physiology, Pharmacology, Experimental Medicine and Surgery, costing \$200,000, and the Elliott Memorial Hospital costing \$160,000.

The work of the College of Medicine and Surgery is at present given in eight buildings upon the University campus, exclusive of the three mentioned above, and in the various hospitals and dispensaries of the two cities.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from a close association with the other University departments, such as general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Millard Hall, a large, four-story, brown stone, and cream brick building (65x125 ft.) the oldest of any in the group, contains a faculty room, a large amphitheatre and lecture rooms, library and reading rooms of the department together with the laboratory of pharmacology and materia medica. In addition, the College of Dentistry is temporarily provided with rooms.

The Medical Science building, a large four-story brick building, (75x150 ft.), is especially designed for laboratories. This building houses the department of histology and embryology and the department of phy-

biology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of anatomy occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south wing and the center of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.) constitutes the headquarters of the School of Chemistry. The laboratory of medical chemistry is a one-story, brick building devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, and basement building.

The Institute of Public Health and Pathology is the newest and largest of any in the Medical Quadrangle.

Five buildings are used for the University Hospital and the Training School for Nurses.

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 colleges of Dentistry and Pharmacy, the departmental 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 7,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications.

The general University library contains some 115,000 bound volumes, 30,000 unbound volumes and pamphlets, and several hundred current periodicals. The public libraries of Minneapolis, with 160,000 volumes, and of St. Paul, with some 90,000 volumes, the State Historical Library of 85,000 volumes, and the State Library of 59,000 volumes, the Library of the Minnesota Academy of Natural Sciences of some 12,000 titles, place before the student the greater part of the important literature relating to all branches of the physical and natural sciences as well as works of general culture and those pertaining particularly to medicine. All of

these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition by the department of anatomy, through the generosity of F., John S and Charles C. Pillsbury, of a large portion of the working library of the late Professor William His, of Leipzig, containing about 8,500 titles and representing some 2,500 authors.

Recently the library has secured through the gift of Doctors C. J. and C. H. Spratt the valuable library on Ophthalmology, of Professor Hermann Cohn of Breslau, numbering some 2,000 titles.

THE TRAINING SCHOOL FOR NURSES

The Board of Regents has recently authorized the organization, in connection with the University Hospital service, of a Training School for Nurses. Like the hospital itself, it will exist, primarily, for educational purposes.

It will be conducted by a superintendent and a teaching staff selected from the faculty of the College of Medicine and Surgery, under the direction of a Committee on Training School.

A four years' high school course will be the minimal requirement for admission. Applicants will be required to undergo a sufficient physical examination to determine their fitness for the service, and will offer suitable business and social references.

A preliminary four months' course in anatomy, physiology, chemistry, bacteriology, pharmacology, public health, English, physical culture, principles of nursing and hospital and household economics, will be given to all students of The Training School in the laboratories and lecture rooms of the University.

Examinations at the close of this course must be successfully passed. Students, during this four months' course will not be in residence. The course will be under a fee of \$25.00.

Students who have completed this preliminary work, will be admitted to the hospital service on two months' probation.

If finally accepted, they will, thereafter, be entered for the remaining two and one-half years' work in hospital. Examinations will be held at the close of each year's work. The completed course will lead to the degree of Graduate in Nursing, conferred, upon recommendation of the faculty, by the Board of Regents.

For Bulletin and other information address

THE DEAN,
College of Medicine and Surgery,
University of Minnesota.

**SIX-YEAR COURSE IN SCIENCE AND MEDICINE LEADING TO
THE DEGREES OF BACHELOR OF SCIENCE
AND DOCTOR OF MEDICINE**

In the year 1903-04 the University established a six-year course of study arranged especially for students of medicine. The first two years of the 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 the first four years, and to the degree of doctor of medicine at the end of the six-year course.

In the College of Science, Literature, and the Arts the year is divided into two semesters. In the College of Medicine and Surgery the year is divided into four quarters (half semesters). In the College of Medicine and Surgery the work is given on a concentration plan.

Students who enter without French or German are required to take Beginning German, Course 1, ten credits, and Scientific German, Course 3, six credits.

Students entering with two years of German may take Beginning French, Course 1, ten credits, in either first or second year, and German Course 3, six credits, in the other year.

Page reference is made to the bulletins of the College of Science, Literature, and the Arts, and of the College of Medicine and Surgery for more detailed information.

Courses in the College of Science, Literature and the Arts

FIRST YEAR

ANIMAL BIOLOGY (See p. 53)

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| 1. GENERAL ZOOLOGY | PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS
OESTLUND, BROWN AND DOWNEY |
| Six credits (six hours per week) | First and second semester |
| BOTANY (See pp. 57) | |
| 1. GENERAL BOTANY | PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN
AND ROSENDAHL AND INSTRUCTORS |
| Six credits (six hours per week) | First and second semester |

CHEMISTRY (See pp. 61)

1. GENERAL CHEMISTRY MISS COHEN AND MR BADGER
OR,
2. ADVANCED GENERAL CHEMISTRY PROFESSOR FRANKFORTER, MISS COHEN AND
MR. BADGER
Six credits (six hours per week) First and second semesters

GERMAN (See p. 96)

1. BEGINNING GERMAN PROFESSOR SCHLENKER, ASSISTANT PROFESSORS
WILKIN AND JURGENSEN, MR. BURKHARD AND MR. WILLIAM
Ten credits (five hours per week) First and second semesters

MATHEMATICS (See p. 113)

3. SECOND PART HIGHER ALGEBRA PROFESSOR BAUER, ASSISTANT PROFESSOR
BUSSEY, DR. MANCHESTER, MR. DALAKER AND MR. SHUMWAY
Three credits (three hours per week) First semester
4. TRIGONOMETRY PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY, DR
MANCHESTER, MR. DALAKER AND MR. SHUMWAY.
Three credits (three hours per week) Second semester

MILITARY DRILL CAPTAIN EDWARD SIGERFOOS, U. S. A.
Required of all men First and second semesters

GYMNASIUM DR. COOKE
Required of all students First and second semester

SECOND YEAR

ANIMAL BIOLOGY (See p. 53)

4. COMPARATIVE ANATOMY OF VERTEBRATES ASSISTANT PROFESSOR BROWN,
MR JOHNSON
Six credits (six hours per week) First and second semester

CHEMISTRY (See p. 61)

3. QUALITATIVE ANALYSIS ASSISTANT PROFESSOR NICHOLSON, MR.
FRARY AND ASSISTANTS
Six credits (six hours per week) First and second semesters

ECONOMICS (See p. 70 and 73)

1. ELEMENTS OF ECONOMICS PROFESSOR ROBINSON, DR. PHELAN AND MR.
COULTER
Three credits (three hours per week) First semester
18. ECONOMIC CONDITIONS IN AMERICAN CITIES MR. LIES
Three credits (three hours per week) Second semester

FRENCH (See p. 133)

1. BEGINNING FRENCH ASSISTANT PROFESSORS ANDRIST AND FRELIN, MADAME
BERTIN
Ten credits (five hours per week) First and second semesters

GERMAN (See p. 96)

3. SCIENTIFIC INTERMEDIATE ASSISTANT PROFESSOR JURGENSON
Six credits (three hours per week) First and second semesters

PHYSICS (See pp. 126)

- 1 and 3. GENERAL PHYSICS PROFESSOR JOHN ZELENY
Six credits (three hours per week) First and second semesters
- 2 and 4. GENERAL LABORATORY PRACTICE MR. KOVARIK
Two credits (two hours per week) First and second semester

RHETORIC (See p. 136)

- 1a. RHETORIC MR. FIRKINS, MR. NICHOLS, MISS MALEY, MISS GRIFFITH,
MISS WHITNEY
Six credits (three hours per week) First and second semester

MILITARY DRILL

- MILITARY DRILL CAPTAIN EDWARD SIGERFOOS, U. S. A.
Required of all men First and second semesters

Courses in College of Medicine and Surgery

THIRD YEAR

ANATOMY (see p. 41)

1. GENERAL ANATOMY
One credit (three lectures and recitations per week for six weeks) First Quarter
2. OSTEOLOGY PROFESSOR ERDMANN, DR. HARE
Six credits (18 lectures and recitations per week for six weeks) First quarter
PROFESSOR ERDMANN, DR. HARE
- GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY PROFESSOR LEE
ASSOCIATE PROFESSOR NICKERSON
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter
4. DISSECTIONS PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DR.
HARE AND DISEN
Ten and one-half credits (21 hours per week for twelve weeks) Second semester
8. SPLANCHNOLOGY AND MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES
PROFESSOR LEE, ASSOCIATE PROFESSOR NICKERSON
Four and one-half credits (six lectures and recitations, three laboratory periods) Second quarter

5. ELEMENTS OF VERTEBRATE EMBRYOLOGY PROFESSORS LEE AND JOHNSTON
Four and one-half credits (six lectures and recitations, three laboratory periods)
First quarter
9. ADVANCED VERTEBRATE EMBRYOLOGY PROFESSORS LEE AND JOHNSTON
Three credits (two lectures and recitations, one laboratory period)
Second quarter
7. ELEMENTS OF MAMMALIAN NEUROLOGY PROFESSOR JOHNSTON, MR. PAPEZ.
Three credits (two lectures and recitations, one laboratory period)
Second quarter

CHEMISTRY (See p. 50)

6. ORGANIC CHEMISTRY PROFESSOR FRANKFORTER, ASSISTANT PROFESSOR
DERBY, MR. HANDY
Fifteen credits (six lectures, six laboratory periods) Third and fourth quarters

PHYSIOLOGY AND PHARMACOLOGY (See p. 46)

1. GENERAL CELLULAR PHYSIOLOGY PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory
periods) Third quarter
2. MUSCULO-NERVOUS MECHANISMS PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods)
Third quarter
3. SYSTEMIC PHYSIOLOGY PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT,
WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory
periods) Fourth quarter
4. SYSTEMIC PHYSIOLOGY (Continued) PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory
periods) Fourth quarter

FOURTH YEAR

ANATOMY (See p. 43)

11. DISSECTIONS PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DR.
HARE AND DISEN
Nine credits (twenty-four hours per week for nine weeks) Third quarter
10. ANATOMY OF THE SPECIAL SENSE ORGANS PROFESSOR LEE
Four and one-half credits (six lectures and recitations, three laboratory periods)
Third quarter
14. MICRO-TECHNIQUE AND SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES
PROFESSOR LEE
Four and one-half credits (six lectures and recitations three laboratory periods.
Third quarter

6. THE HUMAN NERVOUS SYSTEM PROFESSOR JOHNSTON, DR. INGERT
Four and one-half credits (six lectures and recitations, three laboratory periods)
First quarter

CHEMISTRY (See p. 50)

7. TOXICOLOGY, WATER AND FOOD ANALYSIS PROFESSOR FRANKFORTER,
ASSISTANT PROFESSORS HARDING AND DERBY
Three and three-quarter credits (three lectures, three laboratory periods)
Second quarter

PATHOLOGY AND BACTERIOLOGY (See pp.52)

1. GENERAL PATHOLOGY PROFESSOR WESBROOK
Three credits (six lectures, recitations and demonstrations)
Fourth quarter
2. GENERAL PATHOLOGY ASSISTANT PROFESSORS MULLIN AND ROBERTSON
Three credits (six lectures, recitations and demonstrations) Fourth quarter
3. GENERAL PATHOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSORS
MULLIN AND ROBERTSON
Three credits (twelve hours laboratory) Fourth quarter
4. GENERAL BACTERIOLOGY ASSISTANT PROFESSOR HILL, DR. FIDLAR
Three credits (six lectures, recitations and demonstrations) Fourth quarter
5. GENERAL BACTERIOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSOR
HILL, DR. FIDLAR
Four and one-half credits (eighteen hours laboratory) Fourth quarter
- PHYSIOLOGY AND PHARMACOLOGY (See p.47)
5. METABOLISM AND NUTRITION PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods)
First quarter
6. PHENOMENA OF STIMULATION PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods)
First quarter
7. PHYSIOLOGY OF SPECIAL SENSE ORGANS PROFESSOR BEARD, ASSISTANT PROFESSORS
SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods)
Second quarter
8. PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM PROFESSOR BEARD, ASSISTANT
PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods)
Second quarter
- ELEMENTARY PHARMACY PROFESSOR BROWN AND DR. DIGHT
Four and one-half credits (six lectures and recitations, three laboratory periods)
First quarter
2. GENERAL PHARMACODYNAMICS PROFESSOR BROWN AND DR. DIGHT
Four and one-half credits (six lectures and recitations, three laboratory periods)
Second quarter

SEVEN YEAR COURSE LEADING TO THE DEGREES OF B. A. AND M. D.

(See also page 48, Bulletin College Science, Literature and Arts.)

Students who have completed their junior work in the College of Science, Literature and the Arts in this University, or in certain other colleges of arts and sciences, may elect the first year's work in the College of Medicine and Surgery as the work of their senior academic year, and upon satisfactory completion of the same will receive the degree of A. B. from that college.

Students may elect these courses in the College of Medicine and Surgery only by complying with the following regulations.

I. By presenting satisfactory evidence that they have completed three years of academic college work.

II. By filling out the proper application blanks for electing this work. These blanks may be obtained from the Dean of the College of Medicine and Surgery, and after being properly filled out, are to be returned to him for approval and then sent for further approval and record by the proper authorities of the College from which the applicant desires to obtain his degree of B. A.

III. All students entering upon this seven year combined course must present evidence of having completed during the previous three years of college work the following: One year of at least three credit hours per week in each of the following named subjects: (a credit hour in a laboratory subject is taken to be two or more hours of consecutive work.)

1. Physics.
2. General Inorganic Chemistry.
3. Qualitative Analysis.
4. Biology, i. e., Zoology or Botany.
5. Language, i. e., German or French.

In addition each student must offer two years of High School Latin.

IV. Candidates may be allowed to enter with not more than one condition in their academic work. This condition, however, must be removed before the beginning of the second year's work in Medicine.

Note: Provision is made in the summer school at the University for students to make up certain deficiencies or to remove certain conditions. Students are earnestly advised to do this in the summer session immediately preceding the taking up of work in the College of Medicine. According to Rule IV any unfinished work yet remaining must be completed prior to taking up the second year's work in Medicine.

It will be seen that the seven years' course, while a year longer than the B. S., M. D. course, nevertheless permits of a greater range of elective studies. For this reason the seven year course promises to be a very popular one in the future. Students planning to take up Medicine later are strongly advised to arrange their earlier years' work with these requirements in view.

AFFILIATION WITH OTHER COLLEGES

Carleton and Macalester Colleges have entered into an arrangement with University of Minnesota whereby students who have completed three full years' work without conditions and who have also met all the requirements for admission to the College of Medicine and Surgery may elect as the work of their Senior year the first year's work in the College of Medicine and Surgery, upon the satisfactory completion of which they will receive a bachelor's degree from Carleton or Macalester College as the case may be.

By this arrangement students from this college, having satisfactorily completed

their four years' work in the College of Medicine and Surgery, will have received both degrees in a period of seven years.

Opportunity is offered to other colleges meeting the University requirements to enter into similar relations of affiliation for the purpose of shortening the time whereby the student can secure both degrees.

COURSE LEADING TO THE DEGREE OF DOCTOR OF MEDICINE IN HOMEOPATHY

The Board of Regents at a meeting held May 6th, 1909, adopted the following resolutions:

"WHEREAS, there is no substantial difference between the Regular and Homeopathic Schools of Medicine except in Materia Medica and Therapeutics, and,

"WHEREAS, there are at this time only three students in Homeopathy in the University, one senior and two juniors, and,

"WHEREAS, it is the sense of this Board that the University continue to furnish instruction to those who elect to study and practice Homeopathy,

"THEREFORE BE IT RESOLVED, that, in lieu of the present Homeopathic organization in the University there be appointed two Professors of Didactic Homeopathy, one of whom shall be Professor of and shall teach Homeopathic Materia Medica, and one of whom shall be Professor of and shall teach Homeopathic Therapeutics and each student who shall so elect, upon completion of the prescribed course, shall be entitled to and shall receive a diploma of "Doctor of Medicine in Homeopathy."

In accordance with above action, in arranging the curriculum, provision is made whereby students wishing to take these courses leading to the degree of "Doctor of Medicine in Homeopathy," in lieu of those which lead to the degree of "Doctor of Medicine," may do so without conflict with their other medical courses. For further details of the courses see page 50 under the department of Physiology and Pharmacology.

GRADUATE AND SPECIAL STUDENTS

The degree of Master of Arts or Master of Sciences is open to graduates of the College of Medicine and Surgery, who are also Bachelors of Arts or Bachelors of Science of the University of Minnesota, or other colleges who shall be recommended by the Graduate School of the University of Minnesota. Candidates must pursue approved courses in the

College of Medicine and Surgery for at least one year after taking the degree of Doctor of Medicine.

Application for these courses of study must be approved by the Deans of the Graduate School and of the College of Medicine and Surgery.

Opportunity is offered for students registered in the Graduate School to take majors or minors for the degree of M.A. or M.S. in advanced courses in Anatomy, Bacteriology, Embryology, Histology, Neurology, Pathology and Physiology in the College of Medicine and Surgery.

Graduate students of this University or of other colleges or universities who are registered in the Graduate School of the University, may also elect majors or minors in the above scientific branches in the College of Medicine and Surgery toward the degree of Ph.D.

In all cases the students must comply with the rules and regulations of the Graduate School of the University of Minnesota.

Special students properly qualified, whether they be graduates in Medicine or not, may be admitted to many of the courses offered in the College of Medicine and Surgery.

The College of Medicine and Surgery proposes to establish as soon as possible, a summer quarter to provide for both graduate and undergraduate work. Further announcement will be made at the proper time.

Students registered in the Graduate School pay a fee of \$10. The amount of additional charges for the various laboratory or other courses open to special or graduate students, can be learned at the Dean's office.

CURRICULUM

The course in the College of Medicine and Surgery leads to the degree of doctor of medicine. It covers a period of four years of collegiate study, each year representing nine months in actual residence.

The studies are graded, so far as practicable, throughout the four years and this grading is arranged with careful reference to the relation which the subjects naturally bear to each other.

The work of the first two years deals with the so-called scientific or laboratory branches; while that of the last two years includes the principles and practice of medicine and surgery, their associated specialties and the application of scientific or laboratory methods to clinical experience.

With a view of further improving the course of instruction and more effectively co-ordinating the work of the various departments, the schedule is now undergoing thorough revision. Hence, the detailed descriptions of the course of instruction, largely based on pre-existing schedule conditions, may be regarded as, in a measure, tentative.

The perfected schedules will be ready for distribution on September

1, 1909, and may be had on application at the Dean's office.

GRADED SYSTEM OF STUDY

The year is divided into four periods of nine weeks each, called quarters. The credit value of each course is computed in terms of credits in the College of Science, Literature, and the Arts.

FIRST YEAR

FIRST QUARTER

GENERAL ANATOMY 1, one credit

OSTEOLOGY 2, six credits, Professor Erdmann, Dr. Hare

DISSECTION 4, three credits, Professor Erdmann, Assistant Professor Retzer, Drs. Hare and Disen

EMBRYOLOGY 5, four and one-half credits, Professor Lee, Professor Johnston

HISTOLOGY 3, four and one-half credits, Professor Lee and Assistant Professor Nickerson

SECOND QUARTER

DISSECTION 4, seven and one-half credits, Professor Erdmann, Assistant Professor Retzer, Drs. Hare and Disen

EMBRYOLOGY 9, three credits, Professors Lee and Johnston

SPLANCHNOLOGY and MICROSCOPIC ANATOMY 8, four and one-half credits, Professor Lee, Assistant Professor Nickerson

NEUROLOGY 7, three credits, Professor Johnston

THIRD QUARTER

CHEMISTRY 6, fifteen credits, Professor Frankforter, Assistant Professor Derby, Mr. Handy

PHYSIOLOGY I, four and one-half credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

PHYSIOLOGY 2, four and one-half credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

FOURTH QUARTER

CHEMISTRY 6, continued

PHYSIOLOGY 3 and 4, nine credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

SECOND YEAR

FIRST QUARTER

NEUROLOGY 6, four and one-half credits, Professor Johnston
 PHARMACOLOGY 1, four and one-half credits, Professor Brown, Dr. Dight
 PHYSIOLOGY 5 and 6, nine credits, Professor Beard, Assistant Professors
 Scott and Wilcox, Dr. Sedgwick

SECOND QUARTER

CHEMISTRY 7, three and three-quarter credits, Professor Frankforter,
 Assistant Professors Harding and Derby
 PHYSIOLOGY 7 and 8, nine credits, Professor Beard, Assistant Professors
 Scott and Wilcox, Dr. Sedgwick

THIRD QUARTER

DISSECTION 11, nine credits, Professor Erdmann, Assistant Professors
 Retzer, Drs. Hare and Disen
 MICRO-TECHNIQUE and EMBRYOLOGY 14, four and one-half credits, Pro-
 fessor Lee
 ANATOMY OF SENSE ORGANS 10, four and one-half credits, Professor Lee

FOURTH QUARTER

PATHOLOGY 1, three credits, Professor Wesbrook
 PATHOLOGY 2, three credits, Assistant Professors Mullin and Robertson
 PATHOLOGY 3, three credits, Professor Wesbrook, Assistant Professors
 Mullin and Robertson
 BACTERIOLOGY 4, three credits, Assistant Professor Hill and Dr. Fidler
 BACTERIOLOGY 5, four and one-half credits, Professor Wesbrook, Assistant
 Professor Hill, Dr. Fidler

For the statement of the courses of the third and fourth years the
 schedules and detailed announcements must be consulted.

THIRD YEAR

Topographical anatomy, special pathology and bacteriology, surgical
 pathology, principles of surgery, operative surgery, practice of surgery,
 practice of medicine, diseases of children, obstetrics, pathology of the
 nervous system, special neurology, medical jurisprudence, physical diag-
 nosis, clinical microscopy, pharmacology and therapeutics, with electives.

FOURTH YEAR

Practice of surgery, practice of medicine, clinical obstetrics, surgical pathology, practical physical diagnosis, therapeutic conferences, nervous and mental diseases, gynecology, ophthalmology and otology, orthopedia, dermatology and genito-urinary diseases, diseases of the nose and throat, hygiene, electives.

COLLEGE YEAR

The twenty-second annual course of study in this college will begin on Tuesday, September 14, 1909, and will continue nine months, or thirty-six weeks, exclusive of holidays, closing upon Saturday, June 4, 1910. The college year is divided into two semesters; each semester is further divided into two quarters of nine weeks each; the first semester ends January 27, 1910. The last week is devoted mainly to mid-year examination, which will be conducted in many of the departments. The second semester will begin January 28, 1910, and will close June 4, 1910. Certain of the courses of study terminate on November 10th, and April 6th. Commencement exercises will occur in common with the other departments of the University, during the week ending June 10, 1910.

Rules and Regulations of College

REQUIREMENTS FOR ADMISSION

I. Candidates for admission to the College of Medicine and Surgery who have received degrees in arts or science from approved universities or colleges will be admitted on presenting their diplomas or other satisfactory testimonials (subject to conditions under IV).

II. Students will be admitted who present evidence that they have satisfactorily performed the equivalent of at least two full years of work of collegiate grade of fifteen hours per week (subject to conditions under IV).

III. Other candidates who have not completed the two years of required work will be required to pass examinations, conducted by the College of Science, Literature and the Arts, upon such subjects as may be lacking (subject to conditions under IV).

IV. All candidates for admission must furnish evidence that they

have completed one year of at least three credit* hours per week in each of the following named subjects, either in this University or in some other college or university of equal rank:

1. Physics
2. General Inorganic Chemistry
3. Qualitative Analysis
4. Biology, i. e., Zoology or Botany
5. Language, i. e., German or French.

Since the two years of required collegiate work must include the aforementioned subjects, students are advised to choose the prescribed six-year course which leads to the degree of Bachelor of Science and Doctor of Medicine. For detailed outline of this course see pages 23-28.

V. In addition students must offer for entrance two years of high school Latin.

VI. Candidates may be allowed to enter with not more than one condition. This condition, however, must be removed before the beginning of the second-year work in medicine.

For regulations governing admission to the College of Science, Literature and the Arts, and detailed information concerning its curriculum, see the bulletin of that college.

ENROLLMENT

Students are advised to matriculate or register in the office of the University Registrar on or before September 7, 1909. Entrance and condition examinations will be held September 7 to 11. Opening lecture, September 14. Classes called for regular work on September 14.

Students are fined twenty-five cents per day who matriculate or register in the Registrar's office after September 14, 1909, for the first semester's work, or after January 28, 1910, for the second semester's work.

MATRICULATION

Students who are entering the College of Medicine and Surgery for the first time must present to the Registrar satisfactory evidence of having completed the required amount of work for admission, and obtain the proper classification card and statement of fees. The Registrar will determine and record any deficiency in the entrance qualifications of a student, and will arrange with the student for the removal of such deficiencies.

Students who have matriculated in previous years must first present registration slips and obtain statement of fees in the Registrar's office at the beginning of each semester.

*NOTE—A credit hour in a laboratory subject is taken to be two or more hours of consecutive work.

REGISTRATION

The registration of all students consists of three parts and should be carried out in the following order:

1st. Present registration slip to the Registrar and secure a statement of fees.

2nd. Present this statement at once to the cashier and pay fees.

3rd. Report to the dean at once for final classification and registration. Students must follow this order and complete registration as promptly as possible in order to secure tickets for entrance to the various courses.

As the rules of the Minnesota State Board of Medical Examiners and of the Council on Medical Education of the American Medical Association, and the examining boards of several other states require four full years' work in a medical college, students are not given time credit for work done outside a medical school.

No student may be advanced with his class or given advanced standing unless he has passed the majority of the required studies of the previous year; nor shall any student be admitted to the second semester's work of the fourth year who has any unremoved conditions of any of the preceding years.

TERMS OF TUITION

The annual tuition fee in the College of Medicine and Surgery is one hundred dollars. This includes all charges for matriculation, lecture and laboratory courses, dissections and graduation, except a hospital fee of three dollars for juniors and seniors and a rental fee for microscopes, payable by all students who do not own their own instruments. (See microscope rental.)

One-half of the annual fee will be payable when the student matriculates. The cashier's receipt for this portion of the fee will entitle the holder to take the entrance examinations and to classify. The second half will be payable at the opening of the second semester, January 28, 1910. Failure to register within the dates assigned for registration will subject the delinquent to an increase in the registration fee, amounting to twenty-five cents for each day of such delinquency. If the applicant fails to pass the entrance examination, his fees will be returned by the cashier. Absence or failure to continue study will not entitle the student to return of fees, except in cases of special hardship, when application may be made to the executive committee of the Board of Regents.

A student who takes advanced standing will not receive any credit therefor upon his annual fees.

A fee of one dollar is charged for permission to take any examination to remove a condition. The student obtains a fee statement from the Registrar for the conditions charged against him; this he presents to the cashier, and the cashier's receipt must be registered with the Dean at least twenty-four hours prior to the examination.

Special examinations may be ordered by the faculty under exceptional circumstances for which a fee of five dollars for each subject must be paid to the University cashier.

MICROSCOPE RENTAL.

To students who do not own their own instruments, microscope fees are charged which depend upon the length of the course.

The total cost for all four years approximates ten or twelve dollars, including optional or elective courses.

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.

A deposit of five dollars will be made with the University cashier 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 in the college buildings and of breakage and loss of laboratory apparatus and materials. It will be returned to the student at the close of each year, minus the cost of articles assigned to him, which are not returned 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.

EXAMINATIONS—FINAL STANDINGS

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; nor will any student having a second-year condition or failure be allowed to register for any fourth-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.

Habitual absence without satisfactory excuse, continued indifference to study, or persistently poor scholarship will subject the student to temporary or permanent suspension.

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 or 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 the 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 conditions until he presents a receipt from the cashier for the fee for said examination. (See Terms of Tuition.)

Conditions must be removed at the beginning of the school year in September. No student who has any conditions unremoved at the close of the September examination is allowed to continue with his class without the express permission of the Dean on 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 whole 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.

ADVANCED STANDING

Students from other recognized medical colleges applying for admission to the second, third and fourth year classes will be required to present official credentials and other satisfactory evidence of time spent in medical studies and pass examinations in the branches already taken by the class they seek to enter, and to satisfy all other admission requirements; but any student may be excused from such examinations if the instruction which he has received is considered satisfactory by the head of the corresponding department in this college.

No condition of advanced standing will entitle the student to take two years of any graded study coincidentally. Students who desire to obtain advanced standing in some particular subject rather than for a whole college year, may be granted by the head of the department concerned, and approval of the faculty, a proper amount of subject credit.

GRADUATES IN MEDICINE. Graduates from another recognized medical school may obtain the degree of M.D. from this college provided:

1. That he comply with the preliminary requirements for entrance to this college and submit the required time and subject credits.
2. That he be in residence at this college at least one full college year and take at this college all courses not covered by his subject credits and repeat such courses of the fourth year as the faculty may require.
3. The total time spent for all courses taken at this college must be the full equivalent of that required of the fourth year class.
4. He must pass examinations in all the courses in which he is deficient, and all the regular examinations of the fourth year in this college.
5. He must submit his diploma and other official credentials from the medical school from which he graduated.
6. He must comply with all requirements for graduation in force for the students of this college.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

Requirements for License.

Examinations are held in the months of January, April, June and October.

Candidates are required to take examinations in the following subjects: Anatomy, Physiology, Chemistry, Histology, Materia Medica Therapeutics, Preventive Medicine, Practice of Medicine, Surgery, Ob-

stetrics, Diseases of Women and Children, Diseases of the Nervous System, Diseases of the Eye and Ear, Medical Jurisprudence, and such other branches as the Board shall deem advisable.

Candidates will also be required to take practical examinations in Pathology, Histology, Bacteriology, Urinalysis, and Clinical Diagnosis.

The National Confederation of State Licensing and Examining Boards in June, 1906, adopted the requirements of one or two years of college work including at least one year's work in Physics, Chemistry, Biology, and Languages, as the minimum entrance standard to apply to all students beginning the study of Medicine after June 1, 1910. The State Medical Board of Minnesota will, after 1912, require the evidence of the completion of two years academic work in an approved college.

Commencing with 1910 fifty-three medical schools in the United States will require one or more years of college preparatory work to enter Medicine.

REQUIREMENTS FOR GRADUATION

A candidate for the degree of Doctor of Medicine must be twenty-one years of age, of good moral character and after having satisfied all the requirements for admission to the College of Medicine and Surgery, must have complied with all the rules and regulations of the College and obtained regular credit for all the work of the complete course.

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 ROLLIN E. CUTTS PRIZE IN SURGERY

Dr. Mary E. Smith Cutts, '91 Medical, has given the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of \$500, 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.

Courses of Instruction

DEPARTMENT OF ANATOMY

THOMAS G. LEE, B.S., M.D., Professor of Anatomy and Director of the Department of Anatomy

CHARLES A. ERDMANN, M.D., Professor of Gross and Applied Anatomy

JOHN BLACK JOHNSTON, Ph.D., Professor of Comparative Neurology

WINFIELD S. NICKERSON, Sc.D., M.D., Assistant Professor of Histology and Embryology

ROBERT RETZER, M.D., Assistant Professor of Anatomy

EARL R. HARE, B.A., M.D., Instructor in Anatomy

CHARLES F. DISEN, M.D., Demonstrator in Anatomy

C. C. TYRELL, B.A., M.D., Prosector in Anatomy

JARL FERDINAND LEMSTROM, M.D., Associate in Histology

FREDERICK H. POPPE, A.B., M.D., Associate in Histology

JAMES W. PAPEZ, Assistant in Neurology

HAROLD ALDWORTH, Departmental Assistant in Histology

The department of Anatomy is at present located in two separate buildings, one building being devoted to the work in dissection. The other divisions of the work of the department including Histology, Embryology, Osteology, Neurology, Topographical Anatomy, Micro-technique, the laboratory and lecture rooms, the departmental library and offices of the staff, the preparation rooms, chemical and photographic laboratories, store rooms, etc., are located in the Medical Science Building, occupying all four floors of the north half of the building, some 17,000 square feet. These various laboratories are adequately equipped with apparatus and material for properly conducting the courses given.

The last legislature appropriated \$200,000 for the purpose of erecting a building to be known as the Institute of Anatomy, and which will provide adequate space for the proper development of all of the several divisions of the subject of human and vertebrate anatomy, gross and microscopic. The plans for this building are being made, and when completed it will afford ample opportunities for graduate and undergraduate study and investigation in this subject.

The various anatomical courses occupy portions of the first three years in the college. In the first year Osteology and general courses of Histology, Embryology and Neurology, together with dissection, occupy about half the students' time. In the second year the work in dissection is completed together with advanced and special courses in Neurology, Histology, Micro-Technique, Topographical Anatomy, while in the third

year special attention is given to Regional and Surgical Anatomy in cooperation with the departments of Medicine and Surgery.

Each student receives a human skeleton for the purpose of study in Osteology. In Histology, in Embryology and in Neurology in addition to specimens completed by the students themselves, there are very large collections of specially prepared sets of slides and series of embryos which are loaned to the student during the course.

The departmental library contains a carefully selected collection of reference literature both standard and periodical. All of the anatomical periodicals are received and complete sets of nearly all are available. An important addition to the library was the gift of the working anatomical collection of the late Prof. William His, of Leipzig. The other libraries of the University, as well as those of the Twin Cities, render it possible to easily consult practically all of the important anatomical and biological literature.

The abundance of material and other facilities for research work offer very favorable opportunities for students who wish to take majors or minors in some division of anatomy toward their Master's or Doctor's degree. Unusually good opportunities also will be offered to practitioners for doing special work in anatomy.

Courses of Study

1. GENERAL ANATOMY PROFESSOR LEE
One credit (3 lectures and recitations per week for six weeks) First year, first quarter. Lectures and recitations on general human and vertebrate morphology.
2. HUMAN OSTEOLOGY PROFESSOR ERDMANN AND DR. HARE
Six credits (eighteen lectures and recitations per week for six weeks)
First year, first quarter
Lectures and recitations and laboratory work upon the human skeleton and supplementary work on the osteology of domestic animals. A practical study of the skeleton, followed by recitations from the specimen.
3. GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY PROFESSOR LEE
ASSISTANT PROFESSOR NICKERSON
Four and one-half credits (six lectures and recitations, and six hours laboratory work per week) First year, first quarter
The structure and properties of protoplasm; the cell, its structure; the phenomena of cell division. A comparative study of the histology of the epithelial, connective and muscular tissues, the blood, and the vascular and lymphatic systems of man and vertebrates.
4. DISSECTIONS PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DRs.
HARE AND DISEN
Ten and one-half credits (twenty-one hours each week for twelve weeks)
First year, first and second quarters
Open to students who have completed courses 1 and 2.
The student makes a complete dissection of all the structures of either the upper or lower half of the human body, using textbooks, atlases and models as guides.

The work is largely independent, and a dissection must be completed in the quarter in which it is undertaken.

5. ELEMENTS OF VERTEBRATE EMBRYOLOGY PROFESSOR LEE, PROFESSOR JOHNSTON

Four and one-half credits (six lectures and recitations, and six laboratory hours per week) First year, first quarter

A comparative study of reproduction; the ovum, the spermatozoa, fertilization, cleavage, formation of the blastodermic layers, the formation of the embryo and foetal envelopes, with practical work on mammalian and other vertebrate embryos.

6. THE HUMAN NERVOUS SYSTEM PROFESSOR JOHNSTON AND MR. PAPEZ

Four and one-half credits (six lectures and recitations, and six hours laboratory work per week) Second year, first quarter

Open to second-year students who have completed courses 7, 8 and 9, or equivalent.

A detailed study of the internal structure and functional organization of the central nervous system by means of sections of the human brain, with comparison of mammals and lower vertebrates.

7. ELEMENTS OF MAMMALIAN NEUROLOGY PROFESSOR JOHNSTON AND MR. PAPEZ

Three credits (six lectures and recitations, and six hours laboratory per week) First year, second quarter

Open to first-year students who have completed courses 3 and 5, or equivalent. A study of the structure and relations of the nerve elements and of the general morphology of the central nervous system.

8. SPLANCHNOLOGY AND MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES PROFESSOR LEE, ASSISTANT PROFESSOR NICKERSON

Four and one-half credits (six hours lecture and recitation, and six hours laboratory work per week) First year, second quarter

Open to freshmen who have completed courses 3 and 4, or equivalent.

A comparative study of the anatomy, gross and microscopic, of the various organs of the alimentary, respiratory, urogenital, cutaneous, vascular and lymphatic systems.

9. ADVANCED VERTEBRATE EMBRYOLOGY PROFESSOR LEE, PROFESSOR JOHNSTON

Three credits (six lectures and recitations, and six hours laboratory per week) First year, second quarter

Open to first-year students who have completed course 11, or equivalent.

A comparative study of human and mammalian embryos, including impregnation, segmentation and implantation of the ovum, the formation, structure and relationships of the placenta and the foetal envelopes, and the details of organogenesis studied in a practical manner upon a very large collection of serial sections of human and mammalian embryos cut in various planes, and representing all phases of development.

1. THE ANATOMY OF THE SPECIAL SENSE ORGANS INCLUDING NOSE AND THROAT. PROFESSOR LEE

Four and one-half credits (six hours lecture and recitation and six hours laboratory work per week) Second year, third quarter

Open to sophomores or those who have completed courses 6, 8 and 9, or equivalent.

alent.

Anatomy of the organs of special sense, gross, microscopic, and developmental, with dissections, study of wet specimens and a large variety of microscopic preparations, laying a broad foundation for the special and clinical courses on these parts.

11. **DISSECTIONS** PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DRs.
HARE AND DISEN
Nine credits (twenty-four hours each week for nine weeks)

Second year, third quarter

Required of sophomores.

In this course the student completes the dissection of the other half of the human body.

12. **SPECIAL AND APPLIED NEUROLOGY** PROFESSOR JONHSTON AND MR. PAPEZ
One and one-half credits (two lectures and recitations, and two hours demonstrations per week)

Third year, fourth quarter

Open to third year students.

Special studies in preparation for the work of the fourth year in pathology and diseases of the nervous system.

14. **TOPOGRAPHICAL ANATOMY, MICRO TECHNIQUE AND SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES** PROFESSOR LEE, ASSISTANT PROFESSOR RETZER
Four and one-half credits (six lectures and recitations, and six hours laboratory per week)

Second year, third quarter

Open to second-year students who have completed courses 8 and 9.

A study of frozen sections, special dissections and of surface anatomy in preparation for the work in medicine, together with assigned problems in the study of embryological series and including the elements of teratology, also a course on the principles and practice of micro-technique, fixation, sectioning, staining, making drawings for illustrations, methods of reconstruction, injection, corrosion methods, museum methods, etc., of especial value to those who intend qualifying for laboratory positions.

15. **SURGICAL ANATOMY** PROFESSOR ERDMANN
Two and one-half credits (seven hours, lectures and recitations and laboratory each week for nine weeks)

Third year, third quarter

Open to students who have completed courses 10, 11 and 14.

A comprehensive review of the relationships of anatomical structures in their application to clinical medicine and surgery, comprising surface anatomy, the outlining of organs, the location and significance of landmarks, determination of blood vessels, and nerves, regional anatomy, influence of muscles in fractures, etc. Instruction is given by means of the living model, cadaver, special dissections, the lantern, models, and a study of frozen sections.

16. **THE ANIMAL PARASITES OF MAN** ASSISTANT PROFESSOR NICKERSON
Three credits (six hours per week lectures and laboratory)

Third quarter

An elective course in Medical Zoology. The general outlines of the morphology and classification of the different groups which contain members parasitic upon man, with special consideration of each species of medical importance, including its distribution, life history, methods of infection, means of diagnosis, and the chief symptoms produced by it.

17. **CYTOLOGY AND HISTOGENESIS** PROFESSOR LEE
Three credits (lectures and laboratory)

Third quarter

Elective course open to students who have had course 3 or 13, or equivalent.

18. **EXPERIMENTAL EMBRYOLOGY** PROFESSOR LEE

- Three credits (lectures and laboratory) Fourth quarter
 Elective course for advanced students.
19. RESEARCH IN HUMAN AND VERTEBRATE ANATOMY, HISTOLOGY, EMBRYOLOGY
 PROFESSOR LEE
 Properly qualified students in this and other colleges will be provided every facility for original investigation of anatomical problems of all kinds, either in their application to medicine or as abstract science, as majors or minors for the degrees of M.A., M.S., or Ph.D.
20. NEUROLOGICAL TECHNIQUE PROFESSOR JOHNSTON
 Three credits Fourth quarter
 Elective course for qualified students.
 Practical work in the preparation of the nervous system for gross and microscopic study.
21. THE NERVOUS SYSTEM AND MENTAL LIFE PROFESSOR JOHNSTON
 Two credits (two lectures, two demonstrations and reading with reports and discussion per week) Second quarter
 Open to a limited number of students by special permission.
 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.
22. COMPARATIVE NEUROLOGY OF VERTEBRATES PROFESSOR JOHNSTON
 Six credits (six hours lecture and recitations, and four hours laboratory per week) Second quarter
 Intended for graduates; open by special permission to seniors who meet the requirements. Prerequisite courses 1 and 2, or 3 in Animal Biology, or courses 3 and 8 in Histology and Embryology.
23. RESEARCH IN NEUROLOGY PROFESSOR JOHNSTON
 Open to those who are qualified to carry on investigation.
 Problems and special work in vertebrate neurology.
24. COURSE IN ANATOMY FOR DENTAL STUDENTS DRs. HARE AND DISEN
 A specially planned course in Osteology and Dissection. Open only to Dental students. First year, first and second quarters
25. DENTAL HISTOLOGY AND EMBRYOLOGY ASSISTANT PROFESSOR NICKERSON
 DR. LEMSTROM
 Three credits (four lectures, four recitations, eight hours laboratory per week) First year, fourth quarter
 Open to first-year students. A modified course specially arranged and open only to dental students.
 The structure and histogenesis of the organs and tissues, the structure and development of the teeth and jaws, the mouth cavity and glands.
26. COURSE IN ANATOMY FOR NURSES PROFESSORS LEE AND ERDMANN
 Lectures, recitations, demonstrations and laboratory exercises four hours per week, one semester.
27. ANATOMICAL JOURNAL CLUB AND SEMINAR
 Weekly meetings during year for reviews of the current literature and dis-

cussion of special topics in anatomy, histology, embryology, and neurology, and of the research work being carried on in the department. The department library, which is large and rapidly growing, receives all the leading anatomical journals.

The following text-books should be consulted:

ANATOMY. Cunningham, Piersol, Morris, Gray, Spalteholtz Atlas, Barker's Laboratory Manual, Cunningham's Manual of Dissection, Treve's Applied Anatomy, Quain's Anatomy, Flower's Osteology of Mammals, Gegenbauer's Elements of Comparative Anatomy, Chauveau's Comparative Anatomy, Wiedersheim's Elements of Comparative Anatomy, McClellan's Regional Anatomy, Deaver's Surgical Anatomy, Hildebrans' Chirurgisch Topographische Anatomie, Schultze's Applied Anatomy, Eisendrath's Clinical Anatomy, Boxe's and Eccluts' Applied Clinical Anatomy.

HISTOLOGY. Stohr-Lewis' Histology; Bohn-Davidoff-Huber's Histology; Bailey's Histology; Ferguson's Histology; Szymonowicz-MacCullum's Histology; Sobotta-Huber's Atlas; Lee's Vade Mecum; Kolliker's Gewebelehre; Oppel's Mikroskopische Anatomie.

EMBRYOLOGY. Minot's Human Embryology; Quain's Vol. 1, Part 1; Minot's Laboratory text-books; Hertwig-Mark's Embryology; Heisler's Embryology; Marshall's Embryology; Kolliker's Embryologie; Schultze's Embryologie; Kollman's Embryologie; Schenk's Embryologie.

NEUROLOGY. Johnston's Nervous System of the Vertebrates; Barker's Nervous System; Edinger's Lectures Nervous System; Gordinier's Nervous System; Van Gehuchten's Systeme Nerveaux; Kolliker's Gewebelehre; Obersteiner; Sabin's Atlas.

DEPARTMENT OF PHYSIOLOGY AND PHARMACOLOGY

RICHARD OLDING BEARD, M. D., Professor of Physiology and Director of the Department of Physiology and Pharmacology.

E. D. BROWH, Phm. D., M. D. Professor of Pharmacology and Materia Medica.

F. H. SCOTT, M. A., M. B., Ph. D., D. Sc., Assistant Professor of Physiology,

M. RUSSEL WILCOX, M D., Assistant Professor of Physiology.

JULIUS PARKER SEDGWICK, B. S., M. D., Instructor in Physiology and Chemistry.

W. H. CONDIT, B. S., M. D., Instructor in Therapeutics and Materia Medica.

CHAS. F. DIGHT, M. D., Lecturer in Pharmacology.

Professor of Homeopathic Materia Medica.

Professor of Homeopathic Therapeutics.

COURSES OF INSTRUCTION

The department of physiology and pharmacology occupies rooms in the medical science building, and in Millard's Hall, including lecture amphitheatres, a laboratory of experimental physiology, a laboratory of physiological chemistry, a laboratory of pharmacology, demonstration and recitation rooms, the laboratory libraries and offices of the Director and the professors of the department.

In the basement of the medical science building is a well-equipped workshop for the manufacture and repair of apparatus. Here, also, are animal rooms, furnished with enclosures, breeding cages, frog-tanks and aquarium. From the animal room supplies of animals and materials are obtained for the work in physiological chemistry

and experimental physiology. The hygienic conditions of the room are carefully studied, with a view to maintaining the physiological and structural integrity of its animal occupants as perfectly as possible.

The physiological and pharmacological laboratories are equipped with a full supply of apparatus, instruments, etc., for experimental purposes, including artificial respiratory machines, batteries, Du Bois Reymond coils, galvanometers, rheostats, Despretz signals, chronographs, moist muscle-chambers, kymographions, spring myographs, stethoscopes, phonendoscopes, stethometers, sphygmographs, cardiographs, sphygmometers, Gaskell's clamps, oncometers, oncographs, hemometers, hemocytometers, hematocrits, ergograph, plethysmograph, and microscopes. Electric motor power is provided for driving apparatus.

The course in physiology is graded in the first and second years. Under the concentration system in vogue, one half of the student's time is occupied with this study during one semester of each of these years.

Each phase of the subject is treated as a unit: i. e., the laboratory courses in physiological chemistry, experimental physiology, physical chemistry, etc., are correlated and interwoven with the lecture courses throughout. The work is essentially practical and is individualized as much as possible.

In the first year, the student takes up the study, first, of the physiologic components of the animal body; next, the physiological and physical properties of tissue-cells in general; the nutritive media; and the neuromuscular mechanisms. He then enters upon the study of systemic physiology, taking in turn, the circulation, digestion, secretion, respiration and excretion. Urinalysis is made a special feature of the work in physiological chemistry. The student is thoroughly drilled in the technique of analytical and estimative methods in the study of the body-fluids.

In the second year, the same methods are applied to the problems of metabolism and nutrition. The student makes a complete nutritive balance, based upon a series of actual feeding experiments, including the analysis of a standard dietary, the qualitative and quantitative examination of the feces and urine, the estimation of the total and differential nitrogens and the determination of respiratory quotients.

In relation to the question of nutrition, the physiology of development and the distinctive physiologic conditions of successive ages of human life are discussed.

The last three quarters of the year are occupied with the discussion and laboratory study of the physiology of the nervous system, special attention being paid to the observation and testing of special sense phenomena, cerebral localization, etc.

The course in pharmacology, materia medica and therapeutics is similarly graded in the second, third and fourth years. By lectures, demonstrations, laboratory experiments and recitations, the student is familiarized with the structure and character of drugs and with pharmaceutical preparations. He observes and experimentally determines the physiologic action of drugs; learns the principles and is drilled in the practice of prescription writing; discusses the indications of therapeutic use, and by the bedside and in the dispensary service applies this knowledge.

Laboratory reference libraries are accessible to the students for purposes of collateral reading.

Courses of Study

PHYSIOLOGY

1. GENERAL CELLULAR PHYSIOLOGY PROFESSORS BEARD, SCOTT AND WILCOX
AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, third quarter

The study of the physiologic components of the animal body; the physiologic and physical properties of the tissue-cells in general; the specializations of function; the nutritive media, including methods of blood examination.

2. THE MUSCULO NERVOUS MECHANISMS PROFESSORS BEARD, SCOTT AND WILCOX AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, third quarter

The study of the physiologic chemistry of nerve and muscle tissues; the phenomena of muscle and nerve action; and the principles of nerve control in general; the nature of stimuli and phenomena of stimulation. The student is introduced, in this course, to the technique of experimental study.

3. SYSTEMIC PHYSIOLOGY PROFESSORS BEARD, SCOTT AND WILCOX AND DR. SEDGWICK

Four and one half credits (twelve lecture and recitation periods, six laboratory periods) First year, fourth quarter

The vascular mechanism, including the estimation of blood-pressure, the mapping of cardiac areas, the study of heart sounds, and the making of sphygmograms.

The digestive system, including the process of secretion, the analysis of the digestive fluids, the examination of the normal stomach contents and the conduct of digestions.

4. SYSTEMIC PHYSIOLOGY (Continued) PROFESSORS BEARD, SCOTT AND WILCOX AND DR SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, fourth quarter

The respiratory mechanisms; the mechanics, physics, chemistry and nerve control of respiration.

The excretory system, including the study of excretion by the air passages, the intestinal tract, the skin and the kidney. Analysis of the physiological urine is addressed both to the determination of functional facts and to the attainment of the technique of clinical diagnosis in this field.

5. METABOLISM AND NUTRITION PROFESSORS BEARD AND SCOTT AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, first quarter

A study of metabolic and nutritional problems for the determination of nutritive balance, nitrogenous and body equilibrium, and specific dietetic results; including the analysis of standard dietaries and the further examination of the normal stomach contents and the fecal debris, the estimation of nitrogen excretion in total and in differential forms, the relation of fat splitting and fat-absorption, and the determination of respiratory quotients, etc.

6. THE PHYSIOLOGY OF DEVELOPMENT PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, first quarter

A study of the physiology of the ovum, the embryo and the foetus; of birth, infancy, childhood, puberty, menstruation, ovulation, pregnancy, parturition, maturity and old age.

7. PHYSIOLOGY OF SPECIAL SENSE ORGANS PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, second quarter

A study of special sense phenomena and of the means of determining the acuity of, and the influences which condition, special sense function in all its fields.

8. THE PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, and six laboratory periods) Second year, second quarter

A study of the functions of the nervous system in general, including the functional relations of nerve tracts, association paths, and central localization.

TEXT BOOKS:

First and second years—

Howell's Text-book of Physiology.

Foster's Physiology, Sixth English Edition.

Abderhalden's Physiologic Chemistry.

COLLATERAL READING: The American Text-book of Physiology; Hammarsten's Physiologic Chemistry; Landois and Sterling's Handbook of Physiology; Van Noorden's Text-book of Metabolism; Stewart's Practical Physiology; Tigerstedt's Physiology; Blyth's Foods and their Composition; Hutchinson's Dietetics.

PHARMACOLOGY

1. ELEMENTARY PHARMACY, GENERAL TOXICOLOGY AND PRINCIPLES OF PRESCRIPTION WRITING PROFESSOR BROWN, DR. DIGHT

Three credits (three hours lecture or recitation per week)

Second year, first semester

The course includes the following subdivisions;

(a) Elementary pharmacy; the gross, microscopic and chemic structure of drugs; weights and measures; pharmaceutic processes; and classes of pharmaceutic preparations.

(b) General treatment of poisoning; principles of prescription writing and incompatibilities; principles and rules of incompatibility; rules for solubility; construction of prescriptions; grammar and phrases of prescription-Latin, with class practice in writing simple prescriptions; use and materia medica of flavors.

(c) Materia medica is studied from the crude drugs and pharmaceutic preparations taken from the museum of materia medica to which the students has access at all times.

2. GENERAL PHARMACODYNAMICS (Experimental) PROFESSOR BROWN AND DR. DIGHT

Four and one-half credits (nine hours laboratory work per week)

Second year, first semester

Experiments on cold-blooded and warm-blooded animals, illustrating the action of drugs and the methods of pharmacologic experimentation. The class is divided into sections and these sections into groups of three to six students, each group performing experiments in the same line, but by modified methods, on different drugs having a similar pharmacologic action. The results are discussed at conferences, and the conclusions arrived at from the sum of the results. The knowledge thus obtained is by direct observation and serves to impress the student with the actions of drugs and prepares him for the systematic didactic courses given in the third year.

The experimental course includes the following subdivisions:

(a) Actions of drugs on tissues outside the body; corrosives; hemoglobin, osmosis, etc.

(b) Exercise on intact mammals, absorption and excretion of drugs; racial idiosyncrasy; treatment of poisoning; emetics; convulsants and depressants; pulse, pupils; salivation, etc.

(c) Exercises on frogs, convulsants central depressants, local anesthetics, on striped and cardiac muscle, cardiac nerves, etc.

(d) Operative work on mammals, general anesthetics, the effects of important drugs on blood pressure, respiration; oncometric and myocardiographic work; diuresis, peristalsis, perfusion of excised organs, isolated heart, etc.

3. SYSTEMATIC PHARMACOLOGY, TOXICOLOGY, MATERIA MEDICA AND THERAPEUTICS
PROFESSOR BROWN

Three credits (two hours lecture and recitation per week)

Third year, throughout the year

This course is the principal didactic course given in the department. The instruction is given by lectures and recitations. Each drug or group of drugs is studied in detail under the following subdivisions:

(a) PHARMACODYNAMICS. The effects of drugs are studied from the experimental and clinical evidence. Constant reference is made to the results obtained in the experimental course (course 2).

(b) TOXICOLOGY. Symptoms and treatment of poisoning.

(c) MATERIA MEDICA. The student is required to be able to identify the more important drugs, learn their physical characters, uses, etc.

(d) THERAPEUTICS. The conditions in which the drugs are rationally indicated or in which their empirical use has been found of value.

4. PRESCRIPTION WRITING

One credit (two hours lecture and recitations per week)

Third year, fourth quarter

Hypothetical cases are given and the student is required to write a prescription for the treatment, using the proper drugs which have already been covered in the text.

TEXT BOOK: Pharmacology, Sollmann.

5. PRACTICAL PHARMACY

PROFESSOR WULLING

One credit (four laboratory and lecture hours per week)

Third year, third quarter

1. U. S. Pharmacopeia.

(a) Metrology.

(b) Grades of drugs in use.

(c) Pharmacopoeial requirements as to purity.

2. Identity and impurities with U. S. Pharmacopoeial tests of six official substances.

3. Dispensing.

(a) The prescription.

(b) Compounding of prescriptions calling for the preparation of fourteen types of pharmacopoeial preparations.

6. THERAPEUTIC CONFERENCES

DR. CONDIT

Two credits (one hour weekly)

First and second semesters

Required of all seniors.

Conferences on assigned topics to be prepared by students from the point of view of literature and current clinic records, will be conducted weekly.

These will include the therapy of some of the common diseases and also the varied application of some of the common drugs and methods.

TEXT BOOKS:

Pharmacology, Materia Medica and Therapeutics—Sollmann.
Ortner's Treatment of Internal Diseases.
The Prophylaxis and Treatment of Internal Diseases—Forchheimer.
COLLATERAL READING. U. S. Pharmacopoeia; Dosebook and Manual of Prescription Writing—Thornton; National Dispensatory; National Formulary.

HOMEOPATHIC MATERIA MEDICA AND THERAPEUTICS.

An outline of these courses had not been received at the time the bulletin went to press. A reservation of space in the schedule has been provided, however, pending the preparation of the outline.

DEPARTMENT OF CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry.
CHAS. F. SIDENER, B.S., Professor of Chemistry.
EDWARD E. NICHOLSON, M. A., Assistant Professor of Chemistry.
EVERHART P. HARDING, M. S., Ph.D., Assistant Professor of Chemistry.
IRA HARRIS DERBY, B.S., Assistant Professor of Chemistry.
LILLIAN COHEN, M.S., Instructor of Chemistry.
FRANCIS C. FRARY, M.S., Instructor in Chemistry.
JOHN A. HANDY, Ph.C., Instructor in Chemistry.
JAMES ZIMMERMAN, B.A., Instructor in Chemistry.
WALTER L. BADGER, B.A., Instructor in Chemistry.

CHEMISTRY

(Courses in general and advanced general chemistry and qualitative analysis are required for entrance to this college and must precede the instruction in courses 1 and 2 listed below. See p. 34 this catalogue and p. 61 in catalogue of the College of Science, Literature and the Arts.)

1. ORGANIC CHEMISTRY PROFESSOR FRANKFORTER
Six credits (six hours per week) First year, second semester
Open to those who have completed courses in general and qualitative chemistry.
Lectures and laboratory work. The course includes an exhaustive study of the theories of organic chemistry, with one or more important preparations in each of the advanced series and groups of compounds.
2. TOXICOLOGY AND HYGIENE PROFESSOR FRANKFORTER, ASSISTANT PROFESSORS HARDING AND DERBY
Second year, second semester
TOXICOLOGY.—This course includes the general methods for the separation and identification of the poisons both organic and inorganic. Attention will be given to the identification of poisons associated with medicines and with vegetable and animal matter. Besides this qualitative and quantitative work, attention is given to the structure of those organic groups of compounds which have poisonous properties.
HYGIENE.—Chemistry lectures and laboratory work. This course includes

the chemical analysis of air, water and some of the common foods, milk, sugar and fruit products. Special attention is given to food adulteration and to food preservatives.

For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry). Facilities for research work are also afforded in a 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.

DEPARTMENT OF PATHOLOGY AND BACTERIOLOGY

FRANK F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology, and Director of the Department of Pathology and Bacteriology

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

H. E. ROBERTSON, A.B., M.D., Assistant Professor of Pathology and Bacteriology

H. W. HILL, M.D., Assistant Professor of Bacteriology

LOUIS B. WILSON, M.D., Assistant Professor of Clinical Pathology

J. FRANK CORBETT, B.S., M.D., Assistant Professor of Surgical Pathology

EDWARD FIDLAR, B.A., M.B., Demonstrator of Pathology and Bacteriology

ARTHUR S. HAMILTON, B.S., M.D., Instructor in the Pathology of the Nervous System

THOMAS R. MARTIN, B.A., M.D., Demonstrator of Pathology and Bacteriology

_____, Demonstrator of Pathology and Bacteriology

CLEMENT C. BLAKELY, M.D., Pathological Interne City and County Hospital, St. Paul

HALLWARD M. BLEGEN, M.D., A.B., Pathological Interne City Hospital, Minneapolis

CLIFFORD A. BOOREN, B.S., M.D., Pathological Interne St. Barnabas Hospital, Minneapolis

LEE POLLOCK, Departmental Laboratory Assistant

The Institute of Public Health and Pathology, to which attention has already been directed, provides adequate room and facilities for teaching and research in pathology, bacteriology and public health.

The main laboratory, 56x75 feet, lighted on three sides and by a skylight, is used for the general or required courses. It is divided into twelve loges, each fully and independently equipped in every detail for the use of six students who are responsible for all equipment therein contained. Supplies are distributed from a

(a) Inflammation. The cell reaction to various irritants is carefully studied throughout a variety of tissues and animals, so as to be comparative. As soon as familiarity with cell reaction is insured, the inflammatory processes in the various organs and systems are studied.

(b) Regeneration not already dealt with under inflammation is illustrated by specimens especially prepared from experimental animals and clinical and autopsy material.

(c) Inflammatory reactions and pathological processes dependent upon the activities of the circulatory system, including metastasis, thrombosis, embolism, infarction, etc., are systematically studied.

(d) Degeneration. The theories as to causation and the chemical processes involved are presented on the basis afforded by experimental work, together with a large amount of illustrative clinical material.

(e) The general physical, chemical and biological processes involved in immunity are presented together with practical and illustrative work on the precipitins, agglutinins, opsonins, etc. The pathology of fever is also fully given.

(f) The theories of causation, the general principles involved and the classification of tumors are illustrated by a carefully selected assortment of the various types.

3. *PATHOLOGY OF SPECIAL DISEASES (includes Bacteriology) PROFESSOR
WESBROOK, ASSISTANT PROFESSORS MULLIN AND ROBERTSON AND DRs.
FIDLAR AND MARTIN.

Ten credits (four lecture or recitation hours and twelve laboratory hours per week, eighteen weeks) Required in third year, first semester

Disease processes will be grouped, so far as practicable, according to their etiology. Instruction will be afforded by means of lectures, demonstrations of museum specimens and preparations, and laboratory work on materials secured from clinical cases and at autopsy.

The course will consist of instruction in

A. Pathology of infectious diseases.

(a) Special bacteriology of the infectious diseases with the cultivation on the various media of all the important pathogenic bacteria, sown and kept under observation by each student. Fluids and tissues from clinical cases and autopsies (human and animal) will be supplied for microscopic and cultural examination and an intimate relationship with clinical pathological work maintained.

(b) Special pathology of the infectious diseases. Concurrently with the bacteriology and parasitology of each of the diseases, the pathology of each infection will be studied.

The important gross and microscopic lesions in all the organs will be illustrated from clinical and autopsy material, fresh and preserved, and supplemented by experimental work. Each student will be required to prepare and examine under the microscope selected fresh and stained specimens of morbid tissues, fluids, etc.

B. Pathology of diseases of toxic and obscure origin. Under this are included the special degenerations, inflammations and other pathological conditions not already included under infectious diseases.

4. *MEDICAL PATHOLOGY (See also Course 21 under Department of Medicine.)

ASSISTANT PROFESSOR MULLIN

Two credits (two lecture hours and four laboratory hours per week)

Third year, first quarter

Required of all students.

The course includes:

*In schedule now under revision Course 1 may be transferred from the second to the first year and ecourses 3 and 4 from the third to the second year.

(a) The urine; a macroscopical study of its colors, and sediments, and the microscopical study of blood, pus, epithelial casts, spermatozoa, etc., in the urine of disease.

(b) The blood; the counting of red and white cells in the blood, the estimation of hemoglobin, the making of blood smears, and the fixing, staining, mounting and studying of all forms of normal and pathological red and white blood cells. In this course students are given specimens of blood from cases of pernicious anemia, myelogenous leukemia and lymphic leukemia, for study.

(c) Stomach contents; them acroscopical, chemical and microscopical study of gastric contents in various diseases of the stomach, with special reference to differential diagnosis, by lectures and demonstrations.

(d) Exudates and transudates in various disease of the pleura and peritoneum.

5. AUTOPSIES AND POST-MORTEM TECHNIQUE ASSISTANT PROFESSORS
ROBERTSON AND MULLIN

Required in third and fourth years.

Students will have an opportunity of personally taking part in this work, under the direction of the pathologists in charge, in the hospitals of Minneapolis and St. Paul. A knowledge of the technique of post-mortem work and of morbid anatomy will be thus afforded.

6. SURGICAL PATHOLOGY ASSISTANT PROFESSOR CORBETT
(Laboratory demonstrations, three hours per week) Third year, first semester

A demonstration laboratory course covering the subjects of surgical inflammations.

Abnormal conditions are demonstrated by gross and microscopic preparations from clinical cases and experimental sources and where possible the actual lesion in the living subject.

7. LABORATORY COURSE ON TUMORS ASSISTANT PROFESSOR CORBETT
(Three hours weekly) Fourth year, second semester

This course includes the comprehensive study of tumors, with the view of giving the student a knowledge of the methods employed in the laboratory diagnosis of this class of pathological conditions and familiarizing him with the characters of the common as well as the rarer types. It is intended to supplement the course on the surgery of tumors by Professor Stewart.

The work consists of combined study of microscopical sections and gross tumors with their clinical histories illustrated also by photographs and lantern slides (see also courses 10 and 11 under Department of Surgery).

8. SPECIAL PATHOLOGY OF THE NERVOUS SYSTEM DR. HAMILTON
Two credits (twelve hours per week, first four weeks)

Third year, second semester

So far as possible, the clinical history, autopsy notes, gross specimens and sections stained by various special methods will be presented of individual cases representing the principal organic diseases of the nervous system.

9. RESEARCH WORK IN ONE OF THE FOLLOWING LINES: Second semester of third and throughout the fourth year, hours assigned.

- (a) General pathology and bacteriology.
- (b) Special pathology and bacteriology.

TEXT BOOKS:

Pathology.—Adami's Inflammation; Delafield and Prudden's Handbook of Pathological Anatomy and Histology.

American Text-book of Pathology.
 Ziegler's General and Special Pathology.
 Schmaus-Ewing; Pathology and Pathological Anatomy.
 Coplin's Manual of Pathology.
 Cattell's Post-Mortem Pathology.
 Durck-Hektoen: Special Pathologic Histology.
 Jakob: Nervous System.
 Mallory and Wright's Pathological Technique.

Collateral Reading.—Adami's Principles of Pathology; Hamilton's Text-book of Pathology; Woodhead's Practical Pathology; von Kahlden's Pathological Histology Thoma's Text-book of General Pathology; Lubarsch Ostertag, Ergebnisse der Pathologie u. Anatomie; Orth, Pathologische Anatomie; Birch-Hirschfeld Pathologische Anatomie; Osler's Modern Medicine; Clifford Allbutt's System of Medicine; Leukhart's die Thierische Parasiten des Menschen; Bouchard, Traite de Pathologie Generale; Eichorst, Pathologie du Therapie; Gaylord and Aschoff, Pathological Histology; Nothnagel, Encyclopedia of Practical Medicine.

MEDICAL PATHOLOGY.

(See text-books under Department of Medicine.)

SURGICAL PATHOLOGY.

(See text-books under Department of Surgery.)

HYGIENE

HENRY MARTYN BRACKEN, M.D., L.R.C.S., (Edin), Professor of Preventive Medicine and Secretary of the Minnesota State Board of Health.
 F. F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology and Director of the Minnesota State Board of Health laboratories.
 F. H. BASS, B. S., Assistant Professor of Municipal Engineering and acting Sanitary Engineer, Minnesota State Board of Health.

Required of fourth year students, throughout the year. The fundamental portions of this subject are covered in the practical and lecture courses on chemistry of water, air, soil, milk and other food, and in the department of physiology in physiological chemistry.

The life history of bacteria and parasites, which serve to produce communicable diseases, are covered in pathology and bacteriology, as also in the bacteriology of water and milk and in the instruction on germicides and disinfectants.

The remaining portions of the subject and the application of the principles already inculcated in practical sanitation are reviewed in a special course of lectures and by special field work in the fourth year by those who have to deal with sanitation in practical every-day life.

The legal phases of sanitation, including federal, state and municipal hygiene together with the sanitation of various industries and the control of communicable diseases, are fully dealt with.

The relation of the laboratory and field methods to the location of foci of infection, the practical study of the selection of water supplies and the sanitary disposal of sewage and garbage are thoroughly covered, as is also the matter of the sanitary construction of buildings, ventilation and practical school hygiene.

In addition to the lectures and practical work at the college, visits of inspection are made to abattoirs, dairies, sources of water supply, sewage disposal and garbage plants, detention hospitals for smallpox and other communicable diseases, sanitary camps, sanatoria for tuberculosis, state schools for the deaf, dumb, blind and feeble-minded and the state hospitals for the insane. The officers of these various state and other institutions give instruction to the students and, in addition to the special lecturers listed, instruction is given by certain other state and municipal employees and by charity and social workers. The departments of economics, engineering, dairy husbandry and others in the University and a numerous corps of instructors from the various chairs in this college are used in special instruction.

It is the intention to carry the instruction of this department further each year into an organized coordinated symposium by all of the technical workers in the various lines which have to be reckoned with in public health and for which the municipal and state, executive, technical and educational machinery affords peculiar facilities to this college.

The thanks of the College are herewith tendered to those outside of the College, who have already contributed so largely to the successful teaching in this subject.

TEXT BOOKS:

The various federal, state and municipal reports are fully used, as well as special and general journals. Municipal and state blanks are supplied, particularly those which are used in Minnesota by the State Board of Health.

DEPARTMENT OF MEDICINE

CHARLES LYMAN GREENE, M.D., Professor of Medicine and Chief of the
Department of Medicine

CHARLES H. HUNTER, A.M., M.D., Clinical Professor of Medicine

EVERTON J. ABBOTT, A.B., M.D., Clinical Professor of Medicine

HENRY L. STAPLES, A.M., M.D., Clinical Professor of Medicine

THOMAS S. ROBERTS, M.D., Clinical Professor of Diseases of Children

JAMES T. CHRISTISON, M.D., Professor of Diseases of Children

CHARLES NOOTNAGEL, M.D., Clinical Professor of Medicine and Physical
Diagnosis

LOUIS A. NIPPERT, M.D., Clinical Professor of Medicine

GEORGE D. HEAD, B.S., M.D., Associate Professor of Medicine

GEORGE E. SENKLER, M.D., Clinical Professor of Medicine

S. MARX WHITE, B.S., M.D., Associate Professor of Medicine

SOREN P. REES, B.S., M.D., Instructor in Physical Diagnosis and Clin-
ical Medicine

JOHN GROSVENOR CROSS, B.S., M.D., Clinical Instructor in Medicine

PEDER A. HOFF, M.D., Clinical Instructor in Medicine

WALTER R. RAMSEY, M.D., Clinical Instructor in Diseases of Children

HENRY L. ULRICH, B.S., M.D., Instructor in Clinical Microscopy

JAMES GILFILLAN, M.D., Clinical Instructor in Medicine

WALTER D. SHELDEN, B.S., M.D., Clinical Instructor in Medicine

THOS. W. STUMM, M.D., Clinical Instructor in Medicine

CHARLES H. BRADLEY, M.D., Clinical Instructor in Medicine

HERMAN A. H. BOUMAN, M.D., Clinical Instructor in Physical Diagnosis
 CHARLES J. MEADE, M.D., Clinical Instructor in Medicine
 HENRY T. NIPPERT, M.D., Clinical Instructor in Medicine
 HENRY WIREMAN COOK, A.B., M.D., Clinical Instructor in Medicine
 WILLIAM H. AURAND, M.D., Clinical Assistant in Medicine
 LESLIE O. DART, M.D., Clinical Assistant in Diseases of Children
 ALEX R. HALL, M.D., Clinical Assistant in Medicine
 JOHN E. HYNES, M.D., Clinical Assistant in Medicine
 CHAS. B. WRIGHT A.B., M.D., Clinical Assistant in Diseases of Children
 JULIUS PARKER SEDGWICK, B.S., M.D., Instructor in Physiological
 Chemistry and Clinical Assistant in Diseases of Children
 JOHN C. STALEY, M.D., Clinical Assistant in Medicine
 LEVERETT D. BRISTOL, Clinical Assistant in Medicine

GENERAL MEDICINE

Courses in Medicine begin in the second semester of the second year, occupying one hour daily during the fourth quarter.

They occupy six hours per week during the third year and three hours weekly during the fourth year, in addition to the daily section clinics in the University Hospital and Dispensary and the two days of each week devoted to general clinics in the hospitals and dispensaries of the Twin Cities.

In the second year the courses include systematic lectures and quizzes as well as bedside demonstrations.

In the third year the lectures, quizzes, case analyses and recitations are reinforced by the bedside clinics and, so far as possible, the work of the class room and the clinical exercises are correlated.

Test examinations are held at the end of the courses of the second, third and fourth years and practical clinical examinations are required monthly during the third and fourth years, these being supplemented by a general written examination at the end of each year.

The fourth year's work in the class room consists chiefly of the analysis of actual case histories by the members of the class supplemented by explanatory remarks by the instructors. Seminar work also finds its place in the exercises of that year, and students are brought constantly into contact with medical problems of the most practical kind.

Instruction in pediatrics is wholly clinical after the third year.

Medical pathology, including systematic application of laboratory methods to diagnostics is taught in the pathological laboratory during the second semester of the second year and laboratory teachers co-operate with the teaching staff in the University Hospital and Dispensary and the City Hospital of Minneapolis and St. Paul.

Every effort is made to present cases to students in such a manner as will enable them to develop and properly balance the diagnostic features and apply logical and systematic methods. Furthermore the student is constantly drilled in case-taking, physical diagnosis, the use of diagnostic instruments of precision and applied clinical pathology at the bedside, under the Department of Medicine.

1. ELEMENTARY PHYSICAL DIAGNOSIS

DR. REES

(Three lectures and recitations per week, six weeks)

Second year, fourth quarter

2. CASE-TAKING AND GENERAL SYMPTOMATOLOGY DR. SHELDEN
(Three lectures and recitations per week, six weeks)
Second year, fourth quarter
3. DISEASES OF HEART AND BLOOD VESSELS PROFESSOR GREENE
(Two lectures and recitations per week)
Third year, first quarter
4. DISEASES OF THE BRONCHI, LUNGS AND PLEURA PROFESSOR HEAD OR PROFESSOR WHITE
(Two lectures and recitations per week)
Third year, first quarter
5. GASTRIC AILMENTS PROFESSOR GREENE
(Two lectures and recitations per week)
Third year, second quarter
6. DISEASES OF THE KIDNEY PROFESSOR NIPPERT
(Two lectures and recitations per week)
Third year, second quarter
THE ACUTE INFECTIOUS DISEASES PROFESSOR WHITE OR PROFESSOR HEAD
(Two lectures and recitations per week)
Third year, second quarter
8. THE ACUTE INFECTIOUS DISEASES PROFESSOR WHITE OR PROFESSOR HEAD
(One lecture and recitation per week)
Third year, third quarter
9. DISEASES OF THE INTESTINAL TRACT, LIVER, PANCREAS, SPLEEN AND PERITONEUM DR. GILFILLAN
(Two lectures and recitations per week)
Third year, third quarter
1. DISEASES OF THE BLOOD AND DUCTLESS GLANDS PROFESSOR HEAD OR PROFESSOR WHITE
(One lecture and recitation per week)
Third year, third quarter
11. SYSTEMATIC QUIZZES REVIEWING THE WORK OF THE YEAR PROFESSORS GREENE, HEAD, WHITE AND NIPPERT; DRs. CROSS AND GILFILLAN
(Four lectures and recitations per week)
Third year, fourth quarter
The classroom work of the fourth year in Medicine consists chiefly of case analysis, (using actual case histories) with short explanatory talks by the instructors, seminar work, etc.
12. CASE ANALYSIS
(Two exercises per week, fourth year)
First and second quarters
Third quarter
Fourth quarter.
PROFESSOR GREENE
PROFESSORS HEAD AND WHITE
PROFESSOR GREENE
13. Constitutional Diseases and the Intoxications DR. SHELDEN
(One lecture and recitation per week)
Fourth year, first quarter
14. DISEASES DUE TO ANIMAL PARASITES DR. ULRICH
(One lecture and recitation per week)
Fourth year, third quarter
15. TROPICAL DISEASES DR. CROSS
(One lecture and recitation per week)
Fourth year, fourth quarter

16. THE EXAMINATION FOR LIFE INSURANCE DR. COOKE
(One lecture and recitation per week) Fourth year, fourth quarter
17. THE DISEASES OF CHILDREN PROFESSOR CHRISTISON
(Two lectures and recitations per week) Third year, second semester
18. CLINICAL COURSE IN THE DISEASES OF CHILDREN PROFESSOR ROBERTS,
DRS. DART, WRIGHT
AND SEDGWICK
Four hours weekly, third and fourth year at Minneapolis City Hospital, Children's Home, University dispensary and other hospitals.
19. CLINICAL COURSE IN THE DISEASES OF CHILDREN PROFESSOR CHRISTISON
DR. RAMSEY
Four hours weekly, third and fourth year, at St. Paul City and County Hospital and St. Paul Dispensary.
20. MEDICAL PATHOLOGY. Combined laboratory and bedside course under the Departments of Medicine and Pathology. (See Course 4 under Department of Pathology and Bacteriology.)
21. PHYSICAL DIAGNOSIS. In addition to the systematic instruction given under Course 1, the topic is further developed and applied in the University Hospital and Dispensary and the public hospitals of the Twin Cities and special clinical lectures and section clinics are conducted by Professor Nootnagel and Drs. Rees and Boumann.
The class room courses dealing with diseases of the thorax and abdomen, further emphasize and apply the various methods of diagnosis, whether physical, instrumental, chemical or microscopic.
22. GENERAL MEDICAL CLINICS
- (a) Students visit the University Hospital daily, take case histories and closely follow and report upon individual patients to whom they are specifically assigned.
- (b) Section clinics are held daily in the University Hospital and University Dispensary.
- (c) Section Clinics and occasional Clinical lectures occupy the entire afternoon and part of the forenoon on each Thursday and Saturday throughout the entire third and fourth years.
- (d) Special Tuberculosis Clinics are held at the special tuberculosis out patient clinics and in the Thomas Hospital.
- A detailed statement of the clinics of the past year appears on pages 87 to 91 and will illustrate the methods employed in scheduling the work.

MEDICINE

TEXT BOOKS. Greene's Medical Diagnosis; Cabot's Physical Diagnosis; Da Costa's Physical Diagnosis; Musser's Medical Diagnosis; Hare's Diagnosis; Leube's Special Medical Diagnosis; Osler's Practice; Edward's Practice of Medicine; French's Practice of Medicine; Tyson's Practice of Medicine; Mering's Lehrbuch der Innere Medizin.

REFERENCE BOOKS. Osler's Modern Medicine; Allbutt's System; Ebstein und Schwalbe's Handbuch; Gibson's Practice of Medicine; Mackenzie on the Heart; Babcock on the Heart Gibson on the Heart and Aorta; Boas on the Stomach and

Intestines; Zweig's Magen und Darmkrankheiten; Bourget-Die Krankheiten des Magens; Greene's Examination for Life Insurance; Cornet; Eichhorst; Manson's Tropical Diseases.

THERAPEUTICS. Forscheimer, Prophylaxis and Treatment; Croftan, Clinical Therapeutics; Ortner, Treatment of Internal Diseases; Yeo, Manual of Treatment; Hutchinson and Collier, Index of Treatment; Wilcox, The Treatment of Disease; Hare, Practical Therapeutics; Eichhorst, Specielle Pathologie und Therapie.

DISEASES OF CHILDREN. Holt's Diseases of Children; Rotch's Pediatrics; American Text-book of Diseases of Children; Keating's Cyclopaedia of Diseases of Children; Corlett's Acute Infectious Exanthemata; Chapin's Theory and Practice of Infant Feeding; Stengel's Nothnagel's Encyclopedia.

MEDICAL PATHOLOGY. Wood's Chemical and Microscopical Diagnosis; Sahli's Diagnostic Methods; Simon's Clinical Diagnosis; Hutchinson and Rainey's Methods; Emerson's Clinical Diagnosis; Nichol's Clinical Laboratory Methods; Boston's Clinical Diagnosis; Schleip's Atlas of Hematology; Cabot's Clinical Examination of the Blood; Da Costa's Clinical Hematology; Ewing's Pathology of the Blood; Dickson, The BoneMarrow; Ogden's Clinical Examination of the Urine; Braun, Animal Parasites of Man.

DEPARTMENT OF SURGERY

JAMES E. MOORE, M.D., Professor of Surgery and Chief of the Department of Surgery

FREDERICK A. DUNSMOOR, M.D., Professor of Operative and Clinical Surgery

J. CLARK STEWART, B.S., M.D., Professor of Principles of Surgery

MAX P. VANDER HORCK M.D., Professor of the Diseases of the Skin and Genito-Urinary Organs

ARCHIBALD MACLAREN, A.B., M.D., Clinical Professor of Surgery

ARTHUR J. GILLETTE, M.D., Professor of Orthopedic Surgery

BURNSIDE FOSTER, A.B., M.D., Clinical Professor of Diseases of the Skin and Lecturer upon the History of Medicine

HENRY J. O'BRIEN, M.D., Clinical Professor of Surgery

JOHN T. ROGERS, Clinical Professor of Surgery

A. T. MANN, B.S., M.D., Clinical Professor of Surgery and Clerk of Clinics

H. B. SWEETSER, M.D., Clinical Professor of Surgery

A. SHIMONEK, M.D., Clinical Professor of Surgery

WARREN A. DENNIS, M.D., Clinical Professor of Surgery

A. R. COLVIN, M.D., Clinical Professor of Surgery

J. FRANK CORBETT, M.D., Assistant Professor of Surgical Pathology

JUDD GOODRICH, M.D., Clinical Instructor in Surgery

F. R. WRIGHT, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases

JOHN B. BRIMHALL, M.D., Clinical Instructor in Orthopedic Surgery

ARTHUR A. LAW, M.D., Instructor in Operative Surgery

R. E. FARR, M.D., Clinical Instructor in Surgery
 S. E. SWEITZER, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases
 ARCHA WILCOX, M.D., Clinical Instructor in Surgery
 EMIL S. GEIST, M.D., Clinical Instructor in Orthopedic Surgery
 PAUL B. COOK, M.D., Instructor in Genito-Urinary Diseases
 JOHN M. ARMSTRONG, M.D., Clinical Assistant in Genito-Urinary Diseases
 E. K. GREEN, A.B., M.D., Clinical Assistant in Surgery

COURSES OF INSTRUCTION

The course in surgery is graded in the third and fourth years. Examination are held at the close of each of these years. Lectures and recitations are given by the teaching staff in surgery and clinics at the dispensaries and hospitals of Minneapolis and St. Paul by a large corps of instructors.

1. **SURGICAL PATHOLOGY** ASSISTANT PROFESSOR CORBETT
 Laboratory demonstrations, three hours per week, third year, first semester
 A demonstration laboratory course covering the subjects of surgical inflammations.
 Abnormal conditions are demonstrated by gross and microscopic preparations and experimental sources, and where possible by similar lesions on the living subject. (See also Course 6 under Pathology and Bacteriology.)
 2. **PRINCIPLES OF SURGERY** PROFESSOR STEWART
 Lectures, two hours weekly Third year, first semester
 Systematic discussion of the diseases and injuries of the bones and joints except fractures and dislocations; injuries and diseases of the skin, lymphatics, blood vessels (including aneurism) and nerves; of the tendons, fasciae and bursae.
 Lectures will be illustrated by lantern slides and demonstration of gross specimens.
 3. **OPERATIVE SURGERY** PROFESSOR DENNIS
 One hour a week, Third year, third quarter
 Lectures upon the principles of operative procedure; the preparation of patient operator and operating rooms; the principles of asepsis, antiseptics and sterilization; ligatures and sutures; and the treatment of wounds.
 4. **THE PRACTICE OF SURGERY** PROFESSOR MOORE
 Lectures and recitations, three hours a week. Third year, second semester
 Fractures and dislocations; regional surgery.
- II. **THE PRACTICE OF SURGERY** PROFESSOR MOORE
 Three hours a week. Fourth year, first semester
 Surgery of the head, neck, chest, back, breast, abdomen, including hernia, anus, rectum and urinary tract. Lectures and recitations.
6. **OPERATIVE SURGERY** PROFESSOR ERDMANN, DR. LAW
 Laboratory course, Fourth year, first quarter
 Practical exercises on the cadaver illustrative of the courses in surgery.

7. **ORTHOPEDIC SURGERY** PROFESSOR GILLETTE
Lectures and recitations, three hours a week. Fourth year, fourth quarter
This includes diseases of bones, joints, synoviae and bursae, congenital and acquired deformities; dystrophies, with the principles of treatment.
8. **DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASES**
PROFESSOR VANDER HORCK
Two lectures and recitations per week. Fourth year, second semester
9. **CLINICAL LECTURES ON DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASE**
PROFESSORS VANDER HORCK AND FOSTER, DRs. WRIGHT AND SWEITZER
Weekly at Minneapolis and St. Paul City Hospitals and daily at the University
Clinical Building and St. Paul Dispensary. Fourth year
10. **TUMORS** PROFESSOR STEWART
Lectures and demonstrations, two hours a week. Fourth year, second semester
The course on tumors is comprehensive, including a complete systematic
laboratory course on tumor histology by Professor Corbett and regional tumor surgery
with lantern slide demonstrations by Professor Stewart. The general subject of
tumors, their life history, classification, pathogenesis, diagnosis and treatment is
taken up by lectures.
Regional surgery of tumors is also considered fully and is copiously illustrated
by lantern slides.
11. **LABORATORY COURSE ON TUMORS** ASSISTANT PROFESSOR CORBETT
Three hours weekly. Fourth year, second semester
Each variety of tumor is taken up and studied. Students are given sections
illustrating same. With this microscopic study is combined recitation and demon-
strations or gross tumors with histories, photographs and lantern slides. (See also
Course 7 under Department of Pathology and Bacteriology.)
12. **BANDAGING, DRESSINGS AND MINOR SURGERY** DR. LAW
Eight hours Fourth Year
A practical course of instruction in which the student is required to apply
bandages and dressings himself. Anesthesia and anesthetics.
13. **CLINICAL SURGERY**
Courses of clinics at which operations, in the whole domain of surgery, are
witnessed by the students of the third and fourth years. These clinics are held in the
dispensaries and hospitals of the cities of Minneapolis and St. Paul, upon Thursdays
and Saturdays throughout the year. The classes alternate at the two cities in their
attendance upon these clinics. They are conducted personally, throughout the year,
by the clinical chiefs and their associates as follows:

University hospital clinics, medical and surgical clinics will be held every
Thursday and Saturday, the former by Professor Greene and his assistants, and the
latter by Professor Moore and his assistants. Bedside clinics will be given throughout
the week by various members of the staff.

At the City and County Hospital, St. Joseph's Hospital, St. Luke's Hospital
in St. Paul, weekly, by Professor John T. Rogers.
At the City and County Hospital, St. Joseph's Hospital, St. Luke's Hospital
or Free Dispensary, in St. Paul, with sections of class weekly, by Professor John T.

Rogers, Dr. C. M. Coon, Professor A. J. Gillette, Dr. W. A. Dennis, Dr. Judd Goodrich and Dr. A. Colvin.

At St. Luke's Hospital, Professor Archibald McLaren.

At St. Joseph's Hospital, Professor H. J. O'Brien.

At the Swedish Hospital or the City Hospital, Minneapolis, weekly, by Professor F. A. Dunsmoor.

At the City Hospital, Minneapolis, weekly, by Professors J. Clark Stewart and A. T. Mann.

TEXT BOOKS

SURGERY. Park's Surgery; Rose and Carless' Surgery; International Text-book of Surgery; Warren's Surgical Pathology and Therapeutics; Surgical Diagnosis, Berg; Bryants' Operative Surgery; Binnie's Operative Surgery; Scudder on Fractures; Stimson on Fractures; Moore's Orthopedic Surgery; Bradford's and Lovett's Orthopedic Surgery; Whitman's Orthopedic Surgery; Lexer's Handbook of Surgery; Taylor's Orthopedic Surgery.

DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASES. Key's or White and Martin's Diseases of Urinary Organs; Lydston's Genito-Urinary, Venereal and Sexual Diseases; Hyde's Diseases of the Skin; Walker's Dermatology; Jackson's Diseases of the Skin; Hyde and Montgomery's Venereal Diseases; Crocker's Diseases of Skin; Morris' Diseases of the Skin; Hayden's Diseases of the Skin; Stelwagon's Diseases of the Skin; Taylor's Genito-Urinary and Venereal Diseases of the Skin.

DEPARTMENT OF OBSTETRICS

PARKS RITCHIE, M.D., Professor of Obstetrics, and Chief of Department of Obstetrics.

A. B. CATES, A.M., M.D., Professor of Obstetrics.

FREDERICK LEAVITT, M. D., Clinical Professor of Obstetrics.

JENNINGS C. LITZENBERG, B.S., M.D., Clinical Professor of Obstetrics.

JEANETTE M. McLAREN, M.D., Clinical Instructor in Obstetrics.

F. L. ADAIR, M.D., Clinical Instructor in Obstetrics

COURSES OF INSTRUCTION

The subject of obstetrics is taught by lectures, recitations and demonstrations upon the manikin; by illustrative drawings and by attendance upon cases of labor. The didactic work is done in the third year; the clinical study is had in the fourth year. A large part of the obstetrical service of the City Hospital in St. Paul and of the Minneapolis City Hospital is at the disposal of the department of obstetrics. Clinics are also held at other hospitals in St. Paul and Minneapolis.

1. THE ANATOMY AND PHYSIOLOGY OF THE PELVIC ORGANS PROFESSORS RITCHIE AND CATES

Lectures and recitations, two hours a week in October and January, and three hours a week, second semester, third year.

The development of the embryo and appendages; pregnancy; symptoms and diseases; operative obstetrics; the complications of labor and its sequelae.

2. THE THEORY AND PRACTICE OF OBSTETRICS

Lectures and recitations, two hours a week in November, December and January, third year.

The mechanism and conduct of normal labor, with its complications; abortions.

3. HOSPITAL WARD WORK PROFESSOR LEAVITT

Twice a week, from January 1st to May 1st, small sections of the third and fourth year classes will study the signs of pregnancy, pelvimetry, obstetric diagnosis, the puerperal state, the early care of infants, incubation, etc., in the maternity wards of the City and County Hospital, St. Paul.

4. CLINICAL OBSTETRICS

The study of and the participation in the conduct of two or more hospital deliveries in the fourth year under the direction of Professors Leavitt and Litzenberg. Also a number of confinements in maternities and private homes, conducted by Doctors Adair and Jeanette McLaren.

5. MANIKIN DEMONSTRATIONS PROFESSOR LITZENBERG AND DR. ADAIR

Once a week during the third and fourth years the various positions, presentations and obstetric operations will be demonstrated by means of the manikin.

6. RECITATIONS PROFESSORS LEAVITT AND LITZENBERG

One hour a week.

Fourth year, first and second semesters

This course will be a review of the subject of practical obstetrics by recitations.

TEXT-BOOKS:

Hirst, Edgar, Williams, Jewett, Lusk, Peterson, and the American Text-Book of Obstetrics.

DEPARTMENT OF GYNECOLOGY

ALEXANDER J. STONE, M.D., LL.D., Professor of Diseases of Women, and Chief of the Department of Gynecology.

AMOS W. ABBOTT, M.D., Clinical Professor of Diseases of Women.

JOHN J. ROTHROCK, A.M., M.D., Clinical Professor of Diseases of Women.

GEO. C. BARTON, M.D., Clinical Instructor in Gynecology.

ARTHUR E. BENJAMIN, M.D., Clinical Instructor in Gynecology.

HARRY P. RITCHIE, Ph.B., M.D., Clinical Instructor in Gynecology.

H. L. WILLIAMS, A.B., M.D., Clinical Instructor in Gynecology.

COURSES OF INSTRUCTION

The course in the diseases of women consists of lectures, recitations, clinical instruction and the witness of operations upon the human subject, as they may offer.

1. LECTURES AND RECITATIONS PROFESSOR STONE

Two hours per week, first semester, one hour a week,

Fourth year, second semester

2. CLINICAL COURSES AT THE CITY AND OTHER HOSPITALS IN MINNEAPOLIS AND ST. PAUL.

Observations and examinations of patients, methods of examination, diagnosis and treatment.

Weekly clinics in Minneapolis hospitals, by Prof. Abbott, Dr. Benjamin and Dr. Williams.

Weekly clinics held in St. Joseph's Hospital, St. Paul, by Prof. Stone.

Weekly clinics held at the City and County Hospital, St. Paul, during January, February, and March, by Dr. Rothrock.

The above announcements represent the surgical work given in gynecology throughout the entire year. Every operation in this branch of surgery is presented in these clinics. Owing to the limited field within which this work must be done, the attempt is always made to divide the class into small sections. Daily clinics for small sections are held at the University and St. Paul Free Dispensaries by Drs. A. E. Benjamin, H. L. Williams, and J. L. Rothrock. This work is especially valuable since it brings the student into direct acquaintance with the patient. Individual instruction is given in history-taking, diagnosis, methods of examination, treatment and minor gynecology.

TEXT-BOOKS:

Dudley's Diseases of Women.

Reed's Text-book of Gynecology.

Kelly's Operative Gynecology.

Collateral Reading—Penrose, Gleist and Ashton.

DEPARTMENT OF EYE, EAR, NOSE AND THROAT DISEASE

FRANK C. TODD, M.D., Professor of Ophthalmology and Otology, and Chief of the Department.

WILLIAM R. MURRAY, A.B., M.D., Professor of Rhinology and Laryngology.

JOHN S. MACNIE, A.B., M.D., Clinical Professor in Ophthalmology and Otology.

ALBERT C. HEATH, M.D., Clinical Professor in Rhinology and Laryngology.

ROBERT A. CAMPBELL, M.D., Clinical Instructor in Rhinology and Laryngology.

FRANK E. BURCH, M. D., Clinical Instructor in Ophthalmology and Otology.

CHAS. H. SPRATT B.S., M.D., Clinical Instructor in Ophthalmology and Otology.

E. H. PARKER, M.D., Clinical Instructor in Rhinology and Laryngology.

ROBERT A. CAMPBELL, M.D., Clinical Instructor in Rhinology and Laryngology.

J. A. WATSON, M. D., Clinical Instructor in Rhinology and Laryngology.

H. JOURNEAY WELLS, M.D., Clinical Instructor in Ophthalmology and Otology.

JOHN H. MORSE, B. A., M. D., Clinical Assistant in Ophthalmology and Otology.

E. R. BRAY, M.D., Clinical Assistant in Ophthalmology and Otology.

COURSES OF INSTRUCTION

The student, during the first two years, receives instruction in the anatomy and physiology of these organs in those departments, and the courses upon diseases of the eye, ear, nose and throat are given during the senior year, excepting that a certain amount of clinical work is provided during the third year.

The required work consists of a course of lectures and recitations and of dispensary and hospital clinics given in Minneapolis and St. Paul by a competent corps of instructors. Students are taught the technique of examination and the treatment of the common and important diseases. An elective course is also furnished in ophthalmology.

1. DISEASES OF THE EYE AND ITS APPENDAGES, REFRACTION AND ERRORS
Lectures, two hours a week, first semester, fourth year. PROFESSOR TODD
Recitations covering this course of lectures nine hours during the first semester
Fourth year DR. MACNIE
2. DISEASES OF THE EAR
Lectures, nine hours during first semester, fourth year PROFESSOR TODD
Recitations on this course DR. MACNIE
3. DISEASES OF THE NOSE AND THROAT PROFESSOR MURRAY
Lectures and recitations, two hours a week, second quarter, fourth year
Pathology, diagnosis and treatment.
4. Clinical lectures on Eye, Ear, Nose and Throat operations at Northwestern Hospital Minneapolis, given every Thursday. Sections of Senior and Junior classes.
PROFESSOR TODD
5. Clinical lectures and operations on Nose and Throat, given at Asbury and City Hospital, Minneapolis, every Saturday. Sections of Senior and Junior classes.
PROFESSOR MURRAY
6. Clinical lectures and operations on Eye and Ear, given at Northwestern Hospital, Minneapolis, every Saturday. Sections of Senior and Junior classes.
DR. SPRATT
7. Clinical instruction will be given at the University and the St. Paul Free Dispensaries in the diagnosis of diseases of the eye and ear; in the methods of examination in the use of instruments, including the ophthalmoscope, and in the treatment of eye and ear diseases, etc. Small sections daily. Fourth year.
Diseases of eye and ear, Minneapolis DR. MACNIE AND DR. WELLS
Diseases of the eye, St. Paul DR. BURCH
8. Clinical instruction will be given at the University and St. Paul Free Dispensary in the diagnosis of nose and throat diseases, in the methods of examination, use of instruments and treatment of these. Small sections daily. Diseases of the nose and throat, Minneapolis, PROFESSOR MURRAY, DR. CAMPBELL, DR. PARKER, DR. WATSON.
St. Paul Two days a week, fourth and third year DR. HEATH

9. OPTHALMOSCOPY

DR. MACNIE

A practical course of instruction. Technique of ophthalmoscopy, with illustrations on models and patients, normal and abnormal cases, demonstrating diseases of the interior of the eye. This course elective in the senior year.

10. INTUBATION

DR. E. H. PARKER

An elective course on intubation illustrated by work on the cadaver will be given to fourth year students. Class limited to six students.

TEXT BOOKS:

May, Diseases of the Eye.

Wood and Woodruff, Commoner Diseases of the Eye.

Fox's Diseases of the Eye.

Bacon's Diseases of the Ear.

Coakley's Diseases of the Nose and Throat.

Kyle's Diseases of the Nose and Throat.

Grayson's Diseases of the Nose and Throat.

Collateral Reading. Ballenger's Diseases of Ear, Nose and Throat, Posey and Wright's Diseases of the Ear, Nose and Throat.

DEPARTMENT OF NERVOUS AND MENTAL DISEASES

C. EUGENE RIGGS, A. M., M.D., Professor of Nervous and Mental Diseases, and Chief of the Department of Nervous and Mental Diseases.

WILIAM A. JONES, M.D., Professor of Nervous and Mental Diseases.

A. W. DUNNING, M.D., Clinical Professor of Nervous and Mental Diseases.

HALDOR SNEVE, M.D., Clinical Professor of Nervous and Mental Diseases.

A. S. HAMILTON, B.S., M.D., Instructor in Pathology of the Nervous System.

H. W. JONES, M.D., Clinical Instructor in Nervous and Mental Diseases.

CHARLES R. BALL, A.B., M.D., Clinical Instructor in Nervous and Mental Diseases.

A. E. LOBERG, M. D., Clinical Assistant in Nervous and Mental Diseases

COURSES OF INSTRUCTION

The required courses of lectures and recitations and clinics in this department will be given in the fourth year. The courses relating to the anatomy, physiology and pathology of the nervous system are given by these departments in the first, second and third years. Instruction will be by recitations and the "case method." An elective course in electro-therapeutics will be offered in the fourth year.

NEUROLOGY

PROFESSORS RIGGS AND JONES (alternating)

Two hours a week, twelve weeks.

Fourth year, first semester

Lectures, recitations and demonstrations.

PSYCHIATRY

PROFESSORS RIGGS AND JONES (Alternating)

Two hours a week, five weeks.

Fourth year, first and second semesters

Lectures, recitations and demonstrations.

3. ELECTRO-THERAPEUTICS (elective)

DR. BALL

Fourth year.

4. CLINICAL NEUROLOGY AND PSYCHIATRY PROFESSORS RIGGS AND JONES

Practical instruction will be given upon Thursdays and Saturdays, fourth year Clinics will be conducted in St. Paul, by Professor Riggs, Drs. Dunning and Ball, at the City and County Hospital, St. Luke's Hospital, St. Joseph's Hospital and the Free Dispensary; and in Minneapolis by Professor Jones, and Drs. H. W. Jones and Loberg, at the City Hospital, Asbury Hospital, St. Mary's Hospital and the University Free Dispensary.

TEXT-BOOKS:

Oppenheim's Diseases of the Nervous System.
 Dana's Nervous Diseases.
 Church and Peterson's Nervous and Mental Diseases.
 Allan M. Starr's Nervous Diseases, Organic and Functional.
 The Eye and Nervous System, Posey and Spiller.
 Manual of Psychiatry, Dr. Fursac.
 Text-book of Psychiatry, Leonardo Bianchi.
 Practical Manual of Insanity, Brower and Bannister.
 The Hygiene of Mind, T. S. Clouston.
 Collateral Reading. Edinger's Anatomy of the Central Nervous System;
 Gordinier's Anatomy of the Central Nervous System. Gower's Diseases of the Nervous System.

THE HISTORY OF MEDICINE AND MEDICAL ETHICS

PROFESSOR BURNSIDE FOSTER

Two hours a week.

Fourth year

A course of lectures is given on the history of medicine and of the medical profession from the earliest times, including accounts of the epoch-making discoveries in medicine, brief sketches of the lives of eminent physicians and an account of the great plagues in history.

MEDICAL JURISPRUDENCE

PROFESSOR SWEENEY

Two hours a week.

Fourth year

A course of lectures and recitations, in the legal relations of medicine.

TEXT-BOOKS:

Taylor's Medical Jurisprudence.
 Collateral Reading. Withaus' Principles of Forensic Medicine and Toxicology;
 Wharton and Stille's Medical Jurisprudence; Reese's Medical Jurisprudence and Toxicology; Draper's Medical Jurisprudence.

SCHEDULE OF EXAMINATIONS FOR ADVANCED STANDING
AND TO REMOVE CONDITIONS

September 7-11, 1909

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|---|---|
| <p style="text-align: right;">Tuesday, Sept. 7, 9:00 a. m.</p> <p>I. Year.</p> <p>II. Year Histology and Embryology, practical.</p> <p>III. Year Special Pathology and Bacteriology, practical.</p> <p>IV. Year by arrangement.</p> | <p style="text-align: right;">2:00 p. m.</p> <p>I. Year Histology and Embryology, practical.</p> <p>II. Year General Pathology and Bacteriology, practical</p> <p>III. Year Practical Pharmacy.</p> <p>IV. Year by arrangement.</p> |
| <p style="text-align: right;">Wednesday, Sept. 8, 9:00 a. m.</p> <p>I. Year Physiology.</p> <p>II. Year Chemistry.</p> <p>III. Year Principles of Surgery.</p> | <p style="text-align: right;">2:00 p. m.</p> <p>I. Year Histology and Embryology, written</p> <p>II. Year Histology and Embryology, written.</p> <p>III. Year Surgery.</p> |
| <p style="text-align: right;">Thursday, Sept. 9, 9:00 a. m.</p> <p>I. Year Chemistry.</p> <p>II. Year Physiology.</p> <p>III. Year Practice of Medicine.</p> | <p style="text-align: right;">2:00 p. m.</p> <p>I. Year.</p> <p>II. Year General Pathology and Bacteriology, written.</p> <p>III. Year Special Pathology and Bacteriology, written.</p> |
| <p style="text-align: right;">Friday, Sept. 10, 9:00 a. m.</p> <p>I. Year Anatomy.</p> <p>II. Year Anatomy.</p> <p>III. Year Surgical Anatomy.</p> | <p style="text-align: right;">2:00 p. m.</p> <p>I. Year.</p> <p>II. Year Materia Medica and Pharmacology.</p> <p>III. Year Therapeutics.</p> |
| <p style="text-align: center;">Saturday, Sept. 11.</p> | |

Examination for advanced standing and to remove conditions in the following third- and all fourth-year subjects will be held by *appointment* during September 7-11: Diseases of Children, Physical Diagnosis, all elective subjects, and all subjects not listed above. In all subjects not specifically scheduled, condition examinations must be arranged for not later than Sept. 7.

Students must register for examinations in dean's office at least twenty-four hours prior to any examination they may wish to take. See also under Rules, page 36 for regulation concerning unremoved conditions, etc.

Conditioned students will not be admitted to any examination without presenting receipt from the cashier for the examination fee, to the dean and obtaining entrance ticket.

MINNEAPOLIS HOSPITAL CLINICS

(For Dispensary Clinics see page 91.)

MONDAY

HOURL	SUBJECT	CLINICIAN	SERVICE
2:15-3:15	Tuberculosis	Prof. Nippert	Thos. H. 3d q.

TUESDAY

12:30-1:30	Jr. Phys. Diag.	Prof. Nootnagel	Clin. Building
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WEDNESDAY

12:30-1:30	Jr. Phys. Diag.	Dr. E. K. Green	Clin. Building
2:15-3:15	Tuberculosis	Dr. Cross	Thos. H. 3d q.

THURSDAY

8:30-10:30	Eye and Ear	Prof. Todd	Nw. Hosp.
10:30-12:30	Gynecology	Dr. Benjamin	Nw. Hosp.
1:00-2:00	Medicine	Prof. Hunter	St. Barnabas
8:30-10:30	Medicine	Prof. Nootnagel	City
11:00-12:00	Nose & Throat	Prof. Murray	Ashbury
11:00-12:00	Nose & Throat	Dr. Watson	
1:00-2:00	Medicine	Prof. White	City
1:00-2:00	Medicine	Dr. Bradley	City
1:00-2:00	Medicine	Dr. Rees	City 3 mos.
8:30-10:30	Surgery	Prof. Sweetser	City
10:30-12:00	Medicine	Dr. Rees	City 3 mos.
10:30-12:00	Surgery	Prof. Mann	City 3 mos.
10:30-12:00	Contagious	Dr. Hart	City
1:00-2:00	Medicine	Prof. Head	Clin. Building
2:00-3:00	Dermatology	Prof. F. R. Wright	Clin. Building
2:00-3:00	Pediatrics	Dr. Sedgwick	City
2:00-3:00	Ner. & Ment.	Dr. H. W. Jones	City
2:30-3:30	Medicine	Prof. Head	Thos. H.
3:15-4:15	Ner. & Ment.	Prof. W. A. Jones	City
4:00-6:00	Autopsies	Prof. White or Prof. Corbett	City

FRIDAY

HOOR	SUBJECT	CLINICIAN	SERVICE
12:30-1:30	Jr. Phys.Diag.	Dr. Rees	Clin. Building

SATURDAY

8:30-10:30	Surgery	Prof. Dunsmoor	Swedish
10:30-12:00	Medicine	Prof. Nippert	City
1:00-2:30	Surgery	Prof. Mann	City 3 mos.
1:00-2:30	Medicine	Dr. Cross	City 3 mos.
2:30-3:30	Pediatrics	Dr. C. B. Wright	City 3 mos.
8:30-10:30	Medicine	Prof. Head	City
8:30-10:30	Medicine	Dr. Sheldon	City
10:30-12:00	Gynecology	Prof. Abbott or Dr. Williams	City
10:30-12:00	Gynecology	Dr. Barton	City
8:30-10:30	Contagious	Dr. Dart	City
1:00-2:25	Surgery	Dr. Farr	St. Mary's
1:00-2:00	Pediatrics	Dr. Dart	Clin. Building
2:00-3:00	Medicine	Dr. Sheldon	Clin. Building
2:15-3:15	Tuberculosis	Dr. Cross	Thos. Hosp. 1 & 2 q.
9:00-10:30	Surgery	Prof. Moore	Nw. Hosp.
10:30-12:00	Eye and Ear	Dr. Spratt	Nw. Hosp.
1:00-2:30	Medicine	Prof. Staples	City
2:30-3:30	Nerv. & Ment.	Dr. Hamilton	City
2:30-3:30	Obstetrics	Dr. Litzenberg	City
3:00-4:00	Orthopedics	Dr. Geist	Clin. Building
4:00-6:00	Autopsies	Prof. White or Prof. Corbett	City

Parturition Clinics throughout the year by Prof. Litzenberg, Dr. Adair, and their assistants for Seniors at City Hospital and in the Out-patient service.

NOTICE. Throughout the school year, clinics for each week are announced in advance by the publication of a weekly bulletin covering hospitals and dispensaries in the Twin Cities.

ST. PAUL CLINICS THURSDAY

HOUR	SUBJECT	CLINICIAN	SERVICE
9:00-12:00	Surgery	Prof. Mac Laren	Entire Year, St. Luke Hosp.
9:00-12:00	Surgery	Prof. O'Brien	Entire Year, St. Joseph Hosp.
9:00-12:00	Orthopedics	Prof. Gillette	Entire Year, City Hosp.
10:15-12:00	Gynecology	Prof. Rothrock	After Jan. 1st, City Hosp.
1:30-3:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Prof. Colvin	After Jan. 1st, City Hosp.
1:30-3:00	Gen-Urin	Dr. Coon	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Goodrich	Oct. to Jan. Dispensary
1:30-3:00	Surgery	Dr. Ritchie	After Jan. 1st, Dispensary
1:30-3:00	Medicine	Dr. Gilfillan	Oct. to Jan. Dispensary
1:30-3:00	Medicine	Dr. Hall	After Jan. 1st, Dispensary
1:30-3:00	Pediatrics	Prof. Christison	Oct. to Jan. Dispensary
1:30-3:00	Ner. & Ment.	Dr. Dunning	Oct. to April Dispensary
1:30-3:00	Ner. & Ment.	Dr. Ball	After April 1st, Dispensary
1:30-3:00	Eye & Ear	Dr. Burch	Oct. to Jan. Dispensary
1:30-3:00	Nose & Throat	Dr. Heath	Oct. to May, Dispensary
3:00-4:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Senkler	After April 1st, City Hosp.
4:00-5:00	Medicine	Dr. Hoff	After April 1st, City Hosp.
4:00-5:00	Surgery	Dr. Ancker	After Jan. 1st, City Hosp.
4:00-5:00	Obstetrics	Prof. Leavitt	After Jan. 1st, City Hosp.
4:00-5:00	Pediatrics	Dr. Ramsey	After Jan. 1st, City Hosp.
4:00-5:00	Eye & Ear	Dr. Burch	After Jan. 1st, City Hosp.

SATURDAY

HOOR	SUBJECT	CLINICIAN	SERVICE
9:00-10:00	Ner. & Ment.	Prof. Riggs	After Jan. 1st, City Hosp.
10:00-12:00	Surgery	Prof. Rogers	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Dennis	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Goodrich	Oct. to Jan., Dispensary
1:30-3:00	Surgery	Dr. Ritchie	After Jan. 1st, Dispensary
1:30-3:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
1:30-3:00	Medicine	Dr. Hall	After Jan. 1st, Dispensary
1:30-3:00	Ner. & Ment.	Dr. Dunning	Oct. to April, Dispensary
1:30-3:00	Ner. & Ment.	Dr. Ball	After April 1st, Dispensary
1:30-3:00	Pediatrics	Dr. McCloud	After Jan. 1st, Dispensary
1:30-3:00	Dermatology	Prof. Foster	Entire year, Dispensary.
3:00-4:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Senkler	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Dr. Hoff	After Jan. 1st, City Hosp.
4:00-5:00	Surgery	Dr. Ancker	After Jan. 1st, City Hosp.
4:00-5:00	Obstetrics	Prof. Leavitt	After Jan. 1st, City Hosp.
4:00-5:00	Pediatrics	Dr. Ramsey	After Jan. 1st, City Hosp.
	Surgery	Prof. Shimonek	} Service to be announced later.
	Medicine	Dr. Stumn	
	Gen-Urin	Dr. Armstrong	
	Gen-Urin	Dr. Cook	

Gynecology. Prof. Stone at St. Joseph Hospital weekly.

Gynecology. Prof. Rothrock and Dr. H. P. Ritchie, daily clinic at Dispensary. (One student.) 1:00 to 2:00.

Parturition clinics throughout the year at City Hospital, Maternities, and Dispensary out-service with Prof. Leavitt and Dr. Jeanette McLaren. (One to five students.)

NOTICE: Throughout the school year, clinics for each week are announced in advance by the publication of a weekly bulletin covering hospitals and dispensaries in the Twin Cities.

DISPENSARY CLINICS

At the University Clinical Building, Minneapolis
 First and Second Semesters, 1909-1910

Mon. and Thurs.	1:00-3:00	Medicine	Prof. Head, Drs. Aurand and Hynes
"	" "	Surgery	Dr. Condit
"	" "	Nose and Throat	Dr. Campbell
Mon., Wed. and Friday	" "	Pediatrics	Dr. C. B. Wright
"	" "	Eye and Ear	Dr. Macnie
"	" "	Skin and Venereal	Dr. F. R. Wright
"	" "	Nervous and Mental	Dr. Hamilton
"	" "	Gynecology	Dr. Benjamin
"	" "	Orthopedics	Dr. Geist
Daily	" "	Clin. and Microscopy	Dr. Ulrich
Tues. and Friday	" "	Medicine	Dr. Rees Dr. Bouman
"	" "	Surgery	Dr. Law
"	" "	Nose and Throat	Prof. Murray
Tues., Thurs. and Saturday	" "	Pediatrics	Dr. Dart
"	" "	Eye and Ear	Dr. Wells
"	" "	Skin and Venereal	Dr. Sweitzer
"	" "	Gynecology	Dr. Williams
"	" "	Nervous and Mental	Prof. W. A. Jones or Dr. Loberg
Wednesday	" "	Medicine	Prof. Nippert Dr. Green
Wed. and Sat.	" "	Surgery	Prof. Mann Dr. Goehrs
"	" "	Nose and Throat	Dr. Parker

G.

THE SCHOOL FOR NURSES

THE TRAINING SCHOOL FOR NURSES

The Board of Regents of the University of Minnesota has directed the organization of The Training School for Nurses, under the control of the faculty of the College of Medicine and Surgery and in affiliation with the University Hospital service.

It is the purpose of the faculty to conduct the school, not merely for the attainment of a suitable hospital nursing service, but as one in which the nurse can obtain a most thorough scientific training. It will endeavor to make the school a stepping-stone to the advancement of the profession of nursing in the northwest.

While its requirements for admission will serve as reasonable tests of fitness, it wishes to attract a class of refined, educated and earnest women to its matriculation.

The entire course of study will cover a period of three years. The first six months will be devoted to preliminary courses of instruction under a special matriculation fee. These courses, for a period of four months, will be conducted in several of the departments of the College of Medicine and Surgery, by a corps of faculty instructors, with the assistance of the Superintendent of the Training School. Examinations will be held at the close of this four months work and must be satisfactorily passed in order to permit of further advancement.

Following these courses, admission will be had to the hospital and the ensuing two months will be given to practical training in hospital service and economics, and during this time the student will be given no responsibility for the care of patients. Nurses will, then, upon successfully completing this preliminary course and with due consideration to their general fitness, be admitted to the full hospital service. In the succeeding two and a half years, a graded system of hospital education will be conducted, during which the student will serve in the wards, dispensaries, laboratories, dressing-rooms and operating-rooms, in succession or alternation. Courses of lectures and demonstrations will be given by members of the faculty and by the Superintendent in each year, and, at its close, examinations will be conducted in both practical and didactic work.

At the close of the three years' course of training, the successful candidate for graduation will be presented to the Faculty and, upon its recommendation, she will receive from the Board of University Regents a nurse's diploma. A certificate will be issued, at the close of each year's work, to the successful student, by the Dean of the College, but applicants will not be admitted to advanced standing from other schools until a better determination can be made of a standard of minimal requirements in each year than is, at present, possible.

Graduate nurses will be eligible, under prescribed regulations and competitive examination, for positions in the hospital service as head nurses.

Graduates or undergraduates of other hospital training schools will be admitted, upon certificate of good standing from their respective schools, and upon payment of the usual matriculation fee, to the four months preliminary course of training. After regular attendance upon this course and upon passing the examinations proper to the course, certificates of its satisfactory completion will be granted.

CORPS OF INSTRUCTORS OF THE TRAINING SCHOOL FOR NURSES.

PRELIMINARY COURSE

ANATOMY, ETC.

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

Charles A. Erdmann, M.D.

PHYSIOLOGY

Richard Olding Beard, M.D.

F. H. Scott, M.A., M.B., Ph.D.

M. R. Wilcox, M.D.

Julius Parker Sedgwick, B.S., M.D.

CHEMISTRY

George B. Frankforter, M.A., Ph.D.

MATERIA MEDICA AND PHARMACOLOGY

E. D. Brown, Phm.D., M.D.

CHAS. F. DIGHT, M.D.

BACTERIOLOGY AND HYGIENE

Frank Fairchild Wesbrook, M.A., M.D., C.M. Dean

PUBLIC HEALTH

Henry Martyn Bracken, M.D., L.R.C.S. (Edin)

ENGLISH

Helen Griffith, B.A.

PHYSICAL CULTURE

Anna M. Butner, Director

HOSPITAL AND HOUSEHOLD ECONOMICS

Members of the Faculty and the Superintendent of Training School

UNDERGRADUATE COURSES

MEDICINE, PHYSICAL DIAGNOSIS, ETC.

John W. Bell, M.D.
Charles H. Hunter, A.M., M.D.
Henry L. Staples, A.M., M.D.
Thomas S. Roberts, M.D.
S. Marx White, B.S., M.D.
J. G. Cross, M.D.
Geo. Douglas Head, B.S., M.D.
Peder A. Hoff, M.D.
W. D. Sheldon, M.D.

SURGERY

James E. Moore, M.D.
Frederick A. Dunsmoor, M.D.
J. Clark Stewart, B.S., M.D.
Arthur J. Gillette, M. D.
Arthur T. Mann, B.S., M.D.
Alexander R. Colvin, M. D.

OBSTETRICS

A. B. Cates, A.M., M.D.
Fred E. Leavitt, M.D.
J. C. Litzenberg, B.S., M.D.

NERVOUS AND MENTAL DISEASES

W. A. Jones, M.D.

EAR AND EYE, NOSE AND THROAT DISEASES

Frank C. Todd, M.D.
William R. Murray, A.B., M.D.

DISEASES OF WOMEN

Amos W. Abbott, M.D.
A. E. Benjamin, M.D.

THERAPEUTICS

E. D. Brown, Phm.D., M.D.

PHYSIOLOGIC CHEMISTRY, HYGIENE (PERSONAL) AND DIETETICS

Richard Olding Beard, M.D.
Julius Parker Sedgwick, B.S., M.D.
Bertha Erdmann, R. N. the Superintendent of the Training
School

HOSPITAL ADMINISTRATION

Arthur B. Ancker, M. D.

SOCIAL ECONOMICS IN RELATION TO NURSING

John H. Gray, Ph.D.

HOSPITAL ECONOMICS AND PRINCIPLES OF NURSING

Bertha Erdmann, R.N., Superintendent of Training School, and
member of the Faculty

CLINICAL FACILITIES

All of the clinical facilities of the State of Minnesota are now available, all of the medical interests of the state are harmonized, and the highest standards in medical education and development are assured.

The present medical group of buildings is located on the University campus overlooking the Mississippi River and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all of the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the College of Medicine and Surgery, the gift of the late Dr. A. F. and Mrs. Elliott and Mr. Walter J. Trask, of Los Angeles, Cal., to which an appropriation by the Legislature has been added, is in process of construction at a cost of about \$155,000.

The Legislature, in 1909, appropriated \$440,000 for the erection of buildings for the College of Medicine and Surgery as follows: \$200,000 for an Institute of Anatomy, which will provide for all varieties of anatomical work, both gross and microscopic; \$200,000 for a Medical Science building which will house the Department of Physiology and Pharmacology, and temporarily provide space for the didactic teaching in Surgery, Medicine and Obstetrics; the sum of \$40,000 was granted to be added to the Elliot bequest of \$115,000 to permit of the erection of a larger hospital building.

In connection with the extension of the University, a new medical campus site has been selected south of Washington Avenue and on the high bluffs overlooking the Mississippi, upon which the above laboratory and hospital buildings of the College of Medicine and Surgery will be located. Eventually, other laboratory and hospital buildings will be added to this group, to be followed by the relinquishment, for other purposes, of all of the present buildings now occupied by the department.

The Elliot Hospital is located on the above site overlooking the river and will form a part of the medical group of buildings. This hospital site was purchased by means of a gift of \$50,000, from generous citizens of Minneapolis, to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which will constitute the

medical campus has already been made by the last two state legislative appropriations of \$800,000 for campus extension.

The College of Medicine and Surgery is in intimate relationship with the numerous hospitals, infirmaries and dispensaries of the Twin Cities and also with the medical departments of the various state correctional and charitable institutions for which Minnesota is so justly noted. St. Mary's Hospital, Rochester; St. Mary's Hospital, Duluth, and the Duluth Health Department are in close affiliation with the college through their laboratories.

HOSPITALS

The Twin Cities, with a population of over 500,000, through their several hospitals, afford clinical service to the extent of 1,620 beds. During the last year, important additions have been made to almost every hospital in the two cities, some of them having doubled their capacity.

The hospital facilities of the University are thus exceptionally good, since they are not limited to one large amphitheatre, where but a few students can closely observe diagnostic and surgical methods, but are divided among a number of hospitals where the various professors care for the clinical cases. This makes it possible to divide the classes into small sections, so that each student has equal opportunities of observation and is in close touch with both teacher and patient.

The University Hospital, pending the completion of the Elliott Hospital, occupies four buildings on the University campus, two as pavilions containing 44 beds; the others serve as the residence quarters of The Training School for Nurses.

These University Hospital pavilions constitute a strictly charity hospital, no pay patients being received. The indigent sick, from any part of the state, on proper medical certification, will be received in these wards.

St. Paul City and County Hospital has a capacity of 400 beds and is the largest and most complete of its kind in the northwest. Many of the members of its staff are on the staff of this college and its entire clinical facilities are at the disposal of the college. It enters over 2,000 patients annually, a large proportion of whom are of the emergency order or are suffering from acute disease. The opportunities for bedside instruction are very great and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A recent and thoroughly modern fireproof pavilion for contagious diseases is provided, where the students have unexcelled opportunities to study diphtheria, scarlatina, erysipelas, etc. A separate building is provided for midwifery, and senior students see labor cases under the personal supervision of the professor or instructor in obstetrics.

The orthopedic department contains a large number of crippled and deformed children, and houses the State Hospital for Crippled and Deformed Children. All of this work is under the control of the Professor of Orthopedic Surgery of this college.

The City Hospital, Minneapolis, places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital with splendid equipment and has a capacity of 200 beds. During the year 1908, 1,836 patients were treated in the hospital, and 2,450 patients in the out-patient department and hospital dispensary. A new administration building has just been completed by the city at a cost of \$55,000, and a pavilion for the care of the incurable is planned for early completion. A modern, newly-erected contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases under the direction of the professor of diseases of children. In the City Hospital, bedside and amphitheatre medical and surgical clinics are conducted daily throughout the year by members of the faculty. Clinics in diseases of the skin, nervous diseases, obstetrics, etc., are likewise given in the hospital throughout the school year. A special feature is made of medical bedside clinics in the wards of the hospital to small sections of senior students, conducted by members of the faculty.

Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building only a portion of which is as yet occupied. It has a capacity of 160 beds, and, when the building is entirely completed, the hospital will have a capacity of nearly 350 beds. Many members of the faculty are on the staff of the hospital and give clinics.

St. Joseph's Hospital, St. Paul, with 130 beds and one of the finest amphitheatres, with every modern device, contributes largely to the clinical instruction. Members of the faculty are on the staff and give clinics there to the students.

Northwestern Hospital, Minneapolis, affords splendid surgical material, available to this college alone. Semi-weekly clinics in surgery are given in its amphitheatre and in three operating rooms and wards, by members of the faculty. It has a capacity of 100 beds and during 1908 treated 1,000 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical clinics. Clinics of this college are held in this hospital by many members of its staff who are on the college faculty. Two operating rooms, with conveniences for students, give unusual facilities and a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 115 beds, is housed in a newly-constructed modern building and members of this

faculty exclusively utilize the material of the hospital for teaching purposes. During the year 1908, 1,456 patients were treated.

St. Barnabas' Hospital, Minneapolis; with a capacity of 100 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the preceding year 1,617 patients were treated at this hospital.

St. Mary's Hospital, Minneapolis, also furnishes clinical material for the University. The hospital is located directly across the Mississippi River from the new University Hospital. It has a capacity of 100 beds and treated 1,200 patients during the last year.

The Norwegian Hospital, Minneapolis, has been erected immediately across the river from the new University Hospital. Among other things, it provides a sanatorium, now completed, for the treatment of tuberculosis.

DISPENSARIES

Students of The Training School will be given suitable opportunities for clinical observation and nurses may be assigned, as occasion offers, to indoor and outdoor dispensary service.

In its clinical instruction the medical department makes use of two well-organized free dispensaries, each having a large outdoor service. The University clinical building is located across the river from the medical department proper at 1810 Washington Ave. S. It is a three-story building, 40x150 feet, situated in a thickly populated part of Minneapolis, and receives 2,500 new patients per year, or an average of 33 daily. The staff is composed exclusively of the members of the faculty and their assistants and is organized under a chief of staff.

The St. Paul Free Dispensary is centrally located in a twenty-room building, and its clinical service is wholly under the control of the staff of University instructors. Forty patients daily are treated throughout the year.

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 colleges of dentistry and pharmacy, the departmental 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 7,000 volumes and 150 journals, give

the student additional opportunity to consult all the more important medical publications.

The general University library contains some 115,000 bound volumes, 30,000 unbound volumes and pamphlets, and several hundred current periodicals. The public libraries of Minneapolis, with 160,000 volumes, and of St. Paul, with some 90,000 volumes, the State Historical Library of 85,000 volumes, and the State Library of 59,000 volumes, the Library of the Minnesota Academy of Natural Sciences of some 12,000 titles, place before the student the greater part of the important literature relating to all branches of the physical and natural sciences, as well as works of general culture and those pertaining particularly to medicine. All of these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition, by the department of histology and embryology, through the generosity of Alfred F., John S. and Charles C. Pillsbury, of a large portion of the working library of the late Professor William His, of Leipzig, containing about 8,500 titles and representing some 2,500 authors.

LABORATORY BUILDINGS AND EQUIPMENT

Over \$500,000.00 is already invested in the laboratories and equipment of this college, exclusive of site.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from a close association with the other University departments, such as the general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Millard Hall, a large, four story brown stone and cream brick building, (65x125 ft.) the oldest of any in the group, contains a faculty room, a large amphitheatre and lecture rooms, library and reading rooms of the department, together with the laboratory of pharmacology and materia medica. In addition, the College of Dentistry is temporarily provided with rooms.

The Medical Science Building, a large, four-story, brick building, (75x150 ft.) is especially designed for laboratories. The building houses the department of histology and embryology and the department of physiology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of histology and embryology occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south wing and the center of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.) constitutes the headquarters of the School of

Chemistry. The laboratory of medical chemistry is a one-story, brick building devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, basement building.

The Institute of Public Health and Pathology is the newest building of any in the Medical Quadrangle.

THE COURSE OF TRAINING

REQUIREMENTS* FOR ADMISSION

Applicants for admission to the Training School for Nurses must present application in writing to the Dean of the College of Medicine and Surgery, by whom they will be referred to the Faculty Committee in charge. Such applications will be received at the opening of each semester. They must state the age and residence of the applicant and must be accompanied by credentials showing the completion of, at least, a four years' High School course of study. While a high school diploma will be a prerequisite of admission, preference will be given to women of superior preliminary training. Applicants must not be less than twenty, nor more than thirty-five years of age. They must meet the Committee in person. They must present a good physique and must submit satisfactory evidence to the Committee of physical and mental fitness and of good character.

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

FEEES AND TERMS

A fee of twenty-five dollars (\$25.00) will be charged upon admission to the preliminary course of instruction, and will be payable at the office of the University Cashier.

A deposit of three dollars will be required to cover loss or breakage of apparatus used by the student in the laboratories, returnable at the close of the preliminary course, less the cost of apparatus missing or destroyed.

During the preliminary course, the student will provide for her own board and lodging, text-books and stationary.

No fees will be charged during the remaining two and one-half years of the training course. After their admission to the hospital, the

students will be expected to reside at the Nurses' Home, where comfortable rooms, board and laundry, together with hospital uniforms, will be provided for them at the expense of the University. Clothing, other than the hospital uniform-dress, they will provide for themselves and in character and sufficiency of supply it must conform to the hospital regulations.

A vacation of two weeks will be allotted, in succession, to each nurse in each year, at her own living expense.

Graduates of other Training Schools for Nurses, in good standing, or matriculants of these schools, having the required preliminary qualifications, will be admitted to the preliminary course of instruction, upon the conditions of entrance cited above and upon payment of the prescribed fee.

Upon successfully passing the examinations provided in this course, they will be granted a certificate of satisfactory attendance upon and proficiency in such work.

PLAN OF INSTRUCTION

The entire course of instruction in The Training School for Nurses will cover a period of three years and, successfully pursued, in conformity with the rules and regulations of the hospital service, will lead up to the degree of Graduate in Nursing, which will be conferred, upon recommendation of the Faculty, by the Board of Regents of The University of Minnesota.

The first half of the first year will be devoted to preliminary and probational courses of instruction. The first four months of study will be conducted in the lecture-rooms and laboratories of the college of Medicine and Surgery; the student being non-resident during that time. In the succeeding two months, completing the first half-year, she will be in hospital residence and engaged in general hospital training, but will be assigned to no definite hospital service.

In the last half of the first year and the first half of the second year she will be assigned to duty and will receive instruction in the men's and women's medical and surgical wards of the hospital, and in the diet-kitchens.

In the second half of the second year and throughout the third year, she will be assigned to special duty in the obstetrical, gynecological, orthopedic and children's wards; in the operating and anesthetic rooms and in special departments of practice.

The practical work of each year will be accompanied by courses of lectures and demonstrations, conducted by the Superintendent of Nurses and by members of the Faculty, upon phases of each department of practice with which the nurse is concerned, and these courses will be the subjects of examination at the close of each semester.

PRELIMINARY COURSES

ANATOMY

A course of lectures, recitations, demonstrations and laboratory exercises; four hours a week, for four months, including:

1 The study of the general properties of the tissue-cell; of the development of the human embryo; and of the several types of tissue.

2 The osseous system; composition, function, growth and repair of bone; the skeleton and its component parts; the structure and function of joints, etc.

3 The muscular system; the structure and relation of the muscles, tendons, fasciae, etc.

4 The circulatory system; including the heart and the blood and lymph channels.

5 The respiratory system; the lungs and their appendages.

6 The excretory system, the skin, kidneys, ureters and bladder.

7 The nervous system; the special sense organs; the central and peripheral mechanisms.

8 The reproductive system; the organs of generation, male and female.

PHYSIOLOGY

A course of lectures, demonstrations and laboratory exercises, accompanied by oral and written recitations; four hours a week, four months.

The course will include the study of the physiologic components of the animal body; of the nutritive media; of the vascular mechanisms; of the respiratory, digestive, secretory, metabolic and eliminative functions; and of the physiology of the nervous system in general.

CHEMISTRY

Lectures, recitations and laboratory exercises, two hours a week, four months.

This course will give the student a brief study of the general conditions of matter from the chemical standpoint; of chemical, as distinguished from physical changes; of the fundamental laws of chemistry; of the most important chemical elements; of water, physically and chemically considered; of the law of Mass Action, particularly as applied to medicine; of the elements of the carbon compounds and particularly of those which are of especial interest to the nurse, as disinfectants, toxic and antifebrile substances.

MATERIA MEDICA AND PHARMACOLOGY

A course of lectures, demonstrations and recitations, two hours a week, for four months.

The following topics will be discussed: The history and uses of drugs in the treatment of disease; the definitions of terms used to designate the different branches under which drugs are specifically studied; the classification of drugs with reference to origin; to pharmaceutical preparation and to physiologic action; the terms used in such classifications; the common and metric systems of weights and measures; a comparison with popular measures; the definitions and methods of preparing pharmaceutical preparations; the more important plant constituents, such as alkaloids, glucosides, etc.

The course will also include a study of methods of administering drugs; of rules of dosage for children; of rules governing dosage from standpoint both of patient and of drug action; a discussion of the more important drugs of vegetable, animal and inorganic origin, in turn; of the synthetic remedies and of cathartics, anesthetics and poisons and their antidotes.

BACTERIOLOGY

A course of lectures, demonstrations and recitations, three hours a week for

four months, dealing with the science of bacteriology, in its practical relations to nursing; discussing, especially, the relations of this science and that of micro-zoology to disease and to protective measures; the life history of important bacteria and protozoa; favorable and unfavorable conditions of bacterial and parasitic growth; the fate of the pathogenic bacteria outside the body; the general principles of disease transmission; the role of the well individual as a carrier of infection; the conditions of asepsis and immunity in the nurse; the media and agency of infection, air, contact, water, food, milk, vomites, excreta, utensils; insects and vermin as media of infection or hosts of germs; methods of destruction of bacteria; the effects of physical and chemical agents; the practical details of hospital isolation.

PUBLIC HEALTH

A course of lectures, reading and recitations, one hour each week for four months, devoted to the discussion of the legal phases of public health questions in their relation to the profession of nursing; the relation and contribution of the nurse to vital statistics; the details of registration and inspection; the municipal and state control of contagious or communicable disease; the diseases susceptible of sanitary control, viz.: small pox, chicken pox, measles, scarlet fever, mumps, whooping cough, diphtheria, itch, pediculosis, typhoid, tuberculosis; the agencies of control, vaccination, isolation, quarantine, etc.; the principles of disinfection, of rooms, clothing, bedding and persons; school inspection and hygiene; district nursing.

ENGLISH

A course of recitations and reading and written exercises, one hour a week for four months, in language.

Study and practice work in the construction and use of the sentence; in paragraphing; the writing of statements, synopses, reports, etc., correspondence, and in voice training and reading.

PRINCIPLES OF NURSING

A course of lectures, conducted by members of the Faculty and by the Superintendent of the Training School, upon the personal and professional needs of the nurse and upon the conduct of her professional relations. The subject matter of this course will be arranged as follows:

a. THE PERSONAL STATUS OF THE NURSE

Personal hygiene: dietary; ventilation; bathing; special items of toilet; exercise; clothing; hours of work; recreation; sleep; disease immunity.

The professional outfit and equipment of the nurses. Uniform; details of personal protection and asepsis. Necessary armamentarium.

b. THE ETHICS AND ETIQUETTE OF NURSING

Relations to hospital and hospital officials; conditions of hospital regulation and discipline.

Relations to the medical profession and the staff.

Relations to the profession of nursing and to fellow nurses.

Relations to the patient; to the patient's family; to hospital and household domestics; to hospital visitors.

Relation to society in general.

PHYSICAL CULTURE

A course of physical exercises, conducted for two hours in each week, for the period of four months, for the physical development of the student, consisting of calisthenics, systematic work with light apparatus and exercises especially directed to the training of the nurse in the adaptation of her movements to the best results in her practical work.

This course is not designed for the instruction of the nurse in physical exercises, as a means of treatment, that feature of her training being reserved to a later part of the hospital curriculum.

HOSPITAL AND HOUSEHOLD ECONOMICS

This course will be introductory to the admission of the student to hospital service and will be conducted during the entire six months of preliminary work. It will deal with the general principles of hospital and household economics applied to the practice of nursing.

It will include the study of the economics of the hospital, as a whole, and in its several working units; the equipment and operation of various wards; the conduct of general and special kitchens; the methods of food serving; the discussion of foods and food values, of food composition, selection and preparation; and of food adulteration.

It will deal with the general duties of the nurse in the service of the wards and will include laboratory and dietary exercises and demonstrations. The detail of the work follows:

- a. THE GENERAL EQUIPMENT AND FURNISHING OF HOSPITAL
 - The general halls.
 - The linen room; its equipment.
 - The laundry.
 - The general kitchen; the ward kitchen; the diet kitchen.
 - The operating rooms; the anesthesia rooms; the surgical supply rooms.
 - The hospital pharmacy; the drug closet.
 - The hospital laboratories.
 - The toilet rooms and their equipment.
 - The hospital records; method of keeping order-books; the case records; chart making; fulfillment and record of orders.
- b. THE GENERAL HOSPITAL WARD. Its equipment; standard linen-list; cost of ward maintenance; care of ward.
- c. THE ISOLATION WARD. Its purposes; special equipment and care.
- d. THE INDIVIDUAL WARD; or private room. Its average cost of maintenance; its equipment; its personnel.
 - The care of patients' room; cleanliness, light, ventilation, disinfection; care of bed and bed-linen; care of clothing; general toilet of patient; mechanical appliances of the sick-room.
- e. THE KITCHEN; location; equipment. Stove, ranges, heaters, cookers, etc.
 - Fuels; relative values; refrigerators; their care and uses; store closets; kitchen utensils; hardware; linen.
- f. THE PANTRY; its equipment. China: form and adaptation to use.
 - Cutlery; silver, utensils of service.
 - Table and trays; tray linens; tray serving.
 - The esthetics of food service.
- g. FOODS; their definition; classes; form.
 - Food values; economic, nutritive, digestive, metabolic, esthetic.
 - Study of food composition; energy values; caloric supply adapted to age, sex, weight, condition and occupation.
 - Selection of Diets with reference to values; market conditions.
 - Balanced dietaries.
 - Composition of foods; values.
- h. PREPARATION OF FOODS.
 - Methods of cooking in detail.
 - Effect on food values; percentage of loss.
 - Treatment of various classes of foods.

Treatment of typical foods.
 Enhancement of food values.
 Mechanical methods of preparation.
 Raw foods.

1. **FOOD ADULTERATION AND DETERIORATION.** Bacterial decomposition.
 Food storage, Food preservation.
 Types of adulteration.
 Dilution of values.
 Substitution.
 Preservation and preservatives.

HOSPITAL TRAINING

Students who have successfully completed the preliminary courses of the first six months, will be regularly entered in the hospital service. In addition to their hospital duties, they will attend courses of lectures, demonstrations and recitations upon subjects in general medicine and surgery and in special branches of practice related to their professional work. These courses will also include the study of practical dietetics and advanced problems in household and hospital economics and in the general principles of nursing. The detail of these courses follows:

UNDERGRADUATE COURSES OF STUDY

HYGIENE

- a. **RESPIRATORY NEEDS.** Oxygen supply; quantity; uses; waste-removal; relations of CO₂ to air pollution; causes of pollution; Requirements of ventilation; fresh air inlets; distribution; foul air outlets. Relations to heating. Influences of climate in ventilation.
- b. **WATER.** Quantity required; relation to age, growth, sex, etc. Relations to food supply. Purity of drinking water; temperature, etc., Purification of drinking water in the household. Care of water containers.
- c. **FOODS.** The principles of food selection; relation to content; relation to use. Caloric values of foods. Caloric needs with relation to age, sex, occupation, climate; in illness and in convalescence. Method of calculation.
 The market values of food. Food selection with reference to its commercial forms. Study of market supplies. Food values as related to food preparation.
- d. **BEVERAGES.** Their food values. Forms in ordinary use. Their preparation; other than food values; temperature. Combination of foods and beverages.
- e. **STIMULANTS.** Their food values, physiological action; limits of use; relation to habit; conditions of employment; combination with foods; influence upon digestion. Types of stimulants; principles of choice.
- f. **BATHS AND BATHING.** Types of baths. Methods of administration. Classification by temperature. Physiologic effects; therapeutic influence.
- g. **EXERCISE;** its physiologic influence. Relation to occupation. Forms of exercise, active and passive.
- h. **CLOTHING.** Classification according to material; to use. Qualities of clothing in relation to use; to age, sex, climate, occupation. The care of clothing.

BACTERIOLOGY

- a. **RELATIONS OF BACTERIOLOGY TO THE PERSONAL HYGIENE OF THE NURSE.** Principles of personal cleanliness; personal clothing. Personal asepsis and antisepsis.
- b. **RELATIONS OF BACTERIOLOGY TO GENERAL DUTIES OF THE NURSE.** Bacterial precautions in service.

c. RELATIONS OF BACTERIOLOGY TO THE CARE OF THE PATIENT; the patient's clothing; the patient's environment.

THERAPEUTICS

- a. MEDICINES; their methods of administration; periods of repetitional dosage; cumulative tendencies.
- b. CLASSIFICATION OF DRUGS THERAPEUTICALLY. Choice of agents.
- c. POISONS AND THEIR ANTIDOTES.
- d. DOSAGE; measures; quantities; effect of repetition.

MEDICINE

a. GENERAL PRINCIPLES OF NURSING. Considerations of age, sex, occupations; character of disease; its duration; the history of the patient; the study of idiosyncrasy. The duty of the nurse in the general conduct of cases; the detail of orders; the treatment of emergencies.

b. CASE RECORDS. The study of case history. Methods of case recording. The items of record: temperature; pulse; respiration, etc. Observation and interpretation of symptoms.

c. THE GENERAL PRINCIPLES OF TREATMENT. The dietary of disease in general. The uses of water. The value of oxygen; ventilation; open air treatment. The regulation of light; the value of sun exposure. The temperature of the patient's apartment. Special aids to regulation of body temperature.

The value of exercise; active and passive. Massage; Swedish movements. The use of baths. Methods of bathing. The care of the skin, hair, mouth, teeth.

d. THE NURSING OF THE NEW BORN. The physiology of birth. Infant temperature; tendencies to heat loss. Care of premature infants. Incubation. Incubators.

Treatment of skin of new-born; care of eyes; nose; ears; mouth; umbilicus; breasts; genitals.

Conditions of infant bathing.

Clothing of new-born; protection from light, etc.

Water-feeding. Feeding the new-born.

Diseases of the new-born. Ophthalmia neonatorum.

Jaundice. Trismus. Cyanosis. Convulsions. Melena.

e. THE NURSING OF INFANCY.

(1) Infant-feeding. Study of the human milk. The metabolism of the mammary-gland. Nutrition of the mother with reference to nursing. Causes of impairment of lactation. Hygiene of nursing. Care of the nursing breast. Quantity and quality of breast-milk. Intervals of nursing. Sleep requirements. Caloric needs of infancy. Determination of nutrition by weight. Tables of weight increase. Milk analysis. Supplementary feeding. Substitution of human milk. Artificial food supplies. Relation to period of infancy. Rate of digestion of substitutive food compared with human milk. Principles of infant feeding following lactation. Infant digestion. Diets of later infancy. Manufactured foods. Water-supply. Care of utensils of feeding. Care of foodstuffs.

(2) Infant bathing; form and temperature of baths. Care of infant skin. Toilet preparations.

(3) Infant clothing. Study of ideal wardrobes; materials of clothing; adaptation to season; cleanliness and ventilation of clothing.

(4) The excreta of infancy. The output from the skin. Urinary output; quality; quantity. The foecal debris; character of stools; evidences and causes of abnormality.

(5) The milk-teeth; order of irruption; disorders of teething period.

f. THE NURSING OF INFANTILE DISEASES.

General management. Pulse, temperature and respiration of infancy. Nutri-

tional disorders; their relation to food and feeding. Marasmus; scorbutus; rachitis; cholemia; stomatitis. Gastro-enteric catarrh. Gastro-intestinal disorders. Respiratory disorders. Treatment of contagious diseases in infancy. Tuberculosis of infancy; tuberculous bone diseases; tuberculous meningitis. Specific disease in infancy. Parasitic disorders in infancy. Infantile neuroses.

g. THE NURSING OF CHILDHOOD.

General management of children in disease. Hygiene of childhood. The feeding of childhood. Conditions of growth. Sleep requirements. Conditions of temperature, pulse and respiration; oxygen supply and CO₂ output. Special tendencies to disorder in childhood. Digestive disorders; digestive reflexes; tendency to skin reflexes; to fever; to delirium. Management of fright; delirium; fever; skin disorders; sleep induction. Selection of food in disease during childhood. Administration of food in diseases of childhood. Administration of medicines. Study and care of the excreta in childhood.

h. THE DISEASES OF CHILDHOOD.

Care of contagious diseases. Principles of isolation. Disinfection of persons; clothing; bedding; furnishings; excreta; utensils, etc. Degrees of contagion; contagious principles; their control. Limitations of quarantine. Preventive measures. The nursing of scarlet fever; measles; mumps; whooping-cough; chicken-pox; small-pox; diphtheria; cholera; dysentery. General disorders of childhood. Special features of disease in childhood.

The care of continued fevers; typhoid fever; typhus fever; yellow fever. The care of malarial fevers; of acute rheumatic fever; of epidemic cerebro-spinal meningitis. The care of contagious disorders in adult life; small-pox; Asiatic cholera; amebic dysentery; pneumonia; pleurisy; bronchitis; etc. The care of nutritional disorders; Bright's disease; diabetes; rheumatoid arthritis; lithemia; pernicious anemias; etc.

i. THE NURSE IN RELATION TO TUBERCULOSIS

The cause of tuberculosis and its control. Personal protection. The factor of heredity, age, family history, contagion.

The several expressions of the disease: Tuberculosis of bones and joints. Tuberculous lymph nodes. Tuberculous meningitis. Tuberculous peritonitis. Pulmonary tuberculosis.

The hygiene of tuberculosis: in the hospital; in the hospital tent; in the sanatorium; in the home. The relations of climate.

k. THE CARE OF CONTAGIOUS DISEASES

The isolation ward; the isolation room; methods of isolation and quarantine.

The care of infected bedding and clothing; its disinfection.

The care of the infected skin; mouth; nose; throat.

Irrigation and vaporization; instruments of each.

The care of the infected excreta and stools.

The care of infected utensils and supplies.

The agency of insects and other vermin as carriers of contagion.

The nurse as a carrier of contagion. The self-protection of nurse.

The ultimate disinfection or fumigation of patient; nurse; clothing; bedding; utensils; furniture; room or ward.

The relations to general practice of contagious disease.

PRINCIPLES OF NURSING

a. GENERAL CARE OF PATIENTS

The patient; dressing and undressing; initial bath; disposition of patients' clothing; its renovation.

The toilet of hair; mouth; teeth; hands, etc.; bed sores, causes and treatment.

The patients' clothing; changes of personal linen.

The making of beds; treatment of mattress; changing of bed-linen; rubber sheets.

- Care of bed-utensils; their uses and character.
 The collection, measurement and preservation of urine. Catherization.
 The collection and preservation of fæces. The collection and preservation of sputum.
- The care and uses of rubber bags, ice-caps, coils, syringes, catheters, etc.
- b. **BATHS AND BATHING**
 Forms of bath; their uses and effects; their standard temperatures.
 Methods of bathing; preparation and care of patient in bathing.
 Hot and cold packs. Alcohol bathing. Topical application to skin.
- c. **SPECIAL METHODS OF TREATMENT**
 Enemata; irrigating, evacuant, sedative, astringent, nutrient.
 Douches; utensils and methods. Irrigations.
 External applications; compresses; fomentations; stupes; poultices; plasters; blisters; cupping; Bier treatment.
 Lavage; test meals; gavage; nasal feeding; methods of forced feeding.
 Transfusion; hypodermoclysis; infusion; lumbar puncture.
 Uses and administration of oxygen.
 Thoracentesis; paracentesis; exploratory procedures.
 The cautery; forms and uses.
- d. **METHODS OF ADMINISTRATION OF MEDICINES**
 Times of administration; method; system.
 Administration by mouth; by stomach tube; by rectum; by hypodermatic method.
 Care of poisons. Control of medicinal agents in relation to habit.

BACTERIOLOGY

- a. **BACTERIAL AND PARASITIC DISEASES**
 Their causes and means of control; their relation to hospital life; to general nursing; their special nursing.
- b. **THE RELATIONS OF BACTERIOLOGY TO SURGERY.**
 The micro-organisms of surgical significance. Asepsis and antiseptis.

SURGERY

- a. **THE PRINCIPLES OF STERILIZATION**
 Study of sterilizers; their forms and management; methods of use applied to specific results.
 The sterilization of the person; surgical cleanliness. Care of hands; face; hair; mouth; nose.
 The sterilization of clothing; surgical suits. Detail of care. Dressing rooms.
 The sterilization of utensils; instruments; supplies.
 Aseptic and antiseptic solutions; their preparation and control.
 The preparation of sterile dressings.
- b. **SURGICAL SUPPLIES**
 Surgical dressings; moist and dry.
 Bandages; their form; variety; uses; preparation.
 External applications; dusting powders; solutions; unguents.
 Splints; pads; gloves; syringes; etc.
 The instrument room or cabinet.
- c. **BANDAGING**
 A course of demonstrations and practical exercises in the uses and methods of application of bandages of all forms.
- d. **SURGICAL EMERGENCIES**
 Wounds; their causes, results and care. Inflammation. Suppuration.
 Hemorrhages; points of origin; character; continuance or recurrence; causes.
 Principles of control; methods.

Burns, scalds, etc.; their nature; extent; methods of treatment.

Fractures, dislocations and sprains. Varieties and immediate treatment.

Shock, collapse, fainting; other causes of unconsciousness.

e. PRINCIPLES OF SURGICAL INFECTION

Septicemia. Pyemia. Erysipelas. Gangrene. Necrosis. Bedsores and their treatment.

f. ANESTHESIA AND ANESTHETICS

General anesthesia; its several degrees; duration and danger; its after treatment.

Nature of anesthetics. Varieties. Comparative values and dangers.

Local anesthesia. Agents and methods of production. Treatment.

GENERAL NURSING OF SURGICAL CASES

a. PRE-OPERATIVE-CARE

Feeding. Management of bowels and bladder. Special care for special cases. Medication and hypodermics. Preparation of patient; site of operation, etc.

b. OPERATIVE CARE

The operating room; the operating table; positions of patients on operating table for various operations; and precautions to be taken. Coverings of patient. Washing of patient; solutions used. Pulse, etc., during operation. The use of hypodermics; the oxygen apparatus; electrical apparatus, etc.

c. POST-OPERATIVE CARE

Shock; observation of pulse and temperature. Use of pneumonia jacket. Vomiting. Use of water. Secondary hemorrhages and signs of hemorrhage. Care of bladder and bowels.

Post-operative infections and evidences of infections. Dressings. Position of patient and bed. Feeding.

d. THE CARE OF SPECIAL SURGICAL CONDITIONS

Pain; its importance; significance; location. Evidence and significance of pus formation or accumulation. Tumors; benign and malignant. Appendicitis, Hernia. Hemorrhoids and rectal conditions.

e. STUDY OF DEFECTS AND DEFORMITIES

The mechanics of the normal body. The nursing of orthopedic cases.

OBSTETRICS

a. THE PHYSIOLOGY OF PREGNANCY; the care of the pregnant mother.

b. THE ACCIDENTS OF PREGNANCY; their nursing. Evidences of extra-uterine pregnancy.

c. THE PHYSIOLOGY OF PARTURITION. Study of minor aids to labor.

d. THE NURSING OF LABOR. The obstetrical outfit. The sterilization of materials and dressings. Obstetrical suits.

The preparation of the confinement room. The preparation of accessories; of obstetrical instruments; of bed and bed-clothing; of the patient.

The arrangement of the patient in the several positions for examination and delivery; for forceps delivery; for placental extraction.

The care of the placenta. The care of patient immediately following labor. The abdominal binder.

The care of the obstetrical convalescent. The conditions of the lochia. The uses of the vaginal douche. The employment of enemata. Catheterization after delivery. The care of breasts; cleanliness, support, massage, milk extraction.

Complications following labor. Post-partum hemorrhage; its management. Constipation and its relief. Puerperal fever; its causes and treatment. Puerperal convulsions; causes and control. Puerperal insanity; history, predisposition, care.

GYNECOLOGY

Gynecological terms and definitions; conditions of the pelvis which bear upon the nursing of pelvic diseases.

The preparation of gynecological patients for examination; for operation.
The general care of gynecological cases. Special modes of treatment at the hands of the nurse.

NERVOUS AND MENTAL DISEASES

- a. **INSANITY**; its common forms and usual symptoms. Principles of nursing insane patients.
- b. **EPILEPSY**; Its manifestations; immediate and general care.
- c. **NEURASTHENIA**; **HYSTERIA**; their recognition and distinctive features. Methods of Nursing. Principles and practice of rest cure. General Management of nervous cases.

DISEASES OF THE EYE, EAR, NOSE AND THROAT

Lectures, illustrated by stereopticon, upon the anatomy and physiology of these organs. The general and local care of diseases, including instruction in applications to the eye, douches and other remedies to the ear, nose and throat. The recognition and care of foreign bodies in eye, ear, nose and throat. Instruction in the use of artificial and ordinary leech. The prevention and treatment of ophthalmia neonatorum. Preparation for operations and care after operation, etc.

PHYSIOLOGIC CHEMISTRY

- a. **WATER**: Its uses in the human body; quantity and character of supply; its food relations; the water-diet; substitutes for water.
- b. **MILK**: The composition of the human milk; the colostrum milk. Comparison with bovine milk. Analysis.
- c. **THE URINE**: Its normal composition. Analysis. Quantity, physical conditions, collection.

PRACTICAL DIETETICS

- a. **THE DIETARY OF DISEASES**. Conditions of digestion and metabolism in disease. Influences of age and sex. Relation of food supply to functional inactivity. Relation to tissue loss. Relation to elimination.
- b. **DIETARIES OF SPECIAL FORMS OF DISEASE**. Diet in continued fevers; in gastro-intestinal disorders; in respiratory disorders; Diet in disorders of nutrition; in renal disorders; in cardiac disorders; in diabetes.
- c. **DIETARIES OF CONVALESCENCE**. Milk diets. Light diets. General diets.
- d. **THE CARE OF FOOD-STUFFS**. Their protection from dust, flies and vermin; Their temperature conditions. Storage of foods. Treatment of frozen foods.

ETHICS AND PRINCIPLES OF NURSING

- a. The duties of the superintendent of nurses.
- b. The duties of the hospital economist and dietician.
- c. The duties of the head nurse; the day nurse; the night nurse.
- d. The duties of pupil nurses.
- e. The duties of the orderly.
- f. The duties of the ward maid.
- g. Hours of service; rest hours; exercise; order of employment.
- h. Departments of management; store-room; linen-room; laundry; halls and corridors; general kitchen; ward kitchens.
- i. Nurses' Home.

HOUSEHOLD ECONOMICS

- a. **SANITARY DETAILS OF CONSTRUCTION**
Walls: Relative value of structural materials; sanitary values of wall coverings and surfaces.

Floors: Relative merits of structural materials; sanitary values of different floor-coverings.

Windows: Position and area. Window shades and draperies.

Plumbing: Sanitary structural features; recognition of defects; care of plumbing fixtures.

Ventilation: Sanitary requirements; causes of contamination; relation to temperature or heating; means of inlet, filtration, distribution and outlet.

Heating: Sources of heat; methods of supply; direct and indirect radiation; degree of heating and room temperatures.

b. THE ROOMS OF THE DWELLING

The Living Rooms: Size, ventilation; lighting; color; furnishings; utensils.

The Dining Rooms: Size, ventilation; lighting; color; furnishings, utensils.

The Bed-rooms: Size, air-capacity, ventilation, lighting, sun exposure; floors and floor coverings; care of rooms. Sleeping-room furnishings; single beds; care and renovation; beds and bed coverings; mattresses; care and treatment.

Clothes' Closets and Presses: Size, situation; ventilation; airing and drying of clothing; protection from insects; protection from and removal of dust. Mending of clothing.

Linen Store-room: Arrangement and care. Kind and quantities of supplies. Removal and renovation. Sorting and mending.

Laundry: Size, situation, working capacity, ventilation. Laundry apparatus; its sanitary care. Laundry utensils and materials. Drying and ironing rooms.

Pantry: China and food closets. Size, lighting, ventilation. Equipment. Care of contents. Protection from vermin.

Dietary Store-room: Relation to bacterial contamination and conveyance. Influences of heat and cold. Protection from dust.

Refrigerators: Form, size, structural material, ventilation. Food capacity; ice capacity; care of ice. Cleanliness of ice, ice water and food compartments. Arrangement of food. Refrigerator food containers. Influence of food materials upon each other.

House cleaning; daily and periodical practice. Domestic and scientific methods. Cleaning devices. Sanitary details.

Household refuse: waste disposal; incineration. Refuse containers, collection and removal. Treatment of receptacles.

H

THE COLLEGE OF DENTISTRY

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 laboratories are posted in their respective places.

REQUIREMENTS FOR ADMISSION

For list and description of subjects accepted for admission see pages 68, 69 and 72.

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 determin-

ed 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 beginning 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 laboratory 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 outside 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.

FEEES

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 themselves 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.

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 Assistant^s
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 ANOESTHESIA 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, DR. 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, DR. HARE AND TYRRELL
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 structure and movements of joints. Demonstrations from the specimen and preparation.
3. **SPLANCHNOLOGY** PROFESSORS ERDMANN, DR. 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 viscera, supplemented by the study of dissected specimens and models.
4. **NEUROLOGY** PROFESSOR ERDMANN, DR. 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** DR. 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 comparative 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 thera-
 peutic 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 identification.
- 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 be 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 (sight 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. SCHEFICK, B.S., Ph.G., M.D., C.M., Instructor in Materia Medica

1. MATERIA MEDICA DR. SCHEFICK
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 PROFESSOR OWRE, WALLS AND ASSISTANTS
Eight credits (three recitation and ten laboratory hours per week)
Second semester
Open to students completing 1. Required of juniors.
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) First semester
 Required of seniors.
 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 WESTBROOK 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 function 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.

I

THE COLLEGE OF PHARMACY

The College of Pharmacy

FACULTY

CYRUS NORTHROP, LL.D., 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	J. N. KIRBY	A. D. THOMPSON
STEWART GAMBLE	A. J. KLINE	E. A. TUPPER
J. W. HARRAH	C. B. McCALL	THOMAS VORGELI
CHARLES H. HUHN	HENRY McCOLL	

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.

UNCLASSIFIED STUDENTS

Unclassified 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.

FEEES

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. Blossmo 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. Blossmo
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.
Blossmo 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. Blossmo
 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. Blossmo
 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. Blossmo
 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. Blossmo 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. FRANKFORDER, 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; gravimetric 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. Blossmo. 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. Pharmacodynamics, 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 media, filtration of solution 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, deliquescence,

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.

1. 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 cellulose 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, one 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.
20. 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 more 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, cyripedium, 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, cusco, arnica, matricaria, anthemis, rosa gallica, zea, chondrus, cannabis indica, scoparious, eupatorium, grindella, 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 succus, 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, alce (Socotrina, Barbadosensis, et Capensis), kino (Malabar et Pallas), gambir, opium, elastica, manna, saccharum, acacia, tragacantha, mastiche, gualacum, benzoinum, cambogia, asafetida, scammonium, myrrha, copaiba, terebinthina, terebinthina canadensis, resina, pix liquida, styrax, balsamum peruvianum, toluatanum, camphora, thymol, menthol, ergota (Spanish and German), sassafras medulla, galla (Aleppo et Chinensis), gossypium, purificatium, lupulinum, lycopodium, amylium, 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 I.

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)

Second 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, pancreatic 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 lectures 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 Laboratory				
	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 Crystallography				
	Thurs.	U. S. P. Testing				Dispensing				Pharmaceutical Laboratory				Pharmaceutical Laboratory				
	Fri.	Materia Medica	U. S. P. Testing		Physiology	Dispensing				Materia Medica	Pharmacognosy Laboratory			Pharmaceutical Laboratory				
	Sat.	Make up Laboratory								Make up Laboratory								

Second Semester--Junior and Senior Schedule

		THIRD QUARTER								FOURTH QUARTER								
1916		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 Pharmacy	New Remedies	Pharmaceutical Laborat'ry							
	Wed.	Quantitative Chemistry			Pharmaceutical Laborat'ry				Pharmacognosy Laboratory		Identifi- cation	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		Identifi- cation	Pharmaceutical Laborat'ry						
	Sat.	Make up Laboratory								Make up Laboratory								

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THE SCHOOL OF MINES

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 beginning 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

For list and description of subjects accepted for admission see pages 68, 69 and 72.

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 unclassified 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 type-written 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
	<hr/>
	\$ 95.00

SOPHOMORE YEAR

*Incidental fee.....	\$ 30.00
Chemical laboratory fee.....	14.00
Books.....	8.00
Note books and supplies.....	2.00
	<hr/>
	\$ 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
	<hr/>
	\$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
	<hr/>
	\$ 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 unforeseen 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 $12\frac{1}{2} \times 12$ 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 13, 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 gravi-
metric 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 necessary stoichiometric 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, representa-
 tion 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. Instruc-
 tion 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 occurrence 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.
1. **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.

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THE SCHOOL OF CHEMISTRY

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

For list and description of subjects accepted for admission see pages 54, 55 and 58

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.

FEEES

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. Fray
 *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 Pro-
 fessor 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 Pro-
 fessor 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 Assistants
 †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. MORPHOLOGY 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 stoichiometric 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 food-stuffs 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 value

including coal, mineral oil and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and flintle 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 staurosopic 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 hours 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., Professor 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

Three credits (three recitations per week)

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.

PROFESSOR JOHN ZELENY

First semester

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.

L

THE COLLEGE OF EDUCATION

College of Education.

FACULTY OF INSTRUCTION

CYRUS NORTHROP, LL.D., President
GEORGE F. JAMES, Ph.D., Dean and Professor of Education
A. W. RANKIN, B.A., Professor of Education
FLETCHER HARPER SWIFT, Ph.D., Professor of Education
JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
JOHN G. MOORE, B.A., Professor of German
CHRISTOPHER W. HALL, M.A., Professor of Geology and Mineralogy
CHARLES W. BENTON, M.A., Litt.D., Professor of French
JOSEPH M. THOMAS, M.A., Professor of Rhetoric
JOHN CORRIN HUTCHINSON, B.A., Professor of Greek
HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
JOHN ZELENY, Ph.D., Professor of Physics
GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
WILLIS M. WEST, M.A., Professor of History
J. J. FLATHER, Ph.B., M. M. E., Professor of Mechanical Engineering
FRANCIS P. LEAVENWORTH, M.A., Professor of Astronomy
JOSEPH BROWN PIKE, M.A., Professor of Latin
SAMUEL G. SMITH, Ph.D., LL.D., Professor of Sociology
NORMAN WILDE, Ph.D., Professor of Philosophy
WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
FREDERIC E. CLEMENTS, Ph.D., Professor of Botany
JOHN HENRY GRAY, Ph.D., Professor of Economics
FRANCIS SQUIRE POTTER, M.A., Professor of English
EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
CARLYLE M. SCOTT, Professor of Music
LOUIS J. COOK, M.D., Director of Gymnasium
JOHN B. JOHNSTON, Ph.D., Associate Professor of Neurology

EDWARD M. LEHNERTS, M.S., Assistant Professor of Geology

D. D. MAYNE, Principal of the School of Agriculture

JAMES BURT MINER, Ph.D., Assistant Professor of Philosophy and
Psychology

INSTRUCTORS

MARGARET BLAIR, Domestic Art

ANNA M. BUTNER, Physical Culture

HENRIETTA CLOPATH, Drawing

CHARLES M. HOLT, B.A., Education

LAURA FRANCES KENDALL, Music

ALICE J. MOTT, Ph.D., Principal of the Practice School

W. H. RICHARDS, Sloyd and Woodwork

S. C. SHIPLEY, B.S., M.E., Machine Work and Iron work

JUNIATA SHEPPERD, Domestic Science

THE COLLEGE OF EDUCATION

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

It offers both a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

ADMISSION

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

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

CONDITIONS OF ADMISSION

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

ADMISSION TO ADVANCED STANDING

I. FROM OTHER COLLEGES

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

II. FROM MINNESOTA NORMAL SCHOOLS

Graduates of the "advanced graduate course" of a Minnesota State Normal School who have completed in addition a full year of college

work will be admitted to the College of Education, but will not be permitted to elect either course 5 or course 7 in education. They will be granted twelve credits toward graduation in addition to thirty credits previously allowed on the work of the first two college years. Individual graduates of either of the five-year courses of a Minnesota State Normal School will be admitted under the same regulations, but without the additional twelve credits above named.

UNCLASSED STUDENTS

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

EXAMINATIONS

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

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

FAILURE TO KEEP UP WITH THE CLASS

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

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

FEEES

All students in the college who are residents of the state, are charged an incidental fee of ten dollars a semester. Non-residents are charged

double the fee required of residents of the state, or twenty 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 by twenty-five cents for each day's delay in registration, beginning with the first day set for recitations. The usual fees for shop work are required of students in manual training.

COURSE OF STUDY

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

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

A third part of the teacher's training is found in the specific subjects which he proposes to teach. In this particular the standard in Minnesota schools is constantly rising, and year by year school trustees are asking of all high school teachers more definite and adequate preparation in the subjects assigned them. This preparation is not possible unless the prospective teacher selects his subjects early in the college course and effects also a desirable and natural combination. When this is done the work required for a bachelor's degree may be arranged to give both a liberal and a special training.

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

THE DEGREE OF BACHELOR OF ARTS IN EDUCATION

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

A. The completion of college courses amounting to one hundred and twenty-six (126) credits, in addition to the required exercises in drill, gymnasium and physical culture. The courses selected must be approved by the committee in charge. No student shall elect less than fifteen or more than eighteen hours per week without special permission.

A credit is one hour per week through one semester.

B. At least fifteen (15) credits shall be secured in Education, including courses 1 and 2.

C. An amount of work shall be taken in at least three departments concerned with the studies of the secondary curriculum sufficient to secure one major and two minor recommendations. Each minor recommendation will require not less than twelve (12) credits and each major not less than eighteen (18) credits in one department.

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

E. A maximum of twelve credits is elective from the laboratory and shop courses in the manual arts and agriculture, but, in addition, credit is allowed for allied courses toward the bachelor's degree, in the case of students who desire to specialize in manual training, domestic art, domestic science or agriculture.

GRADUATION "WITH DISTINCTION"

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

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

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

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

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

recommended to the faculty for special excellence, and be approved by the vote of the faculty.

OBSERVATION AND PRACTICE TEACHING

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

In November, 1907, a small school was installed in temporary quarters provided by the regents, and during that academic year classes were conducted in seventh grade and in eighth grade work. In September, 1909, the school will, it is expected, be ready to enroll pupils from the seventh grade to the tenth grade inclusive, and thereafter, as facilities may be organized, the courses of the school will be extended up through the high school years and down through the elementary years. The primary purpose in this school is to afford prospective high school teachers an opportunity for seeing the work of the secondary schools conducted under normal conditions in as efficient a way as possible, in order that they may gain by observation and, to some extent, by practice familiarity with the instruction and management proper to a school of this grade. In addition, a fully graded elementary school, with kindergarten, ungraded room, and a three grade group is planned as a place of observation and practice for prospective school principals and superintendents.

The elementary and high school for observation and practice in connection with the training of teachers is the prime condition of success. To organize this adequately means buildings of considerable size, suitable and sufficient furniture and equipment, school libraries, laboratories, shops, gardens, and playgrounds. To secure this is the first aim and desire of the college. Meanwhile, the fullest use will be made of the temporary facilities, which are all that, during this year, the governing board is able to provide.

COMMERCIAL TRAINING

No definite course is now prescribed for those who are planning to teach business subjects (including commercial geography) in the high

schools, but all are advised to take at least a three years' course in economics and to elect courses also in political science and in history. Each student is advised further to select work in rhetoric, in English literature, and in one modern foreign language.

Students who expect to teach commercial geography will do well to select courses in some of the following subjects: essentials of physical geography, advanced general chemistry, industrial botany, economic zoology, applied geology, and anthropology. In economics, courses are suggested in economic geography, in industrial and commercial history, the principles of accounting, and the elements of business law. These are general suggestions for those who wish to prepare themselves for the teaching of commercial subjects, but each candidate should very early consult with the committee in regard to the outlining of his entire course.

MANUAL TRAINING

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

DOMESTIC ART AND DOMESTIC SCIENCE

These subjects are being added each year to the school course in an increasing number of Minnesota towns. So far, superintendents and boards of education have experienced considerable difficulty in securing teachers in these lines. The larger towns and cities can engage trained teachers and supervisors, but in the smaller communities on the first introduction of these subjects, it is necessary to entrust them to teachers able to give instruction in some high school studies.

A good opportunity, therefore, lies before prospective teachers who, in addition to a preparation in the ordinary studies of the high school course, will prepare for the direction of these subjects. Students who are inter-

ested in this line of work will be directed early in their college course in the selection of foundation work in geography, chemistry, physics, and other related subjects, and will thus be prepared to elect during the last year or two the more technical instruction in domestic art and domestic science.

SATURDAY CLASSES AND COLLEGE EXTENSION COURSES.

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

Extension courses by members of the college faculty were given during 1907-8 and 1908-9 in St. Paul under the auspices of a citizens' committee, and under the immediate direction of the city superintendent. Lectures on literature, anthropology, on general and on education psychology, on school administration, and on the history of education were given each week through the school year, and the enrollment in the courses was large. The college plans to make available, as far as possible, its resources in teachers and equipment to all the school systems of Minnesota, particularly those of towns in the neighborhood of the Twin Cities. It will be possible, from time to time, to secure from the college a series of weekly or fortnightly lectures upon almost any of the ordinary branches of higher study.

THE UNIVERSITY SUMMER SCHOOL

The summer school which has been held at the university for more than fifteen years is under the direction, not of the regents, but of the state department of public instruction. There is no official connection, therefore, between the summer school and the College of Education, but the school has been planned for many years especially to suit the needs and desires of Minnesota teachers, and in the college section the courses are arranged for teachers in state high schools who desire further preparation for their work. At the same time graduate courses are provided in connection with the school for teachers, principals, and superintendents who cannot attend during the academic year, and undergraduate courses leading to the degree of bachelor of arts are also provided for teachers. Men and women who have not completed the requirements for the bachelor's degree are enabled in this way to supplement their previous studies and to bring themselves where a few months of resident study will enable

them to finish their college course. The courses provided during this six weeks' session in June and July are given to a considerable extent by members of the faculty of this college.

LIBRARY FACILITIES

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

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

THE DEGREE OF MASTER OF ARTS

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

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

THE UNIVERSITY TEACHER'S CERTIFICATE

The University Teacher's Certificate is granted to all graduates of the College of Education and to those graduates of the College of Science, Literature, and the Arts who complete one course in general psychology and three courses in education, including courses 1 and 2, and who secure on the basis of excellent scholarship one major recommendation as qualified for teaching from a department of that college concerned with some branch of the secondary curriculum.

SPECIAL LECTURES

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

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

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

THE EDUCATIONAL CLUB

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

COURSES OF INSTRUCTION

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

RELATED DEPARTMENTS

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

- I. English Language and Literature
 - (a) English, (b) Comparative Philology, (c) Rhetoric
- II. Ancient Languages and Literatures
 - (a) Greek, (b) Latin, (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) Astronomy, (c) Mechanics, (d) Physics
- VII. Philosophy, Education, and Anthropology
 - (a) Philosophy and Psychology, (b) Education, (c) Anthropology

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

Courses of Study.

EDUCATION

GEORGE F. JAMES, Professor, Head of the Department of Education

ALBERT W. RANKIN, Professor

FLETCHER HARPER SWIFT, Professor

JAMES BURT MINER, Assistant Professor

ALICE J. MOTT, Instructor

CHARLES M. HOLT, Instructor

1. HISTORY OF EDUCATION TO THE REFORMATION

MR. SWIFT

Three credits (three hours per week)

First semester

Open to juniors and seniors

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

2. HISTORY OF MODERN EDUCATION

MR. SWIFT

Three credits (three hours per week)

Second semester

Open to juniors and seniors 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

MR. MINER

Three credits (three hours per week)

Each semester

Open to juniors who have completed philosophy 1.

Identical with philosophy 2.

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 (three hours per week)

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 (three hours per week) 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 (three hours per week) 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 (three hours per week) 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 (three hours per week) 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 (three hours per week) 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 (three hours per week) 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 (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2 and philosophy 1.
 An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.
12. CURRENT PROBLEMS IN ELEMENTARY TEACHING MR. RANKIN
 Two credits (two hours per week) First semester
 Open to seniors who have completed course 5 and to graduate students.
 This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor, through readings, the visiting of schools and through class discussions.
13. EDUCATIONAL CLASSICS MR. JAMES
 Two credits (two hours per week) First semester
 Open to seniors who have completed courses 1 and 2, and to graduates.
 A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.
14. CURRENT PROBLEMS IN SECONDARY TEACHING MR. RANKIN
 Two credits (two hours per week) Second semester
 Open to seniors and to graduate students who have completed course 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 problem in connection with secondary teaching. The course will be conducted by lectures, class discussion, readings and by the visiting of schools.
15. PROBLEMS IN SCHOOL ADMINISTRATION MR. JAMES
 Two credits (two hours per week) Second semester
 Open to seniors and to graduate students who have completed courses 1 and 2.
 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 to graduate students.
 This course will be conducted by text, by lectures, and by investigation into the problems of school lighting, heating, and ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.
17. ORGANIZATION OF HIGHER EDUCATION MR. JAMES
 One credit (one hour per week) Second semester
 Open to seniors and to graduate students who have 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 a historical sketch of the development of the American University, with discussions of modes of organization and administration, problems of departmental management, and questions of class instruction.

18. PRACTICE TEACHING Mr. RANKIN and Miss MOTT
 Three credits (three hours per week) Each semester
 Open only to seniors and to graduate students.
 The registrar will accept enrollment only on written permission to the student from the instructor in charge, specifying one of the morning periods to be kept free for this work on each day of the week; five periods of teaching and Saturday conference; not counted as one of the five courses in education required for graduation.
 This is a course in observation and practice teaching, related for the present to the work of advanced grammar and first high school grades. As facilities permit, the work of other grades will be added.
19. TECHNIQUE OF READING Mr. HOLT
 Three credits (three hours per week) Each semester
 Open only to a limited number of seniors after individual tests by the instructor.
 This course is given in two sections, for those who are specializing in this work, and for those noticeably deficient in voice control.
20. HISTORY OF RELIGIOUS EDUCATION Mr. SWIFT
 One credit (one hour per week) First semester
 Open to juniors, 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.

AGRICULTURE

D. D. MAYNE, Principal of the School of Agriculture

1. ELEMENTS OF AGRICULTURE Mr. MAYNE
 Three credits (three hours per week) First semester
 Open to juniors and seniors.
 This course is planned to meet the increasing demand for a knowledge of the elements, at least, of agriculture on the part of graded school principals, rural school teachers, county superintendents of schools, and others concerned with education in the agricultural sections of the state. The course is given at the School of Agriculture on Tuesday and Saturday afternoons.
2. ELEMENTS OF AGRICULTURE (Continued) Mr. MAYNE AND ASSISTANTS
 Three credits (three hours per week) Second semester
 Open to juniors and seniors.
 This is a continuation of course 1 and is planned to give the student some familiarity with the underlying principles and the simple processes connected with various forms of agricultural work. Tuesday and Saturday afternoons. Mr. Mayne will have the co-operation of others connected with this branch of the University.

Students who are interested are advised to read the bulletin of the School of Agriculture and to note the various opportunities which are there afforded, for all of these will be made available to some extent in connection with these courses.

ANIMAL BIOLOGY

HENRY F. NACHTRIEB, Professor. Head of the 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

1. GENERAL ZOOLOGY MESSRS. SIGERFOOS, OESTLUND, BROWN, DOWNEY,
JOHNSON AND OKKELBERG
Six credits (three hours per week) Both semesters
Open to all; the laboratory fee is three dollars per semester.
Lectures, quizzes, and laboratory work. Text-book—Hertwig's Manual of Zoology. This course should be taken in the first or the second college year by all who expect to teach the subject.
2. MORPHOLOGY OF INVERTEBRATES MESSRS. SIGERFOOS AND JOHNSON
Six credits (six hours per week) Both semesters
Open to those who have completed course 1; both semesters must be completed before credit will be given for the first; the laboratory fee is three dollars per semester.
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; the laboratory fee is three dollars per semester.
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 laboratory fee is three dollars per semester.
5. GENERAL PHYSIOLOGY MR. NACHTRIEB
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.
In the first semester are considered the physical, structural, and functional features of living substance and the cell, present conditions and expressions of life, and the theories of the origin of life and death. 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 our high schools.
Demonstrations and simple experiments constitute a part of the course in both semesters.

13. **TEACHER'S 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 on the methods and means by which such ends may be gained.
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; the laboratory fee is three dollars per 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.

FOR A MAJOR, courses 1 and 15 and one course selected from courses 2, 3, 4, and 5 are required, with an average of at least good, together with six credits in botany. Course 13 in zoology is recommended.

Students may select additional work, on the approval of the head of the department, from other courses announced in animal biology.

ASTRONOMY

FRANCIS M. LEAVENWORTH. Professor, Head of the Department of Astronomy

1. **GENERAL ASTRONOMY** MR. LEAVENWORTH
 Six credits (three hours per week) Both semesters
 Open to those who have completed mathematics 4 (trigonometry).
 The study of the general principles of astronomy, illustrated by lantern slides and telescopic observations. This course may be combined with course 2.
2. **OBSERVATORY PRACTICE** MR. LEAVENWORTH
 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 1.
3. **PRACTICAL ASTRONOMY** MR. LEAVENWORTH
 Six or twelve credits (three or six hours per week) Both semesters
 Open to juniors or seniors who have completed course 1 and mathematics 7, 9, and 10.

The theory and use of astronomical instruments in determining time, latitude, longitude, and positions of heavenly bodies; astronomical photography, with measurements of plates; study of the method of least squares.

BOTANY

FREDERICK E. CLEMENTS, Professor, Head of the Department of Botany
 JOSEPHINE E. TILDEN, Assistant Professor
 CARL OTTO ROSENDANL, Assistant Professor
 FREDERICK K. BUTTERS, Instructor
 NED L. HUFF, Instructor
 ALICE MISZ, Assistant

1. GENERAL BOTANY MESSRS. CLEMENTS, HUFF, AND BUTTERS
AND MISS MISZ
Six credits (six hours per week) Both semesters
Open to all; both semesters must be completed before credit will be given
for the first semester; the laboratory fee is three dollars per semester.
2. ADVANCED BOTANY MESSRS. CLEMENTS AND ROSENDAHL
Six credits (six hours per week) Both semesters
Open to those who have completed course 1; the laboratory fee is three dollars
per semester.
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 de-
partment the course may be taken in conjunction with course 2; the laboratory fee
is three dollars per semester.
4. ALGAE Miss TILDEN
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three
dollars per semester.
5. FUNGI MR. CLEMENTS
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three
dollars per semester.
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 laboratory fee is three
dollars per semester.
11. INDUSTRIAL BOTANY Miss TILDEN
Six credits (six hours per week) Both semesters
Open to technical students who have completed course 1, and to academic
students who have completed courses 1 and 2.
A study of the origin, distribution and cultivation of plants yielding products
of economic value, the nature and use of these products, and the processes by which
they are obtained from the plants. Lectures, demonstrations, topics and laboratory
work.
16. TEACHERS' COURSE—Plant Studies and Methods MR. CLEMENTS
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three
dollars per semester.
A course for teachers and for students intending to teach; the subjects of nature
study and high school botany are presented as they are taught, and not from the uni-
versity 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.

FOR A MAJOR, eighteen credits, with an average of at least good, are required,
including courses 1 and 2 and one advanced course covering two semesters, together
with six credits in zoology. Courses 11 and 16 in botany are recommended.

Students may select additional work, on the approval of the head of the department, from other courses announced in botany.

CHEMISTRY

GEORGE B. FRANKFORTER, Professor, Head of the Department of Chemistry

CHARLES F. SIDENER, Professor

EDWARD E. NICHOLSON, Assistant Professor

IRA H. DERBY, Assistant Professor

LILLIAN COHEN, Instructor

FRANCIS C. FRARY, Instructor

JOHN A. HANDY, Instructor

WALTER BADGER, Assistant

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 credit is given for the first semester; the laboratory fee is five dollars per semester.
 Recitations and laboratory work; the course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.

2. ADVANCED GENERAL CHEMISTRY MR. FRANKFORTER, MISS COHEN 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; the laboratory fee is five dollars per 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; the laboratory fee is five dollars per semester.
 Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and the acids, with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. QUANTITATIVE ANALYSIS MR. SIDENER AND ASSISTANTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 3; the laboratory fee is seven dollars per semester.
 The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester; followed the second semester by a discussion of standard solutions and the necessary stoichiometric calculations, with laboratory work in volumetric analysis.

5. ORGANIC CHEMISTRY MESSRS. FRANKFORTER, DERBY, HANDY AND ASSISTANTS
 Nine credits (three lectures and twelve hours of laboratory work per week)
 Second semester
 Open to those who have completed course 3; the laboratory fee is ten dollars.
 This course includes the aliphatic and aromatic series, with the preparation of the more important compounds.
6. THEORETICAL CHEMISTRY MR. DERBY
 Two credits (one lecture and one recitation per week) Second semester
 Open to those who have completed course 5;
 The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.
26. TEACHER'S COURSE MISS COHEN
 Two credits (two hours per week) Second semester
 Open to those who have completed course 3; the laboratory fee is three dollars.
 The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

FOR A MAJOR, courses 2 and 3, course 4 or course 5, and course 26, with an average of at least good, are required, together with six additional credits in physical science.

DOMESTIC ART AND DOMESTIC SCIENCE

MARGARET BLAIR, Instructor
 JUINATA L. SHEPPERD, Instructor

These courses cover specifically the science and art of the home. In the reactionary movement away from the theoretical and toward the practical in education, the need of teachers of scientific and artistic home-making has become marked. To meet this demand the following courses have been organized.

DOMESTIC ART

Domestic art has to do with the very beginning of home-making, the selection of a site, the adaptation of architecture to the needs of the family, the choice of materials, colors, etc., and their relation to the surroundings, the interior of the home, its furniture and keeping. All of these topics are viewed in both their economic and their social aspect. In addition a full course is offered in needle-work in all its branches.

1. A STUDY IN TEXTILES MRS. BLAIR
 Three credits First semester
 Open primarily to those who expect to teach this subject.
 Animal and vegetable fibres, weaves and dyes, testing fabrics for household use and personal wear, the hygiene values of various fabrics, harmony of color. This course is designed especially to assist the teaching of sewing in graded schools, and

includes the preparation, explanation and making of models suited to grade work in the public schools. This course will be given upon Monday and Thursday afternoons, at the School of Agriculture.

2. DESIGN AND GARMENT DRAFTING

Three credits

MRS. BLAIR
Second semester

Open to those who have completed course 1.

This course is in the design and drafting of children's and adults' garments and includes also a series of lectures upon the home.

This course will be given on Monday and Thursday afternoons at the School of Agriculture.

DOMESTIC SCIENCE

Domestic science has to do with the chemistry of the table, the science of cooking, and the housewifely care of the kitchen and dining-room; household accounts and the administration of the home upon an economical basis, are discussed in their various relation to these courses, and the effort is toward system, economy and effectiveness in home management. Students who look forward to teaching are trained to assist in the teaching or supervision of this work in city schools or to have the entire charge of the work, in connection with other teaching, in the smaller high schools.

1. LAUNDERING AND FOOD ECONOMICS

Three credits

MISS SHEPPERD
First semester

Open primarily to those who expect to teach this subject.

In this course the subject of domestic and commercial laundering and cleaning is first considered, with a study of removing stains, dyeing, setting colors, cleaning delicate fabrics, the use of cleaning agents, starches and bluing. By far the larger part of the semester is given to a study of food economics, with a consideration of all phases of the selection of food materials and the preparation of food. The course is conducted by means of lectures, readings, with the writing of a thesis, and by full individual practical experience in all parts of the work.

The course is given on Wednesday and Friday afternoons at the School of Agriculture.

2. MANAGEMENT OF KITCHEN AND DINING ROOM

Three credits

MISS SHEPPERD
Second semester

Open to those who have completed course 1.

(a) The kitchen equipment, sanitation, labor saving devices, etc.

(b) The dining room, equipment, furniture, decorations, management, etc.

(c) Household inventories, bills of fare, fancy cookery, etc.

The above course is made, as far as possible, both practical and scientific. It requires three hours of work on each of two afternoons. Students who are interested in this line are advised to read a fuller description, which will be found in the Bulletin of the School of Agriculture.

DRAWING

HENRIETTA CLOPATH, Instructor

MAUD H. STEWARD, Assistant

1. **DRAWING AND PAINTING IN REPRESENTATION** Miss CLOPATH
Six credits (six hours per week) Both semesters
Open to sophomores with the permission of the instructor, juniors, and seniors.
Drawing of plant-form and landscape in pencil, water color, and charcoal; the study of perspective and the drawing of still life; drawing from the cast and sketching from life.
2. **ADVANCED DRAWING AND PAINTING** Miss CLOPATH
Six credits (six hours per week) Both semesters
Open to sophomores, juniors, and seniors who have completed course 1.
More advanced work in cast drawing; still life studies and figure pose 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 study of pure design, including arrangement of lines, tones, and colors in accordance with the principles of harmony, balance, and rhythm; and of design in representation, including the fundamental relation of design to pictorial art, composition as applied to plant form, landscape, still life, and life drawing, compositions of the masters, and the making of original compositions.
4. **DESIGN** Miss STEWARD
Six credits (six hours per week) Both semesters
Open to juniors and seniors who have completed course 3.
Advanced composition: book decoration with especial attention to lettering; designs for stained glass; and design applied to leather, pottery, metal, and embroidery.
5. **DRAWING AS RELATED TO EDUCATION** Miss CLOPATH
Six credits (six hours per week) Both semesters
Open to juniors and seniors who have completed courses 1 and 3.
Exercises in all the different kinds of art work used in the schools; advanced work in black and white and in color.
6. **THE TEACHING OF DRAWING** Miss CLOPATH
One credit (two hours per week) Second semester
This course is conducted by lectures and collateral reading on the methods and value of drawing, as revealed through a study of the instincts and mental processes of the child.

ECONOMICS AND POLITICAL SCIENCE

JOHN H. GRAY, Professor, Head of the Department of Economics and Political Science

EDWARD V. ROBINSON, Professor

WILLIAM A. SCHAPER, Professor

RAYMOND V. PHELAN, Instructor

CEPHAS D. ALLIN, Instructor

JOHN L. COULTER, Instructor

ECONOMICS

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.
 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. Text-book, supplemented by lectures and reports.
- 2b. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES Mr. ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 2a.
 A study of the natural resources, chief industries, commercial products, and commercial relations of the leading foreign countries.
- 3a. MODERN INDUSTRIAL AND COMMERCIAL HISTORY OF EUROPE Mr. GRAY
 Three credits (three hours per week) First semester
 Open to sophomores, juniors, and seniors.
 The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain.
- 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 completed course 3a.
 Courses 3a and 3b are conducted each with a text-book, supplemented by lectures, prescribed topical readings, and written reports.
4. ADVANCED ECONOMICS Mr. ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1; required for a major in economics.
 An advanced course in general economics, devoted largely to a study of recent theories of distribution. Assigned readings, reports, and discussions.
- 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, foreign exchange. 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, including our monetary and banking history. Lectures, text-book, assigned readings and 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. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS OF 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, based on Seligman and reports of state tax commissions, with lectures and reports on special topics.

POLITICAL SCIENCE

1. ELEMENTS OF AMERICAN GOVERNMENT MESSRS. SCHAPER AND ALLIN
 Three credits (three hours per week) First or second 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. 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 to-day. Text, with lectures and assigned readings.
3. THE ELEMENTS OF JURISPRUDENCE MR. SCHAPER
 Three credits (three hours per week) First semester
 A study of those human relations requiring legal regulation considered from the American point of view; intended for active citizenship and for the study of law. Text, cases, lectures, and assigned readings.
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. 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 course 1 and course 2 or course 15.
 A study of the theory of the state, the origin, nature, purpose, and justification of the state. 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 completed courses 1 and 2.
 An advanced course in political parties, their origin, development, and function. Text, lectures, and special topics.
13. TEACHERS' COURSE IN GOVERNMENT MR. SCHAPER
 One credit (one hour per week) Second semester
 Open to students of suitable preparation who intend to teach American government in the secondary schools.
 Lectures and the examination of text-books, maps, and other materials useful to teachers.

13. 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. Lectures, cases, and special topics.

FOR A MAJOR: in commercial subjects, eighteen credits in economics, with an average of at least good, are required, together with twelve credits in political science and six credits selected from history and sociology; in government, eighteen credits in political science, including course 13, with an average of at least good, are required, together with twelve credits in economics and six credits selected from history and sociology.

The attention of students who expect to teach history and American government or commercial subjects is called to courses 2a, 2b, 3a, 3b, 5a, and 5b in economics and to courses 2, 3, 7, 9, 13, and 15 in political science. All of these courses are open for election, on the approval of the head of the department, as well as the other courses announced in economics and political science.

ENGLISH

RICHARD BURTON, Professor, Head of the Department of English
 FREDERIC KLAEBER, Professor
 FRANCES SQUIRE POTTER, Professor
 JOSÉPH W. BEACH, Assistant Professor
 MARY GRAY PECK, Assistant Professor
 OSCAR W. FIRKINS, Assistant Professor

1. OUTLINE OF ENGLISH LITERATURE MISS PECK AND MR. BEACH
 Three credits (three hours per week) First semester
 Open to all.
 Full credit only for freshmen, who must complete course 2 before credit for this will be allowed. Not credited toward a major in English.
 An outline sketch of the main personalities of English literature, from the earliest times to the present.
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 at half credit to sophomores, 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. EARLY ENGLISH MESSRS. KLAEBER AND BEACH
 Six credits (three hours per week) Both semesters
 Open to sophomores, juniors, and seniors. The first semester is required of all who take a major or obtain a teacher's certificate in English.
 A study of the language and reading of representative selections of Old English prose and poetry; the 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 completed 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 completed the first semester of course 3; alternates with course 4; not given in 1908-9.
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. **SPENCER** MISS PECK, MR. BEACH, AND MR. FIRKINS
 Three credits (three hours per week) Second semester
 Open to sophomores.
- 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; 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 sophomores and juniors who have completed one year of work in English.
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.
13. **THE BIBLE AS LITERATURE** MRS. POTTER
 Three credits (three hours per week) Second semester
 Open to juniors and seniors.
14. **MILTON** MRS. POTTER
 Three credits (three hours per week) First semester
 Open to juniors who have completed one year of work in English, preferably courses 6 and 7.
15. **SHAKESPEARE** MRS. POTTER
 Three credits (three hours per week) Second semester
 Open to juniors who have completed one year and a half in English, preferably courses 6, 7 and 14.

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 in English, including course 15.
18. **TEACHERS' COURSE IN ENGLISH** Mrs. POTTER
Two credits (two hours per week) Both semester
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.
19. **HISTORY OF LITERARY CRITICISM** Mr. BURTON
Two credits (two hours per week) Both semesters
Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.
20. **ENGLISH PROSE** Mr. BURTON
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed one year of English.
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 English.
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.

FOR A MAJOR, courses 3 (first semester), 6, 7, 14, 15, 18, and 22, together with six additional credits in English and course 2 in rhetoric, are required.

FOR A MINOR, eighteen credits, not counting courses 1 and 2, and including course 19 or course 22, the courses to be selected after consultation.

Students may select additional work, on the approval of the head of the department, from other courses announced in English.

GEOLOGY AND MINERALOGY

CHRISTOPHER W. HALL, Professor, Head of the Department of Geology and Mineralogy

EDWARD M. LEHNERTS, Assistant Professor

FREDERIC W. SARDESON, Assistant Professor

1. **GENERAL GEOLOGY** Mr. HALL
Three credits (three hours per week) First semester
Open to juniors and seniors.
This course comprises: (1) geodynamics, (2) structural geology, (3) physiographic geology, (4) an outline of historical geology. Lectures and conferences, 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.
A discussion 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 course 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 hundred years, and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports; a brief survey of industries in other parts of the world parallels the more detailed study of North America; throughout the course cause and effect are kept in view.

4. ELEMENTS OF METEOROLOGY

MR. LEHNERTS

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1 or course 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 is 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, course 7, or course 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.

15. THE METHOD AND MATERIAL OF GEOGRAPHY

MR. LEHNERTS

Two credits (one hour per week)

Both semesters

Open to juniors and seniors; designed especially for teachers.

The earth as an object of study in the grades and in the high school; the guiding principles; the course of study; text-books and their use; practical laboratory work; excursions; collection and preparation of illustrative material; map drawing; chalk modeling; relief work; organization of geographical subject matter for class room instruction; and the method of recitation.

Students will not offer a major in geology and mineralogy toward graduation in this college except by special permission, but all who intend to teach any biological or physical science are advised to take at least some of the elementary courses, to be selected after consultation.

GERMAN

JOHN G. MOORE, Professor, Head of the Department of German

CARL SCHLENKER, Professor

OSCAR BURKHARD, Assistant Professor

MATILDA J. WILKIN, Assistant Professor

Courses 1, 2 or 3, and 5 are introductory courses. Students who present German for entrance may select courses 4 and 6 or 7 during the first two college years.

8. ADVANCED CONVERSATION, GRAMMER AND COMPOSITION

MR. SCHLENKER, MRS. WILKIN, AND MR. BURKHARD

Four credits (two hours per week)

Both semesters

Open to those who have taken or are taking course 6, course 7, or course 9; recommended that it be preceded by course 5; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

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.

10. MODERN AUTHORS, GERMAN LITERATURE OF THE NINETEENTH CENTURY

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.

11. TEACHERS' COURSE

MR. MOORE

One credit (one hour per week)

Second semester

Open to those who have completed course 10; this course is especially designed for those who expect to become teachers of German in high schools.

FOR A MAJOR, course 2 or course 4, course 6 or course 7, and courses 8, 9, 10, and 11 are required, with an average of at least good.

FOR A MINOR, eighteen credits, not including course 1, to be selected after consultation.

Students may select additional work, on the approval of the head of the department, from other courses announced in German.

GREEK

JOHN CORRIN HUTCHINSON, Professor, Head of the Department of Greek

CHARLES ALBERT SAVAGE, Professor

In addition to at least two of the preliminary courses, students who expect to teach Greek in the high schools should take the following:

4. **ORATORY: Lysias and Demosthenes** 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 of readings from the orations of Lysias and Demosthenes; selections from Socrates may also be read. This work is supplemented by lectures on Greek oratory, and some attention is given to the study of Greek rhetoric. 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*, Xenophon's *Memorabilia*** 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 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 best 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.
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.

FOR A MAJOR, courses 4, 5, 7, 10, and 14 are required.

FOR A MINOR, at least eighteen credits.

Students who desire further courses in Greek will consult with the head of the department.

HISTORY

WILLIS M. WEST, Professor, Head of the Department of History

FRANK M. ANDERSON, Professor

ALBERT B. WHITE, Professor

WILLIAM STEARNS DAVIS, Professor

WALLACE NOTESTEIN, Instructor

INTRODUCTORY COURSES

1. EUROPEAN HISTORY FROM THE ESTABLISHMENT OF THE ROMAN EMPIRE TO THE REFORMATION, 31 B. C. TO 1500 A. D. MR. DAVIS
Six credits (three hours per week) Both semesters
Open to all; juniors and seniors receive only half credit.
Especially designed for freshmen who have had less than two years of history in the secondary schools; not credited toward a minor in history.
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 secondary schools, or who have completed course 1.

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 the Reformation will be studied as general European movements, with emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.
4. EUROPE SINCE 1789 MR. ANDERSON
Six credits (three hours per week) Both semesters
Open to 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.
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 recommended for the sophomore year to students who expect to specialize in history.
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 1908-9 and in alternate years thereafter.
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; designed only for those who intend to specialize in history.

16. **TEACHERS' 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 of those who obtain a teacher's recommendation in history.

This course is designed to assist those who expect to teach history in the high schools. Mr. 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; not given in 1905-9.

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 latter part of the period. Special attention will be given to the permanent influence of Greek civilization.

INTENSIVE COURSES.

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 the approval of the instructor; both semesters must be completed before credit is given for the first semester.

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.

9. **STUDIES IN AMERICAN STATESMEN** Mr. ANDERSON
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates who have completed course 2, and at least the first semester of course 5.

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.

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.

12. **THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789** Mr. ANDERSON
 Three credits (three hours per week) First semester
 Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

13. **COLONIAL EXPANSION AND ADMINISTRATION** Mr. WEST
 Three credits (three hours per week) Second semester

Open to seniors and graduates who have completed course 4 or course 5; given in alternate years; not given in 1909-10.

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.

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 good preparation for this period. This course alternates 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 in history, including course 2, and who obtain permission of the instructor. Students should be able to read Latin, and Latin 9 is recommended to give this preparation. This course alternates with course 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.

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.

FOR A MAJOR, twenty-four credits, including course 4 or course 5, course 16, and at least six credits in intensive courses, are required. At least the elements of the other social sciences are recommended.

FOR A MINOR, eighteen credits.

Students who expect to teach history are advised to consult in respect to their courses with the head of the department during the freshman year.

LATIN

JOSEPH B. PIKE, Professor, Head of the Department of Latin

JOHN S. CLARK, Professor

Students who desire a recommendation to teach Latin are expected to take courses 1, 2, 3, and 4 during the first two college years.

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 *Fasts* with a study of the religion and religious ceremonials of the Romans.

6. ADVANCED COURSE IN CAESAR MR. PIKE
 Three credits (three hours per week) First semester
 Open to those who have completed courses 1 to 4, inclusive; required for teacher's recommendation in Latin.
 Selections from books five to seven of the Gallic War and from the Civil War; thorough study of the principles of indirect discourse; intermediate composition; approximately one hour for one half semester will be spent upon technical portions of the work, e. g. class drill work and discussion of the various problems connected with secondary school work in Latin.

7. ADVANCED COURSE IN VIRGIL MR. PIKE
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 An interpretation of selections from books seven to twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages; approximately one hour for one half semester will be spent upon the strictly technical portions of the subject.

10. LATIN COMPOSITION MR. PIKE
 Two credits (two hours per week) Second semester
 Open to those who have completed courses 1 to 4, inclusive. Required for degree with distinction.

12. CORRESPONDENCE OF CICERO MR. CLARK
 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 the life and history of his times.

FOR A MAJOR, courses 1, 2, 3, 4, 5, 6, and 7, with an average of at least good, are required.

FOR A MINOR, courses 1, 2, 3, and 4.

Students may select additional work, on the approval of the head of the department, from other courses announced in Latin.

MANUAL TRAINING

J. J. FLATHER, Professor and Head of the Department of Mechanical Engineering

W. H. RICHARDS, Instructor

S. C. SHIPLEY, Instructor

Each credit hour calls in all manual training courses for at least three hours of shopwork.

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| 1. INTRODUCTORY COURSE IN WOODWORK
Three credits
Open to juniors or seniors.
Planned to give the elementary principles of sloyd and familiarity with material and tools. | MR. RICHARDS
First semester |
| 2. ADVANCED COURSE IN WOODWORK
Three credits
Open to juniors and seniors. | MR. RICHARDS
Second semester |
| 3. INTRODUCTORY COURSE IN IRONWORK
Three credits
Open to juniors and seniors. | MR. SHIPLEY
First semester |
| 4. ADVANCED COURSE IN IRONWORK
Three credits
Open to juniors and seniors.
Students may register for credit in manual training courses only with the approval of the committee. | MR. SHIPLEY
Second semester |

MATHEMATICS

JOHN F. DOWNEY, Professor, Head of the 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

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| 1. HIGHER ALGEBRA, PART I
Five credits (five hours per week) | MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE,
AND MIKESH
First semester |
| 2. ALGEBRA CONTINUED AND PLANE TRIGONOMETRY
Five credits (five hours per week) | MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE, AND MIKESH
Second semester |
| 3. HIGHER ALGEBRA, PART II
Three credits (three hours per week) | MESSRS. BAUER, BUSSEY, UNDERHILL,
AND PAINE
First semester |
| 4. TRIGONOMETRY
Three credits (three hours per week) | MESSRS. BUSSEY AND PAINE
Second semester |
| 5. HIGHER ALGEBRA, PARTS II AND III AND TRIGONOMETRY
Ten credits (five hours per week) | MESSRS. BUSSEY, PAINE, AND MIKESH
Both semesters |
| 6. HIGHER ALGEBRA, PART III.
Three credits (three hours per week)
Open to those who have completed course 2, course 4, or course 5. | MESSRS. BUSSEY AND PAINE
First semester |

7. **ANALYTICAL GEOMETRY** MESSRS. BUSSEY, UNDERHILL, AND PAINE
 Three credits (three hours per week) First semester
 Open to those who have completed course 6
8. **DIFFERENTIAL CALCULUS** MESSRS. DOWNEY AND UNDERHILL
 Three credits (three hours per week) First semester
 Open to those who have completed course 7.
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.
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.

FOR A MAJOR, eighteen credits, with an average of at least good, are required, including courses 6, 7, 8, 9, and 13, but not including courses 1 and 2.

FOR A MINOR, twelve credits, not including courses 1 and 2.

MUSIC

CARLYLE M. SCOTT, Professor, Head of the Department of Music
 LAURA FRANCIS KENDALL, Instructor

1. **HARMONY** MR. SCOTT
 Four credits (two hours per week) Both semesters
 Open to juniors and seniors; the fee is four dollars per semester.
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.
3. **MUSICAL FORM AND FREE COMPOSITION** MR. SCOTT
 Two credits (two hours per week) Second semester
 Open to seniors who have completed course 1 and the first semester of course 2.
 Intended for those specializing in music, and can be taken only with the consent of the instructor; the fee is four dollars per semester.
4. **PIANOFORTE** MR. SCOTT
 Three or six credits (one and one-half or three hours per week) Both semesters
 Open to juniors and seniors.
 Intended for those who propose to pursue the higher branches of pianoforte playing, or to fit themselves for piano teaching.
5. **PIANOFORTE, Second course** MR. SCOTT
 Three or six credits (one and one-half or three hours per week) Both semesters
 Open to seniors who have completed course 4. The fee is thirty-two or sixty-four dollars per semester.

6. **CHORAL CULTURE** MR. SCOTT
 Two credits (one hour per week) Both semesters
 Open to juniors and seniors
 A single credit may be secured for chorus work, provided that students pursuing work for credit take course 1 or 2 at the same time; students may pursue chorus work without credit by paying the required fee and securing the consent of the director.
7. **PUBLIC SCHOOL MUSIC** MRS. KENDALL
 Two credits (two hours per week) Each semester
 Open to juniors and seniors.
 This course includes methods, harmony, analysis, voice training, composition, and practice teaching. Students are expected to become members of the chapel choir and take part in its duties.
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.

PHILOSOPHY AND PSYCHOLOGY

NORMAN WILDE, Professor, Head of the Department of Philosophy and Psychology

JOHN B. JOHNSTON, Associate Professor

DAVID F. SWENSON, Assistant Professor

JAMES B. MINER, Assistant Professor

ROWLAND HAYNES, Assistant Professor

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. Students who expect to teach are advised to take this course during the second college year.
2. **LOGIC** MESSRS. WILDE, SWENSON AND HAYNES
 Three credits (three hours per week) Each semester
 Open to sophomores, juniors, and seniors.
3. **EDUCATIONAL PSYCHOLOGY** MESSRS. MINER AND HAYNES
 Three credits (three hours per week) Each semester
 Open to those who have completed course 1.
 This course is commended to those who expect to teach; it is announced also as course 3 in education, and is accepted toward the requirements of the teacher's certificate, and counts as one of the five courses in education required for graduation in this college.
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 must arrange with their instructors as to their section before registration.

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.
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.

All of the above courses have direct bearing upon the problems of education. The attention of future teachers is directed also to courses in ethics, the history of philosophy, the philosophy of religion, and other courses which are announced in the bulletin of the College of Science, Literature, and the Arts.

The following course in neurology, offered by the College of Medicine and Surgery, is of value to students who are taking advanced courses in psychology, and who are preparing to specialize in the teaching of education and psychology.

26. **THE NERVOUS SYSTEM AND MENTAL LIFE** MR. JOHNSTON
 Three credits (three hours per week) Second semester
 Open to juniors and seniors

PHYSICS

JOHN ZELENY, Professor, Head of the Department of Physics
 ANTHONY ZELENY, Professor
 HENRY A. ERIKSON, Assistant Professor
 ALOIS F. KOVARIK, Instructor

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 (Trigonometry); may be taken separately or in conjunction with course 2.

Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics; the treatment is experimental rather than mathematical; the course is designed to give the students a general knowledge of the fundamental principles of the subject, and will be found especially useful to those pursuing other sciences. 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 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 a general course in physics; the treatment is experimental, and the fundamental principles of the subject, including those of radioactivity, ionization and 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 students a knowledge of experimental methods.
5. **MECHANICS OF SOLIDS AND FLUIDS** MESSRS. J. ZELENY, A. ZELENY,
ERIKSON, AND KOVARIK
 Four credits (three recitations, one lecture, or two hours laboratory) First semester
 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** MR. J. ZELENY,
A. ZELENY, ERIKSON AND KOVARIK
 Four credits (one lecture, two recitations, and two hours laboratory per week) 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 measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.
7. **ELECTROKINETICS** MESSRS. J. ZELENY, A. ZELENY, ERIKSON AND
KOVARIK
 Four credits (one lecture, two recitations, and two hours laboratory per week) 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, radio-activity, electric waves, and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.
8. **SOUND AND LIGHT** MESSRS. J. ZELENY, ERIKSON, AND KOVARIK
 Four credits (one lecture, two recitations, and two hours laboratory per week) 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 of some of the relations which obtain in the subjects.
22. **TEACHERS' COURSE** MR. ZELENY
 One credit (one hour per week) Second semester
 Open to seniors who have completed courses 1 to 4, inclusive, or courses 5 and 6.
 No special matter is discussed, but methods of presentation and the selection of lecture material and laboratory experiments are considered; the work is conducted by the students under the supervision of the instructor.

FOR A MAJOR, courses 5, 6, 7, 8, and 22 are required, together with six credits in chemistry.

RHETORIC AND PUBLIC SPEAKING

JOSEPH M. THOMAS, Professor, Head of the Department of Rhetoric and Public Speaking

ADA L. COMSTOCK, Professor

FRANK M. RARIG, Assistant Professor

OSCAR W. FIRKINS, Assistant Professor

HALDOR GISLASON, Instructor

ANNA H. PHELAN, Instructor

WILFORD O. CLURE, Instructor

NELLIE A. WHITNEY, Instructor

RHETORIC

1. COMPOSITION AND RHETORIC

MESSRS. THOMAS, FIRKINS, AND CLURE, MISSES COMSTOCK, AND
WHITNEY, AND MRS. PHELAN

Six credits (three hours per week)

Both semesters

Open to all, but juniors and seniors must obtain the consent of the head of the department, and will receive only half credit.

2. ADVANCED COMPOSITION AND RHETORIC

MESSRS. THOMAS, FIRKINS, AND CLURE, MISS WHITNEY, AND
MRS. PHELAN

Six credits (three hours per week)

Both semesters

Open to sophomores, juniors, and seniors who have completed course 1 or English 1 and 2.

3. ADVANCED RHETORIC

Six credits (three hours per week)

MISS COMSTOCK

Both semesters

Open to juniors and seniors who have completed courses 1 and 2. This course should be taken by all who expect to teach English in the secondary schools.

4. ARGUMENTATIVE WRITING

Three credits (three hours per week)

MR. THOMAS

First semester

Open those who have completed courses 1 and 2.

5. SHORT STORY WRITING

Three credits (three hours per week)

MR. THOMAS

Both semesters

Open to those who have shown exceptional proficiency in course 2.

6. SEMINAR

Four credits (two hours per week)

MR. THOMAS

Both semesters

Open to seniors and graduates who have completed courses 1 and 2 and at least one other course.

This course is intended for those who are specializing in rhetoric and composition. In 1909-10 the course will be devoted to lectures, reports, and theses on the history of rhetorical theory.

10. **A GENERAL COURSE IN PUBLIC SPEAKING** MESSRS. RARIG AND GISLASON
Six credits (three hours per week) Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2.
11. **INTERPRETATIVE READING** MR. RARIG
Six credits (three hours per week) Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.
This course aims to develop intelligent, suggestive, and sympathetic reading. The text used is Shakespere's plays.
12. **ARGUMENTATION AND DEBATE** MR. GISLASON
Six credits (three hours per week) Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.
14. **ORATORICAL COMPOSITION** MR. RARIG
Six credits (three hours per week) Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.

ROMANCE LANGUAGES

CHARLES W. BENTON, Professor, Head of the Department of Romance Languages

CHARLES M. ANDRIST, Professor

JULIUS T. FRELIN, Assistant Professor

EMMA BERTIN, Instructor

1. **BEGINNING FRENCH** MESSRS. ANDRIST AND FRELIN, AND MADAME 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 counted toward a minor in French.
2. **INTERMEDIATE FRENCH** MESSRS. ANDRIST AND FRELIN, AND MADAME 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.
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.
4. **BEGINNING FRENCH CONVERSATION** MESSRS. ANDRIST AND FRELIN AND MADAME BERTIN
Four credits (two hours per week) Both semesters
Open only to those who have completed or are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.

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.
6. **ADVANCED FRENCH CONVERSATION** MR. BENTON
 Four credits (two 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.
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.
8. **TEACHERS' COURSE IN FRENCH** MR. BENTON
 Two credits (one hour per week) Both semesters
 Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

FOR A MAJOR, an average of at least good in courses 2 or 3 and 4, 5, 6, 7, and 8 is required.

FOR A MINOR, eighteen credits, including course 2 or course 3 and course 5.

SOCIOLOGY AND ANTHROPOLOGY

SAMUEL G. SMITH, Professor, Head of the Department of Sociology and Anthropology
 ALBERT E. JENKS, Professor
 SAMUEL N. REEP, Assistant Professor

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, civilization, 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 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. REEF
 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. REEF
 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 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, course 2, or course 7, and to graduate students.
 This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the cause of the origin and distribution of several races and sub-races 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.

M

THE GRADUATE SCHOOL

The Graduate School

FACULTY

- CYRUS NORTHROP, LL. D., President 519 Tenth Avenue S. E.
HENRY T. EDDY, C. E., Ph. D., LL. D. 916 Sixth Street S. E.
Dean of the Graduate School, and Professor of Mathematics
and Mechanics, College of Engineering and the Mechanic Arts.
CEPHAS D. ALLIN, M. A., LL. B., Minneapolis
Instructor in Political Science.
FRANK MALOY ANDERSON, M.A., 1629 University Avenue S. E.
Professor of History.
CHARLES W. BENTON, M.A., Litt.D., 516 Ninth Avenue S. E.
Professor of the French Language and Literature.
ANDREW BOSS, St. Anthony Park
Professor of Agriculture and Animal Husbandry.
GISLE BOTHNE, M.A., 934 Fifteenth Avenue S. E.
Associate Professor of Scandinavian Languages and Literature.
JABEZ BROOKS, D.D., 1708 Laurel Avenue
Senior Professor of the Greek Language and Literature.
RICHARD BURTON, Ph.D., 2109 Blaisdell Ave.
Professor of English Literature.
WILLIAM H. BUSSEY, Ph.D., Minneapolis
Assistant Professor of Mathematics.
JOHN S. CLARK, B.A., 729 Tenth Avenue S. E.
Professor of the Latin Language and Literature.
F. R. CLEMENTS, Ph.D., Minneapolis
Professor of Botany.
FRANK H. CONSTANT, C.E., 1803 University Avenue S. E.
Professor of Structural Engineering.
JOHN L. COULTER, M.A., Minneapolis
Instructor in Economics.
W. S. DAVIS, Ph.D., Minneapolis
Professor of Ancient History.

- SAMUEL N. DEINARD, M.A., Minneapolis
Assistant Professor of the Semitic Languages and Literatures.
- JOHN F. DOWNEY, M.A., C.E., 825 Fifth Street E. E.
Dean of the College of Science, Literature and the Arts,
and Professor of Mathematics.
- HENRY A. ERICKSON, Ph.D., Minneapolis
Assistant Professor of Physics.
- OSCAR W. FIRKINS, M.A., 1523 4th Street S. E.
Instructor in Rhetoric.
- JOHN J. FLATHER, Ph.B., M.M.E., 315 Eleventh Ave. S. E.
Professor of Mechanical Engineering.
- GEORGE B. FRANKFORTER, M.A., Ph.D., 525 River Road, S. E.
Dean of the School of Chemistry, and Professor of Chemistry.
- EDWARD M. FREEMAN, M.S., Ph.D., St. Anthony Park
Assistant Professor of Botany.
- JOHN E. GRANRUD, Ph.D., 605 Delaware Street S. E.
Professor of Latin.
- J. H. GRAY, Ph.D., 412 Walnut Street S. E.
Professor of Economics and Politics.
- SAMUEL B. GREEN, B.S., St. Anthony Park
Professor of Horticulture and Forestry, and Horticulturist
of the Experiment Station.
- T. L. HAECKER, St. Anthony Park
Professor of Dairy Husbandry.
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Professor of Geology and Mineralogy; Curator of the
Geological Museum.
- ARTHUR EDWIN HAYNES, M.S., M.Ph., Sc.D., 703 River Parkway
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Professor of the Greek Language and Literature.
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Dean of the College of Education, and Professor of Education.
- ALBERT ERNEST JENKS, Ph.D., 313 Sixteenth Avenue S. E.
Professor of Anthropology.
- JOHN BLACK JOHNSTON, Ph.D., 509 St. Anthony Parkway
Assistant Professor of the Anatomy of the Nervous System.
- WILLIAM H. KAVANAUGH, M.E., 118 State St. S. E.
Professor of Experimental Engineering.
- WILLIAM H. KIRCHNER, B.S., 217 Beacon Street
Professor of Drawing and Descriptive Geometry.
- FREDERICK KLAEBER, Ph.D., 616 Ninth Avenue S. E.
Professor of Comparative and English Philology.

- FRANCIS P. LEAVENWORTH, M.A., 317 Seventeenth Ave. S. E.
Professor of Astronomy and Director of the Observatory.
- THOMAS G. LEE, B.S., M.D., 509 River Road
Professor of Anatomy.
- JAMES BURT MINER, Ph.D., 428 Walnut Street S. E.
Assistant Professor of Psychology.
- JOHN G. MOORE, B.A., 2810 University Avenue S. E.
Professor of the German Language and Literature.
- W. S. NICKERSON, Sc.D., M.D., 217 Beacon Street S. E.
Assistant Professor of Histology and Embryology.
- HENRY F. NACHTRIEB, B.S., 905 Sixth Street S. E.
Professor of Animal Biology; Zoologist of the Geological
and Natural History Survey; Curator of the Zoological
Museum.
- OSCAR W. OESTLUND, M.A., 1910 Fourth Street S. E.
Assistant Professor of Animal Biology.
- WILLIAM S. PATTEE, LL.D., 1319 Fifth Street S. E.
Dean of the College of Law, and Professor of Equity and In-
ternational Law.
- MARY GRAY PECK, M.A., 2412 Harriet Avenue
Assistant Professor of English.
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Instructor in Economics.
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Professor of Latin
- FRANCES S. POTTER, M.A., 2412 Harriet Avenue
Professor of English.
- BENJAMIN M. RASTALL, Ph.D., Minneapolis
Assistant Professor of Economics.
- ALBERT W. RANKIN, A.B., 916 Fifth Street S. E.
Professor of Education.
- M. H. REYNOLDS, M.D., V.M., St. Anthony Park
Professor of Veterinary Medicine and Surgery and Veterinarian
of the Experiment Station.
- E. V. ROBINSON, Ph.D., 1213 Seventh Street S. E.
Professor of Economics and Politics.
- C. O. ROSENDAHL, Ph.D., 626 Sixteenth Avenue S. E.
Assistant Professor of Botany.
- FREDERICK W. SARDESON, Ph.D., 414 Harvard Street
Assistant Professor of Paleontology.
- CHARLES ALBERT SAVAGE, Ph.D., 454 Ashland, St. Paul,
Professor of Greek

- WILLIAM A. SCHAPER, Ph.D., 625 Fulton Street.
Professor of Political Science.
- CARL SCHLENKER, B.A., 422 Union Street S. E.
Professor of German.
- GEORGE D. SHEPARDSON, A.M., M.E., Minneapolis
Professor of Electrical Engineering.
- CHARLES F. SIDENER, B.S., 1320 Fifth Street S. E.
Professor of Chemistry.
- CHARLES P. SIGERFOOS, Ph.D., 328 Tenth Avenue S. E.
Professor of Zoology.
- SAMUEL G. SMITH, Ph.D., LL.D., St. Paul
Professor of Sociology.
- HARRY SNYDER, B.S., St. Anthony Park
Professor of Agricultural Chemistry, and Chemist of the
Experiment Station.
- FRANK W. SPRINGER, E.E., 1005 University Avenue S. E.
Professor of Electrical Engineering.
- ANDREW ADIN STOMBERG, M.A., 709 Delaware Street S. E.
Professor of Scandinavian Languages and Literature.
- DAVID F. SWENSON, B.S., 3101 Sixteenth Avenue S.
Assistant Professor of Philosophy.
- JOSEPH M. THOMAS, M.A., Minneapolis
Professor of Rhetoric.
- JOSEPHINE E. TILDEN, M.S., 800 Fourth Street S. E.
Assistant Professor of Botany.
- ANTHONY L. UNDERHILL, Ph.D., Minneapolis
Assistant Professor of Mathematics.
- FREDERICK L. WASHBURN, M.A., St. Anthony Park
Professor of Entomology, and Entomologist of the Experiment
Station; State Entomologist.
- WILLIS M. WEST, M.A., 1314 Sixth Street S. E.
Professor of History.
- FRANK F. WESBROOK, M.A., M.D., C.M., 328 Tenth Avenue S. E.
Dean of the College of Medicine and Surgery; Professor of
Pathology and Bacteriology.
- ALBERT B. WHITE, Ph.D., 325 Sixth Avenue S. E.
Professor of History.
- NORMAN WILDE, Ph.D., 910 Sixth Street S. E.
Professor of Philosophy and Psychology.
- FREDERICK J. WULLING, Ph.G., Phar.D., LL.M., 3505 Second Avenue S.
Dean and Professor of Pharmacology, Pharmaceutical
Chemistry, and Pharmacal Jurisprudence. College of
Pharmacy.

ANTHONY ZELENY, Ph.D.,
Professor of Physics.

321 Church Street S. E.

JOHN ZELENY, Ph.D.,
Professor of Physics.

Minneapolis

THE GRADUATE SCHOOL

The graduate school has been established by the Board of Regents to include in a single organization the graduate work of all colleges and schools of the University, which offer courses of instruction leading to the higher degrees. The administration of the school is entrusted to the Dean, who is charged with its supervision and regulation, under the general direction of the President.

The faculty of the school consists of all those professors in the University who give courses of instruction accepted for such higher degrees as are offered by the school. Each college of the University has its graduate committee.

The Dean is chairman of the faculty and of the graduate committees of the various colleges, ex officio.

Regular faculty meetings will be held on the second Friday of each semester and on the last Friday of the year, and they may also be called by the Dean at such other times as business may demand.

The aim of the school is to offer instruction and opportunity for study combined with facilities for investigation and research to graduate students who desire to pursue some one or more branches of knowledge beyond the ordinary undergraduate courses.

FEEES

All students taking full work in this school are required to pay a fee of ten dollars a semester, or a proportionate fee for less work. Members of the staff of instruction in the University may register for graduate work without payment of tuition fees. Laboratory fees are charged in addition to those just mentioned.

ADMISSION

Any graduate from a four years' course of study in any reputable college or university will be admitted to the graduate school without examination, but will not be thereby admitted to candidacy for either of the higher degrees until his case has been duly considered and approved, as is explained later, in connection with the several degrees.

Each applicant for admission to the school should present himself in

person to the Registrar with his credentials (preferably his diploma of graduation), in order to register and pay his fees.

In case of doubt respecting the sufficiency of credentials, consult the Dean.

Registration at the beginning of each semester is obligatory upon graduate students and undergraduates alike.

Each student will receive at registration for entrance to the school a registration book in which to inscribe the courses he desires to pursue. When the instructors in charge of these courses shall have signed this book certifying that the student is prepared to begin such courses and when the Dean shall have approved his choice, the Registrar will issue cards authorizing the student to attend the courses thus certified to. Upon the successful completion of such work the instructors shall again sign the registration book. The student shall retain his book until ready for final examination, when he shall present it to the chairman of the examining committee. The action of the committee shall be recorded thereon and the book be deposited with the Registrar for record.

DEGREES

The degree of Master of Arts is, in general, conferred for advanced non-technical study; the degree of Master of Science for advanced technical study, such as agriculture, industrial chemistry, engineering, etc.; and Master of Laws for advanced legal studies.

THE MASTER'S DEGREE. Three degrees of this grade are conferred, viz.: Master of Arts (M.A.), Master of Science (M.S.), and Master of Laws (LL.M.).

CANDIDACY FOR THE MASTER'S DEGREE. Any bachelor, a graduate of this University or of any other university or college with an equivalent baccalaureate course, will be enrolled by the Dean as a candidate for the corresponding master's degree on the basis of an approved course of study conforming to requirements detailed below, provided the heads of the departments in which the studies selected lie, signify their approval of the student's preparation to enter upon the work selected.

In case of inadequate preparation for the work selected, such preliminary study as the case may require will be stated by the professor in charge and will be insisted on before the applicant is admitted to candidacy.

REGULATIONS. The master's degree will be conferred on any candidate enrolled for that degree, who not sooner than one year after graduation if in residence at the University, and not sooner than two years after registration if not in residence, shall pass satisfactory final examinations on the course which was approved when he was admitted to the candidacy,

and shall in addition present an acceptable thesis in accordance with the following provisions:

The professor with whom the candidate pursues his major subject shall be chairman of a committee of three, having in charge the work of the candidate from the time of his enrollment as such, the other members of the committee being those professors under whom the candidate's minors fall. This committee shall arrange for and have charge of the final examinations of the candidate; they shall approve the subject of the thesis, and pass upon the thesis itself. The candidate must secure their approval of his subject at least three months before graduation, and must complete the thesis and all examinations at least two weeks before graduation. All candidates for the master's degree shall pass written examinations upon all work taken by them, time and place to be determined by the committee. If these examinations and the thesis are satisfactory, the candidates shall be admitted to a final oral examination before the committee. It shall be the duty of this committee to canvass the examinations of the candidate's whole course together with the thesis, and in case they regard him entitled to a degree, to report the fact to the Dean, at least one week before commencement. The chairman of the committee shall also make a final report upon the candidate to the Registrar one week before commencement.

Any candidate for master's degree at commencement must, as a preliminary, make application to the Dean in writing, by the first of the preceding May, and state the courses in which he has passed and is to pass examination, the title of his thesis, and the names of the committee in charge of his work.

The amount of work required for the master's degree shall be equivalent to that done by the senior class. Proficiency shall be determined by examination upon the subject matter of the courses taken and of the thesis.

For the convenience of the student in selecting work the various departments and subjects of study are arranged in groups, as follows:

- I. ENGLISH LANGUAGE AND LITERATURE
 - (a) English, (b) Comparative Philology
- 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, (d) Agriculture
- VI. PURE AND APPLIED MATHEMATICS

- (a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics.
- (e) Engineering

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

Candidates desiring a master's degree in some special line of study, for the purpose of teaching or research, or as a basis for studies leading to the doctor's degree, must select three subjects of study, a major to occupy at least one-half of the work required, a first minor to occupy one-fourth, which shall be germane to the major subject by being selected from the same group or a closely related group, and a second minor to complete the work required, which last shall be in some reasonable connection with the other subjects selected. In special cases the candidate may be allowed to fill the required time with a major and one minor only. The thesis in this case must embody the results of study and investigation along the line of the major subject. In attaining this specialized master's degree, the thesis is regarded of much importance, and to it the candidate should devote much time and effort. To render this possible, the professor in charge of the major subject may count work assigned in its preparation as part of the time required in that subject.

Candidates desiring a master's degree with a view to general culture will select subjects from three distinct groups, of which the work in no one group shall be less than four hours a week, for the year. The work in one of these groups shall be designated as the candidate's major and to it the subject of his thesis shall stand in close relation. The courses pursued in the major shall be in advance of any regularly pursued by undergraduates.

All theses must be written in satisfactory English and those accepted for the degree of M. S. and M. A. shall be filed with the librarian of the University for cataloguing before distribution to departmental libraries.

Theses for all degrees in the graduate school shall be typewritten on one side only of the sheet, on paper of good linen stock measuring eight and one-half by eleven inches, and shall have a margin of one and one-quarter inches on all sides of the text. The title page of the thesis should be in the following form: (Title of the thesis). "A thesis submitted to the faculty of the Graduate School of the University of Minnesota by (name in full) in partial fulfillment of the requirements for the degree of (name of the degree in full), (date)."

To entitle a candidate to his diploma his thesis should be placed unbound in the hands of the librarian one week before commencement, together with one dollar to cover expense of uniform binding.

Printed theses whose title pages conform to the regulation stated above will also be accepted.

A candidate for the degree of Master of Laws must not only be Bachelor of Laws from a reputable law college having a course equivalent in length to that at the University of Minnesota, but he must in addition have been admitted to the bar in Minnesota. Any person who possesses the requisite legal learning may on registration pursue any or all of the studies offered for this degree, but he thereby acquires no standing as candidate for this degree.

The major selected for this degree will in all cases be Law, and the minors, Political Science and Constitutional History.

THE DOCTOR'S DEGREE. Three degrees of this grade are conferred, viz.: Doctor of Philosophy (Ph.D.), Doctor of Science (Sc.D.), and Doctor of Civil Law (D.C.L.), for still more advanced study than that leading to the corresponding bachelor's and master's degrees, and such special attainments therein as show power of original investigation and independent research, together with a fair degree of literary skill as evinced by the preparation of a thesis which shall be a contribution to knowledge.

CANDIDACY FOR THE DEGREE OF DOCTOR. Any student in the Graduate School who applies to be enrolled as a candidate for a doctor's degree must, in order to be enrolled as such, possess a reading knowledge of French and German, certified to by the professors respectively in charge of those languages, and in case of an applicant applying to be enrolled as candidate for the degree of Doctor of Civil Law, proficiency in Latin and Roman History is also required. Knowledge of Latin will also be required in certain other cases such as for a major in Medieval History, or Philosophy, as the professor in charge may prescribe.

The applicant must also have made before enrollment such noteworthy advancement in his graduate work as to secure the approval of his candidacy by his instructors. And in particular, he must obtain the written consent of the professor under whom his major subject falls to take charge of his instruction in that subject. His minors must also be acceptable to this professor, who must recommend him to the dean as a suitable candidate for the degree sought.

In order for the applicant to be successful, this professor should also state that, through the work thus far accomplished by the applicant, he has become convinced of his capacity and of his probable ability to carry an investigation in his special field to a successful conclusion and embody it in a valuable thesis.

The Dean shall, after full consideration and consultation with the professor concerned, pass upon his application and have the power to enroll the applicant as candidate or refuse to do so. Such enrollment as candidate must be secured at least one year before the degree will be conferred

It will frequently not be practicable to enroll an applicant as candidate for the doctor's degree before the completion of one year's study in the Graduate School. Graduates desiring to become candidates for this degree will find it advisable, under ordinary circumstances, to spend the first year of graduate study in attaining to the specialized master's degree, as part of the work leading to the doctor's degree.

That procedure is likely to furnish such a decisive test of capacity for advanced study, as well as experience in preparation of a thesis, as to settle definitely the question of candidacy for the doctor's degree.

Candidates for the degree of Doctor of Civil Law are required to secure the degree of Master of Laws as a preliminary.

REGULATIONS. Candidates for the degree of doctor must devote at least three years of graduate study to the subjects approved for candidacy, of which the last year must be spent in residence at the University of Minnesota. In lieu of the other years the candidate may offer an equivalent term of graduate study at some other university, but study pursued and work done *in absentia* without proper facilities of libraries and laboratories will not be accepted.

The same general regulations govern the candidate for this degree as hold in case of the specialized master's degree, both as regards the amount of study per year, the selection and relative amount of major and minors and as regards the chairman of the committee in charge of the work of the candidate, as well as regards the thesis required, which for this degree must give evidence of original and independent research and must be a contribution to knowledge.

In particular, considerable portions of the work on the major and on the thesis may be carried on under general direction of the professor in charge, in which case the candidate will be held responsible for large attainments in the directions indicated, in the form of written reports, reviews and criticism.

The candidate must pass satisfactory written examinations upon his major and minor subject at any time not more than a year prior to the final examination on the major.

In the case of the minors this written examination shall be final. If these examinations are satisfactory and the thesis approved the candidate shall be admitted to a final oral examination upon his major.

The final examination upon the major must show an exhaustive knowledge of the special subject selected, and a large acquaintance with the general field in which the subject lies, but the candidate shall not be admitted to the final examination upon his major until his thesis has been considered by the committee in charge and found satisfactory.

The order of procedure to be followed is this; The candidate for a doctor's degree shall submit the title and the outline of his proposed thesis

to the professor in charge of his major for final approval at least as early as the first of October preceding the commencement at which the degree is to be conferred. In case the proposed subject and the outline are acceptable, the candidate shall make a statement in writing to the Dean, as early as the first of the following February, of his intention to present himself for a doctor's degree at the next commencement, giving at the same time the names of the committee in charge of his work, the subjects of his major and minors, and the title of his thesis.

The thesis itself shall be completed in the typewritten form previously prescribed, and delivered to the professor in charge at least one month before commencement. In case the thesis is adjudged satisfactory, the candidate will be admitted by the committee to final examinations upon his major and upon the subject matter of his thesis.

This examination shall be arranged for by the professor in charge of the major, on a date at least two weeks before commencement. It shall be held by a committee of examination of which the professor in charge of the major shall be chairman, consisting of the professors in charge of the minors, and in addition, of such other members of the teaching force as the Dean may appoint as members of this examining committee. In order to do this, the Dean shall be duly informed of the date of the examination by the chairman.

The examining committee shall decide from all the facts within its knowledge, whether the candidate is, in its estimation, entitled to receive the doctor's degree sought, and the chairman shall, without delay, report its findings, in writing, to the Dean and to the Registrar.

Immediately after the final examination, the chairman will deposit the thesis with the librarian as directed above.

In case the report of the committee is favorable, the candidate shall be presented to the faculty of the graduate school, at a meeting called for the purpose, by the professor in charge of his major subject, who shall then make a written statement of the academic life of the candidate, of the character and scope of his examinations, and the scope and value of his thesis.

Any member of the faculty shall then be at liberty to propound any questions he will to the instructors of the candidate, respecting his work, or to the candidate himself, respecting the subject matter of his thesis. Upon evidence before it, the faculty shall then decide by vote whether the candidate shall be recommended for the degree.

Courses of Instruction.

The Arabic numerals by which the courses are here designated are those under which they appear in the bulletins of the separate colleges.

The courses which are offered to both undergraduates and graduates may not be selected by graduates as major subjects, but as minors only. The courses offered primarily for graduates include the subjects offered to them as majors.

AGRICULTURE

PLANT BREEDING--FIELD CROPS

MR. BULL

Courses in this subject will include research along such lines as may be advisable, in view of the previous training of the student, the available material and facilities for instruction, and the object sought by the candidate.

The prominent features of the course will be a study of history and methods; laws of evolution, heredity, etc.; probabilities, hybridization, selection; nursery and plant manipulation; character plotting; plant economics.

Open to candidates for advanced degrees who have completed a long course in botany and agriculture 1 or their equivalent.

FARM MANAGEMENT

MR. WILSON

Reading and research work combined with occasional lectures. Those who wish may choose any subject or problem of farm management that is of personal interest, provided they can get the necessary material for study. Any problem related to farming may be chosen, and must be presented from a practical business standpoint with special reference to profit and loss on the farm. Open as major subject to candidates for advanced degree.

ANATOMY.

This department offers a number of undergraduate courses which may be selected as minors in human and vertebrate Anatomy, Histology, Embryology and Neurology. The department further affords opportunity for graduate students to carry on investigations in any one of these divisions under the direction of the department as a major for the Master's or Doctor's degree.

Courses 3, 10, 13, 17, 22, 27, and 30 are quite suitable for major subjects.

FOR UNDERGRADUATES AND GRADUATES

1. GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY MESSRS. LEE AND

NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods)

First quarter

2. MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES MESSRS. LEE AND

NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods) Second quarter

3. MICRO-TECHNIQUE AND THE MORPHOLOGY OF THE SPECIAL SENSE ORGANS
Mr. LEE

Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter

7. CYTOLOGY AND HISTOGENESIS
Mr. LEE
Two credits (four lectures and recitations, two laboratory periods) Third quarter

Prerequisite, courses 3 and 13 or equivalent.

10. RESEARCH WORK IN HUMAN AND VERTEBRATE MORPHOLOGY
Mr. LEE
Properly qualified students will be provided every facility for original investigation of anatomical problems.

11. ELEMENTS OF VERTEBRATE EMBRYOLOGY
MESSRS. LEE AND JOHNSTON
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

12. ADVANCED VERTEBRATE EMBRYOLOGY
MESSRS. LEE AND JOHNSTON
Three credits (six lectures and recitations, three laboratory periods) Second quarter

13. SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES
Mr. LEE
Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter

17. EXPERIMENTAL EMBRYOLOGY
Mr. LEE
Two credits (four lectures and recitations, two laboratory periods) Fourth quarter

Prerequisite, courses 3 and 13 or equivalent.

20. THE ANIMAL PARASITES OF MAN
Mr. NICKERSON
One credit (hours to be arranged) Third quarter

21. ELEMENTS OF MAMMALIAN NEUROLOGY
MESSRS. JOHNSTON AND INGBERT
Three credits (two lectures and recitations, one laboratory period) Second quarter

22. THE HUMAN NERVOUS SYSTEM
MESSRS. JOHNSTON AND INGBERT
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

23. SPECIAL AND APPLIED NEUROLOGY
MESSRS. JOHNSTON AND INGBERT
One credit (hours to be arranged) Fourth quarter

24. NEUROLOGICAL TECHNIQUE
Mr. JOHNSTON
Two credits (hours to be arranged) Fourth quarter

26. THE NERVOUS SYSTEM AND MENTAL LIFE
Mr. JOHNSTON
One credit (hours to be arranged) Second quarter

27. COMPARATIVE NEUROLOGY OF VERTEBRATES
Mr. JOHNSTON
One to three credits (hours to be arranged) Second quarter

Intended for graduates; open by special permission to seniors who meet the requirements. Prerequisite, courses 1 and 2, or 3 in Animal Biology, or courses and 12 in Histology and Embryology.

30. RESEARCH IN NEUROLOGY
Mr. JOHNSTON
Problems and special work in vertebrate Neurology. Open only to those who are qualified to carry on an investigation.

40. ANATOMICAL JOURNAL CLUB AND SEMINAR

Weekly meetings during year for reviews of the current literature and discussion of special topics in Anatomy, Histology, Embryology and Neurology, and of the research work being carried on in the department. The department library, which is large and rapidly growing, receives all the leading anatomical journals.

ANIMAL HUSBANDRY

ANIMAL FEEDING AND NUTRITION

Mr. Boss

Original investigations in animal feeding with studies of food requirements for maintenance and growth. Problems will be arranged to suit the training and needs of the individual student.

MEATS—STRUCTURE—COMPOSITION AND PREPARATION FOR USE

Messrs. Boss and Gaumnitz

A course in which special consideration is given to the structure and composition of meats and to processes of ripening and curing them for food purposes. Original investigations will be required and equipment and material furnished for extensive study in this line.

ANIMAL BIOLOGY

Graduates, whether candidates for a degree or not, will be admitted to any line of research or advanced work that can be carried on profitably.

Less advanced graduates will be admitted to any regular classes of the department for which they are sufficiently prepared.

All advanced students are expected to take an active part in the Journal Club and the Biological Club.

Students who contemplate taking advanced work are advised to confer with the head of the department.

FOR UNDERGRADUATES AND GRADUATES

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.

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 Assistant

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 obtained through courses in general zoology and the methods and means by which such ends may be gained.

FOR GRADUATES

14. PROBLEMS AND RESEARCH

Professor 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, connective tissue and excretory organs 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 morphology under | MR. SIGERFOOS |
| (h) Vertebrate embryology or morphology under | MR. NACHTRIEB |

ASTRONOMY

FOR UNDERGRADUATES AND GRADUATES

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
 5, 6, and 7.
 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.

FOR GRADUATES

4. ADVANCED PRACTICAL ASTRONOMY MR. LEAVENWORTH
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed courses 1 and 2.
 CELESTIAL MECHANICS MR. LEAVENWORTH
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed courses 1 and 2.
 6. ASTROPHOTOGRAPHY MR. LEAVENWORTH
 Both semesters
 Open to graduate students who have completed courses 1 and 2.
 Photography of the heavenly bodies, measurement of plates, determination
 of positions, parallax, etc. .

BOTANY

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.

Laboratory fee for each undergraduate course is three dollars per semester

FOR UNDERGRADUATES AND GRADUATES

2. **ADVANCED BOTANY** MESSRS. CLEMENTS AND ROSENDAHL
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 1.
 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.

SPECIAL COURSES

3. **PLANT PHYSIOLOGY AND ECOLOGY** MR. CLEMENTS AND MR. 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.
 A study of the factors that affect the plant and its response to them; the adaptations of plants and the origin of new forms; the structure and development of vegetation, as shown in migration, invasion, competition, etc. Lectures and quizzes, greenhouse and field work.
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 fungi, 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** MR. ROSENDAHL AND MR. 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; alternates with course 8.
 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 course I 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 their 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.

FOR GRADUATES

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 ALGEOLOGY

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; origin and development of the primary tissues; development of organs; correlation, etc.

CHEMISTRY

FOR UNDERGRADUATES AND GRADUATES

4. QUANTITATIVE-ANALYSIS

MR. SIDENER AND ASSISTANTS

Six credits (six hours per week)

Both semesters

Prerequisite, Course 3. The laboratory fee is seven dollars per semester.

The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester; followed by a discussion of standard solutions and the necessary stoichiometric calculations with laboratory work in volumetric analysis, second semester.

5. ORGANIC CHEMISTRY. MESSRS. FRANKFORDER, DERRY, HANDY AND ASSISTANTS

Six credits (three lectures and twelve hours of laboratory work per week)

Prerequisite, Course 3.

Second semester

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

FOR GRADUATES

The following are open to graduate students. Arrangements may be made upon application to the department.

27. SPECIAL INORGANIC CHEMISTRY.

28. ELECTROCHEMISTRY.

29. ORGANIC CHEMISTRY.

30. ALKALOIDS.

31. ANALYTICAL CHEMISTRY.

COMPARATIVE PHILOLOGY

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.

FOR UNDERGRADUATES AND GRADUATES

3. INTRODUCTION TO TEUTONIC PHILOLOGY

MR. KLAEBER

One credit (one hour per week)

Second semester

Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 4.

History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the German languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German).

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.
 Elements of phonetics; history of English and German sounds; orthography.
 The lectures will be supplemented by practical exercises.

FOR GRADUATES

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 course 8; other arrangements may be ascertained upon application to the department.
 Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, etc.).
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.

ECONOMICS

FOR GRADUATES AND UNDERGRADUATES

4. ADVANCED ECONOMICS MR. ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1; required for a major in economics.
 An advanced course in general economics, devoted largely to a study of recent theories of distribution.
 Assigned readings, reports, and discussions.
5. MONEY AND BANKING MR. PHELAN
 Three credits (three hours per week) Repeated 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 discussion.
- 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, including 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
First semester

Three credits (three hours per week)

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 the leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidents, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION

MR. ROBINSON
Second semester

Three credits (three hours per week)

Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, *Essays in Taxation*, and reports of state tax commissions with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION

MR. ROBINSON
Second semester

Three credits (three hours per week)

Open to those who have completed course 1 and to students in the technical colleges.

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 function 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 ECONOMICS

MR. ROBINSON
First semester

Three credits (three hours per week)

Open to those who have completed courses 1 and 8, and to students in the technical colleges.

An advanced 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.

11. THE MODERN BUSINESS CORPORATION

MR. GRAY
First semester

Three credits (three hours per week)

Open to those who have completed

The organization, 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.

10. MUNICIPAL INDUSTRIES

MR. GRAY
Second semester

Three credits (three hours per week)

Open to those 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 of such industries. The general question of municipal ownership. Text-books, lectures, and quizzes.

12. **ECONOMICS OF COMMERCE** MR. ROBINSON
 Three credits (three hours per week) First semester
 Open to those who have completed course 1, 2, or 3
 Causes and characteristics of commercial crises; theory and mechanism of international commerce; free trade, reciprocity and protection by 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 3.
 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 those who have completed course 1.
 A survey of social Utopias 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 those who have completed courses 1 and 26.
 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 to 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 those 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 well being. Lectures, text-book, assigned readings, and discussions.
17. **LABOR PROBLEMS: Part II** MR. PHELAN
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1, but should also be preceded by course 16.
 A study of races and immigrants in America, with reference to their economic and social contributions; the economic and social conditions in foreign countries that lead to emigration; the general problem of immigration; the special 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
 Three credits (three hours per week) First or second semester

Open to those who have completed course 1, course 3, 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.

19. BUSINESS ORGANIZATION

MR. RASTALL

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 readings and discussions.

20a. THE PRINCIPLES OF ACCOUNTING

MR. RASTALL

Three credits (three hours per week)

First semester

Open to those 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. RASTALL

Three credits (three hours per week)

Second semester

Open to those 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 manufacturers, 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. RASTALL

Three credits (three hours per week)

First semester

Open to those who have completed courses 1, 20a, and 20b.

Lectures on concrete problems of the type confronting the general public accountant 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. RASTALL

Three credits (three hours per week)

First semester

Open to those 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 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

MR. PHELAN

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 those 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 those 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 those who have completed course 1 or 2.
 Historic development of, and attitude toward, agriculture in ancient, mediæval 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 those who have completed course 24a, and others by special permission.
 Economic principles which underlie farm and estate management, land values, and price 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. RASTALL
 Three credits (three hours per week) First semester
 Open to those 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.
- 5b. THE MATHEMATICS AND ACCOUNTANCY OF INVESTMENT MR. RASTALL
 Three credits (three hours per week) First semester
 Open to those 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 th,

formulas and tables used in such computations and numerous practical problems. The accountability 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. RASTALL
Three credits (three hours per week) Second semester

Open to those 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, extensions, 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. RASTALL,
Three credits (three hours per week) Second semester

Open to those 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. RASTALL
Three credits (three hours per week) Second semester

Open to those 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. RASTALL
Three credits (three hours per week) Second semester

Open to those 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.

FOR GRADUATES

29. THEORY AND PRACTICE OF STATISTICS MR. RASTALL
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 AND ASSISTANTS
Twelve credits (three hours per week) Both semesters

Open to those 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.

ECONOMIC ENTOMOLOGY

FOR GRADUATES

SPECIAL PROBLEMS IN ECONOMIC ENTOMOLOGY

MR. WASHBURN
Both semesters

EDUCATION

FOR UNDERGRADUATES AND GRADUATES

Preliminary Requirements: Students who desire to undertake graduate work in education must have a general knowledge of psychology and of the history of education, and some acquaintance with the theory of education. For a minor in education the candidate may pursue studies either in the theory and practice of elementary teaching, the organization and methods of secondary education, or in advanced educational theory and administration. Students who undertake a major in education are expected to do work in at least two of these fields. Selection will be made by the candidate on the approval of the head of the department from the following courses:

4. SECONDARY EDUCATION

Three credits (three hours per week)

MR. JAMES
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

Three credits (three hours per week)

MR. RANKIN
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 school or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING MR. RANKIN
 Three credits (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2, and who have completed course 4 or are pursuing course 10.

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.

8. SCHOOL ADMINISTRATION MR. RANKIN
 Three credits (three hours per week) 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. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION MR. RANKIN
 Three credits (three hours per week) Second semester
 Open to seniors; intended only for students with experience in teaching; credit will not be given both for course 8 and for course 9.

An advanced course treating of the duties of principals and superintendents.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS MR. JAMES
 Three credits (three hours per week) 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.

FOR GRADUATES

11. MODERN EDUCATIONAL THEORIES MR. JAMES
 Three credits (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2, and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.

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 student under the direction of the instructor through readings, the visiting of schools, and through class discussions.

13. EDUCATIONAL CLASSICS MR. JAMES
 Two credits (two hours per week) First semester
 Open to seniors who have completed courses 1 and 2, and to graduate students.

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

14. CURRENT PROBLEMS IN SECONDARY TEACHING MR. RANKIN
 Two credits (two hours per week) Second semester
 Open to seniors and graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching ex-

perience, or 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 well being 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.

ELECTRICAL ENGINEERING

The courses offered by the department of electrical engineering are open to graduate students having the required preliminary training. Thorough courses in physics and mathematics are essential prerequisites. The laboratory, shop and library of the department provide facilities for a moderate amount of research work in addition to the regular course of study.

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 poly-phase 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 obtained 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 2,250 volts. The laboratory has equipment for obtaining low voltage direct or alternating current up to 2,000 amperes, for continuous EMF up to 2,000 volts and for alternating EMF up to 40,000 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 certain standards of 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 and for the formation and study of electric furnace products. Alternators, rotary converters, transformers, lamps, motors, condensers, 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.

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 collected and bound. These, with the files in the general and other departmental libraries of the University, offer excellent facilities for research work. The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests.

FOR UNDERGRADUATES AND GRADUATES

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|---|----------------------------|
| 1. APPLIED ELECTRICITY | MR. SHEPARDSON |
| Three credits (three hours per week) | Second semester |
| Prepared for juniors E. E. course. | |
| Preparation, course 5 P. | |
| Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring. | |
| 2. ELECTRICAL MACHINERY | MR. SPRINGER |
| Three credits (six hours per week) | First and second semesters |
| Preparation, course 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. | |
| 6. ALTERNATING CURRENTS | MR. SHEPARDSON |
| Two or three 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, <i>Alternating Current Phenomena</i> . | |
| 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 Mr. 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 and 6 E. E.
 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. SPRINGER
 One credit (one hour per week) Second semester
 Post senior year. Preparation: E. E. 2 or E. E. 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: Gutshall, *Electric Railway Economics*.
11. ELECTRICAL ENGINEERING PRACTICE. Transmission Mr. SHEPARDSON
 One credit (one hour per week) Second semester
 Post senior year. Preparation: courses 1, 2 and 5 E. E.
 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 Mr. SHEPARDSON
 One or two credits (one or two hours per week) Second semester
 Post senior year. Preparation: E. E. 1 and E. E. 5.
 Various systems and instruments used in local and long distance telegraphy and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.
- ELECTROCHEMISTRY Mr. SHEPARDSON
 One or two credits (one or two hours per week) First or second semester
 Post senior year.
 Theoretical and experimental study of electrolytic and electrothermal processes.
14. ELECTRICAL DESIGN Mr. RYAN
 Three credits (six hours per week) First semester
 Post senior year. Preparation: courses 1 and 2 P., courses 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 and 14 E. E.
 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 and 14 E. E.
 Designs, specifications and estimates for an electric light or power plant.

17. **ELECTRICAL LABORATORY** MR. SPRINGER
 Three credits (six hours per week) First and second semesters
 Senior year. Preparation: courses P. 5, 6 and 1 and 2 E. E.
 Tracing circuits and locating faults; electrical engineering measurements; calibration of instruments; operation and characteristic curves of generators and motors.
18. **ELECTRICAL LABORATORY** MR. SPRINGER
 Three 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.
19. **ELECTRICAL LABORATORY** MESSRS. SHEPARDSON AND SPRINGER
 One or two credits (two or four hours per week) First or second semester
 Post senior year. Efficiency tests and special problems.
20. **ELECTRICAL ENGINEERING MEASUREMENTS** MR. SPRINGER
 Application of measurements to electrical engineering practice. Lectures and laboratory.
21. **PLANT OPERATION** MESSRS. RYAN, MARTENS AND DIXON
 One credit (equivalent to two hours per week) First or second semester
 Practice in operation and care of gas engines, gas producers, boilers, engines, turbines, dynamos, battery and switch board and auxiliary apparatus of the University lighting plant.
22. **JOURNAL READING (Post senior I and II.)** MR. SHEPARDSON
 One credit First and second semesters
 Post senior year.
 Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of the American Institute of Electrical Engineers.
23. **PRECISE ELECTRICAL ENGINEERING MEASUREMENTS** MR. SPRINGER
 Preparation, course 19.
 Lectures and laboratory work. Precise measurements of resistance, voltage, current, self-induction and capacity; standardization of measuring instruments. Open to limited number subject to approval.
24. **ILLUMINATING ENGINEERING** MR. SHEPARDSON
 Lectures and laboratory work. Investigation of performance of electric and gas lamps, reflectors and diffusers; luminous efficiency, distribution, color characteristics, physiological phenomena, methods of determining location, kind and quantity of lights for obtaining desired illumination.
25. **TELEPHONE ENGINEERING** MESSRS. SHEPARDSON AND EDDY
 Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus; line and line phenomena, including induction, transpositions, loading coils, etc.
26. **ALTERNATING CURRENT PHENOMENA** MR. SHEPARDSON
 Lectures and laboratory work. Study of wave forms, transient phenomena; oscillographic investigations; tests of apparatus.

ENGLISH LANGUAGE AND LITERATURE

FOR GRADUATES AND UNDERGRADUATES

- 3 **EARLY 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 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*.

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.

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 English 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.

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.

24. SENIOR SEMINAR IN ENGLISH MISS PECK
Two credits (one hour per week) Both semesters
Open to seniors who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.

Hakluyt's Voyages will be studied in 1908-9. 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.

FOR GRADUATES

25. ANGLO-SAXON MR. KLAEBER
First semester

Open to graduates 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.

28. SHAKESPEARE MRS. POTTER

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

29. THE DRAMA AS A LITERARY FORM MR. BURTON
Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

30. FICTION AS A LITERARY FORM

MR. BURTON

Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

FORESTRY

Equipment: The vast lumbering operations in the northern part of Minnesota offer the best opportunities for a study of that branch of forestry. The establishment of the Chippewa Forest Reserve and its management by the Forest Service gives opportunities which few other sections possess to study the best methods of forest management. The state has twenty-one thousand acres of timber land to be used as a forest and game preserve, on which student help will be largely used. In addition Itasca state park, consisting of 22,000 acres, is used by the Forestry School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forestry School a forest equipment which is unsurpassed anywhere.

Graduate work is offered to those who have sufficient preparation to pursue it to advantage. Two courses are offered but others may be given if conditions seem to make it desirable.

1. FOREST MANAGEMENT AND ECONOMICS

MR. GREEN

A general course in economics as applied to the problem of properly handling forest wealth.

2. WORKING PLANS FOR FORESTS

MR. GREEN

The study and discussion of the working plans in use in foreign countries. Criticism of working plans in the United States.

EXPERIMENTAL ENGINEERING

FOR GRADUATES AND UNDERGRADUATES

1. MATERIALS TESTING LABORATORY

MESSRS KAVANAUGH AND 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

MESSRS KAVANAUGH AND SHOOP

Two credits (lectures and laboratory)

Second semester

Required of senior E. E. Open to those pursuing course 20 M. E.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

3. HYDRAULIC LABORATORY

MESSRS. KAVANAUGH AND 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.

6. EXPERIMENTAL LABORATORY

MR. 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 steam-turbines, steam-engines and boilers, and complete power and lighting plants.

7. EXPERIMENTAL LABORATORY MR. KAVANAUGH,
Two credits First semester.
Required of post senior E. E. Preparation: courses 8, mathematics and mechanics, and 20 M. E.

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 MR. 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 MR. KAVANAUGH
Three credits Second semester
Required of post senior M. E. Preparation: courses 21 M. E. and 6 Ex. E
A continuation of course 6, also tests of gas, gasoline and hot-air engines, gas producers air compressors, automobiles and locomotive testing and special work.

10. EXPERIMENTAL LABORATORY MR. KAVANAUGH
Two or four credits Second semester
Elective for post seniors. Special research work and commercial tests.

GEOLOGY

FOR UNDERGRADUATES AND GRADUATES

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 local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

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.

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.

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 course 1 or 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.

FOR GRADUATES

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 application 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.

The 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.

GERMAN

FOR UNDERGRADUATES AND GRADUATES

6. **THE DRAMA**

MR. SCHLENKER, MRS. WILKIN, MR. JUERGOENSEN AND

MR. 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 the 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 semester: Classic drama. Play of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

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 two. Lectures and collateral reading; essays by the class. Schiller's ballads, and other representative poems of this period. German versification. Second semester: Reading and discussion of Lessing's more important critiques, the *Laocoon*, and *Dramaturgie*. Lectures and collateral reading; essays.

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.

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 for 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 or course 10; 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, *Parzival*, etc.

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.

FOR GRADUATES

14. OLD HIGH GERMAN MR. KLAEBER
 Four credits (two hours per week) Both semesters
 Open to seniors who have taken course 9 or course 10; both semesters must be completed before credit is given for the first semester.
 This course is identical with comparative philology 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 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) Second semester
 Open to graduate students who have completed course 9 or course 10.
 Outline of the history and development of the *Volkslied*. Study of selected numbers in Uhland's *Volkslieder* with reference to other general and special collections. Influence of the *Volkslied* upon lyric and ballad writers.
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 9 or 10; both semesters must be completed before credit is given for the first semester.
 1908-9 The literature of evolution (Haeckel, Reinke, etc.)
 1909-10 Chemistry and physics (Ostwald, Helmholtz, etc.)
 1910-11 Psychology and philosophy (especially Wundt.)
 For courses in Germanic philology see the statement of the department of comparative philology.

GREEK

FOR GRADUATES

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; other arrangements may be ascertained upon application to the department.
20. ADVANCED COURSE IN GREEK DRAMATIC POETRY MR. BROOKS
 Open to graduate students only; other arrangements may be ascertained upon application to the department.
21. ADVANCED COURSE IN GREEK ORATORY MR. SAVAGE
 Open to graduate students only; other arrangements may be ascertained upon application to the department.

22. LATER GREEK (322 B. C. to 200 A. D.)

MR. HUTCHINSON

Open to graduate students only; other arrangements may be ascertained upon application to the department.

HISTORY

FACILITIES

The department of history is equipped with library material for "practice courses" in research in American History, especially the colonial and revolutionary periods, in English and French medieval history, in the French Revolution, and in certain phases of European Nineteenth Century history. Valuable additions to the University resources in some of these lines are to be found in the excellent library of the State Historical Society, and in the State Library at the Capitol in St. Paul (thirty minutes distant), and in the City and Athenaeum libraries in Minneapolis.

In none of the lines mentioned, however, is the department satisfactorily prepared to give more than two years of graduate work, with due regard for economy of the student's time and energy. Therefore, if a student desires to take his doctorate in history here, he must be prepared, until the library facilities are materially improved, to do at least a third of his work in libraries elsewhere, under direction of the department.

COURSES OF INSTRUCTION

The following are "general courses" (lectures and reading, with study of selected documents and some research work). They are open to upper classmen in the undergraduate college who have completed one or two elementary courses there; and they may be taken as minors, or parts of minors, for the master's degree. Any one of them may be taken, also, for part of a major towards the master's degree, provided, (1) that the applicant has made large general preparation in other fields of history, and, (2) that the course chosen be accompanied by sufficient work in more intensive courses in the same field. Thus if an applicant is well prepared in European history, including English constitutional history, but has had little American history, he might be allowed a major in 5 followed by two, three, or four courses selected from 7-14.

FOR UNDERGRADUATES AND GRADUATES

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 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 recitations. 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 co-operative 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.

6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885

MR. WEST

Three credits (three hours per week)

Second semester

Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-9, 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.

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.

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.

FOR GRADUATES

The following courses are "intensive" or "advanced" courses. Each one of them requires the completion of the corresponding "general" course in the list above. They may be taken, in proper combination, for majors for the master's degree, or, by ones or twos, for minors.

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 constitutional 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 1908-9.

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 course 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 1909-10 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 discussions 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

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.

HORTICULTURE

Equipment. The library of the division of horticulture is well equipped with literature and periodicals devoted to this subject, all of which are well indexed. The campus, orchards, nurseries, fruit gardens and greenhouses at the University farm afford good illustrations and opportunities for study and experiment work. The new fruit breeding farm offers the best of facilities for the study of this important line of work.

Graduate work is offered to those who are prepared to pursue it to advantage. Two courses are offered but others will be given if conditions seem to make it desirable.

1. GENERAL POMOLOGY MR. GREEN
 A general course in the study of cultivated fruits.
2. PLANT BREEDING MR. GREEN
 A general course in the study of the origin and development of cultivated varieties.

LATIN

FOR UNDERGRADUATES AND GRADUATES

6. ADVANCED COURSE IN CAESAR MR. PIKE
 Three credits (three hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive; required for 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 and twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical reading 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.
10. LATIN COMPOSITION MR. PIKE
 Two credits (two hours per week) Second semester
 Open to those who have completed courses 1 to 4 inclusive.

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

Three credits (three hours per week) Second semester

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 graduates 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 institutions 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 incidentally 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.

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 obtain the permission of the instructor; students must be able to read medieval Latin, and course 9 in the Latin department 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.

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.

boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

20. STEAM ENGINE

MR. FLATHER

Three credits (three hours per week)

Second semester

Senior year, preparation: course 7 M.

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. SHOOP

Two credits (two hours per week)

Second semester

Senior year, Open only 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.

22. MECHANICAL ENGINEERING

MR. FLATHER

Two credits (two hours per week)

First semester

Post senior, preparation: course 8 M.

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.

Two credits (two hours per week)

Second semester

Preparation; course M. 8.

Air compressors and motors, and the transmission of power by compressed

air. Recitations and lectures.

23. MECHANICAL ENGINEERING

MR. 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 the seniors and post seniors once a week.

The following courses are available to students desiring to prepare themselves for special work in railway engineering.

24. RAILWAY TECHNOLOGY

MR. MARTENIS

Two credits (four hours per week)

First semester

Post senior. Railway M. E. course.

The object of this course is to familiarize the student with the principal 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

MR. FLATHER

Four 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 locomotive and car details.

22. ELLIPTIC FUNCTIONS.
 23. THEORY OF FUNCTIONS OF THE COMPLEX VARIABLE.
 24. DIRECTIONAL CALCULUS, VECTOR ANALYSIS, DETERMINANTS.
 25. KINETIC THEORY OF GASES.

MECHANICAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

9. SHOP ECONOMICS MR. FLATHER
 Two credits (two hours per week) Second semester
 Senior elective.
 Shop and factory organization and management; cost systems.
13. MACHINE DESIGN MESSRS. FLATHER AND MARTENIS
 Five credits (ten hours per week) First semester
 Required of seniors. M. E. and E. E. courses. Open only to students pursuing course 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 MESSRS. FLATHER AND MARTENIS
 Three credits (six hours per week) Second semester
 Required of seniors, M. E. course. Open only to those pursuing course 20.
 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 MR. FLATHER
 Four credits (eight hours per week) First semester
 Required post senior year, M. E. course. Preparation: courses 14 and 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 MR. 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 MR. FLATHER
 Two to four credits (four or eight hours per week) First or second semester
 Elective. Preparation: courses 6, 13.
 Design of special tools for manufacturing interchangeable parts: jigs and milling fixtures.
18. ENGINEERING DESIGN MR. FLATHER
 Two or four credits (four or eight hours per week) First or second semester
 Elective. Preparation: courses 19, 20.
 Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer-gas plants; choice of engines and boilers; water powers; power distribution, dynamo and motors; pumps, shafting, piping and accessory plant.
19. STEAM BOILERS MR. SHOOK
 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

- 7a. APPLIED MECHANICS MESSRS. BROOKE AND 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 MESSRS. EDDY, BROOKE AND 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 MR. 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 MR. EDDY
 Two credits (two hours per week) First semester
 Required for all candidates for degrees in mechanical and electrical engineering, except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.
11. STEAM TURBINES MR. 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 MR. EDDY
 Two credits (two hours per week) Second semester

FOR GRADUATES

26. PERSPECTIVE MR. KIRCHNER
 Three credits (three times per week)
 The principles and practice of perspective, including shadows, reflections, distortions, corrections, systems, methods, the practical problem, and inverse constructions.
27. HISTORY OF MATHEMATICS MR. HAYNES
 Two credits (twice per week)
 Lectures and reading, under direction of works in the mathematical library on the ancient and modern development of mathematics.
28. ELLIPTIC INTEGRALS MR. BROOKE
 Four credits (two hours per week) Both semesters
 Courses in the following related subjects in mathematics, mathematical physics and theoretical mechanics are open to those who have had sufficient preparation. Consult the head of this department.
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.

- Three credits (three hours per week) Second semester
 Open to those who have completed courses 3 to 8 inclusive.
 A lecture course. 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.
15. METHOD OF LEAST SQUARES MR. LEAVENWORTH
 Two credits (two hours per week) Second semester
 Open to those who have completed courses 3 to 7 inclusive.
 A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering physics, and astronomy.
17. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS MR. DOWNEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive.
 This course goes farther into some of the subjects treated in courses 6 and 7 and takes up some important subjects not included in those courses.
18. MODERN GEOMETRY MR. BAUER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and 10 and 12.
 This is a course in differential geometry. The fundamental equations of the theory of curves and of surfaces will be developed. The work will be based upon Scheffer's *Theorie der Curven und Flaechen*.
18. THEORY OF NUMBERS MR. BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 9 inclusive.
20. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE MR. DALAKER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 1 to 10 inclusive
 Lectures, readings, and problems.
21. PROJECTIVE GEOMETRY MR. BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and courses 11 and 12.

MATHEMATICS AND MECHANICS

FOR GRADUATES AND UNDERGRADUATES

- DESCRIPTIVE GEOMETRY MR. KIRCHNER
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses in drawing 3 to 5 inclusive; both semesters must be completed before credit is given for the first semester.
 Problems relating to points, lines, planes, solids, surfaces of revolution and warped surfaces; orthographic, isometric, horizontal, oblique, and perspective projections; shades and shadows. Recitations, lectures, and practice.
7. STRENGTH AND RESISTANCE OF MATERIALS MR. EDDY
 Five credits (five hours per week)
 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.

liberty and opportunity as the ends of the state; the state as the organ of power, and guardian of rights; the essentia of constitutions.

3. CONSTITUTIONAL HISTORY AND JURISPRUDENCE.

This course is devoted to a critical study of the "dual system" of constitutional government of which the American Republic is the conspicuous example. The Federal constitution and the State constitutions are illustrated separately in both their historical and their legal aspects, as distinct parts of one system, but designed to work harmoniously in unison, and both necessary to the successful operation of the system. The Federal courts are shown to have so conducted the administration of their high duties as to have contributed to the proper development of the State side of the system, and to have made the Federal Government the firm bulwark of local self-government in the States.

Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other law college having a three years' course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws.

But no graduate of another law school, who has not been admitted to the bar of Minnesota, will be matriculated in this course as a regular student for the degree of LL. M.; but any person who possesses the requisite legal learning may enter the course as a special student and pursue any or all of the studies offered.

SECOND GRADUATE COURSE

Students who have received the degree of LL. B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL. M., from this or some other school after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to candidacy for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis for the doctor's degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the current academic year will depend upon the number of applicants for admission.

MATHEMATICS

FOR UNDERGRADUATES AND GRADUATES

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|---|-----------------|
| 13. DIFFERENTIAL EQUATIONS | MR. DOWNEY |
| Three credits (three hours per week) | Second semester |
| Open to those who have completed courses 3 to 7 inclusive. | |
| Text and lectures. | |
| 11. ADVANCED COURSE IN PLANE ANALYTICAL GEOMETRY | MR. BAUER |
| Three credits (three hours per week) | First semester |
| Open to those who have completed courses 3 to 6 inclusive. | |
| Supplementary to course 5, treating more fully some of the subjects of that course and taking up additional subjects. | |
| 12. SOLID ANALYTICAL GEOMETRY | MR. BAUER |

- 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.
 Courses 6 and 7 are open as minors only on permission of the professor in charge.

FOR GRADUATES

17. LUCRETIUS MR. CLARK
 Three 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
 Three credits (two hours per week) Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Reading, interpretation and annotation of the *de Beneficiis* of Seneca with study of Stoicism at Rome.
19. THE HISTORY AND 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.

LAW

FIRST GRADUATE COURSE

1. PHILOSOPHIC BASIS OF JURISPRUDENCE MR. PATTEE
 For the degree of Master of Laws. This course constitutes an inquiry into the nature of law in its most general significance. It considers the truths of reason, the "laws of nature," so-called, and the positive law or jurisprudence. It considers the nature of international and municipal law, and illustrates by means of judicial authorities how the primary truths of reason operate in the realm of human law.
2. SCIENCE OF THE STATE
 This course considers the segregation from the comprehending science of politics, and the coordinate sciences of government and jurisprudence. The citizen and subject population; the territory, its existence and content, subdivisions, relations of people to the land, comparison of great and small states; theories of the state.

- (c) Of the locomotive boiler.
 (d) Of assembled parts.
26. **LOCOMOTIVE CONSTRUCTION** MR. 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** MR. FLATHER
Second semester
 Post senior.
28. **SPECIFICATIONS** MR. FLATHER
 One credit (one hour per week) Second semester
 Post senior year, M. E. course.
 A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications.

FOR GRADUATES

Courses are offered in:
 Engineering design.
 Experimental investigation.
 Railway engineering.

MINERALOGY

FOR UNDERGRADUATES AND GRADUATES

4. **OPTICAL MINERALOGY** MR. GROUT
 Three credits (six hours per week) Second semester
 Open to juniors and seniors who have completed course 1.
 A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauoscopic practice, embracing the elements of lithology. Lectures and laboratory work.
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. **PHYSIO-CHEMICAL METHODS WITH THEIR APPLICATIONS** MR. GROUT
 Three credits (thr hours per week) Second semester

Open to seniors.

The method of micro-chemical analysis 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-minerals.

7. AN OUTLINE OF MINERALOGY
Two credits (one hour per week)
Open to juniors and seniors.

MR. GROUT
Both semesters

A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.

FOR GRADUATES

8. ORIGINAL PROBLEMS IN MORPHOLOGICAL AND PHYSICAL MINERALOGY

MESSRS. HALL AND GROUT
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Investigations in mathematical crystallography and its application to crystal development and structure. Further application than is 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; other arrangements may be ascertained upon application to the department.

A discussion of genetic relationships. Field work in connection with the different phases of the particular problem in hand.

The equipment of the department of geology and mineralogy is sufficient for many lines of graduate work. The department has collected from many localities, both within and without the state, and the Geological Survey has made extensive collections during the years of its active field work. The material thus gathered, the published literature on the state and the field within easy access from the University afford suggestions of unsolved problems in a number of different geological lines.

PATHOLOGY AND BACTERIOLOGY

The present courses in general pathology and bacteriology for medical and engineering students are offered as minors for Ph. D. and as majors for the master's degree.

A major for the Ph. D. shall consist of research in pathology for medical or experimental medicine, prerequisite to which certain of the regular courses offered in this department must be satisfactorily completed.

Before entrance into any course offered in this department, a working knowledge of certain groups of subjects such as histology and embryology, animal biology, anatomy, physiology, botany, chemistry, physics, etc., must be had.

1. GENERAL BACTERIOLOGY

MESSRS. WEBBROOK, HILL AND FIDLAR

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life

history of bacteria 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 studies of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, 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. Bacterial activities concerned in sewage purification, etc., will receive attention. Twenty hours per week during the last eight weeks of the second semester, second year.

2. GENERAL PATHOLOGY MESSRS. WESBROOK, MULLIN AND ROBERTSON
Twenty hours per week during the last eight weeks of the second semester, second year.

Lectures, demonstrations and laboratory work on the general processes involved in disease to include the study of inflammation, the degenerations and tumors.

PHARMACY

THE GRADUATE COURSE IN THE COLLEGE OF PHARMACY

In addition to its regular undergraduate course this college offers two graduate courses, the first continuing through one college year and leading to the degree of "master of pharmacy," and the second continuing through an additional year or longer, and leading to the degree of "doctor of pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. It is intended that the curriculum shall include higher pharmaceutical chemistry, pharmaceutical assaying, higher organic chemistry, proximate and ultimate analysis, chemistry of food, spectroscopic work, therapeutics, 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 undergraduate course are equal to those of the undergraduate 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, and a certificate of registration as pharmacist from any state board of pharmacy. The fees for this course will be seventy-five dollars, and, upon graduation, an additional fee of ten dollars for diploma. 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.

PHILOSOPHY AND PSYCHOLOGY

FOR UNDERGRADUATES AND GRADUATES

3. EDUCATIONAL PSYCHOLOGY MESSRS. MINER AND HAYNES
Three credits (three hours per week) Second 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 discussions.

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. **PSYCHOLOGICAL PRINCIPLES** MR. SWENSON
Three credits (three hours per week) Second 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.

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 the 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.

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.

FOR GRADUATES

Courses from the following list will be offered to graduates each year as determined by the needs and qualifications of the students presenting themselves. It is desirable that the students consult with the department as early in the session as possible in order that the course and hours may be arranged to suit the greatest number.

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 14; 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 semesters 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.

10. 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 semesters 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 semesters 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 courses 9, 10, and 17; 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.

PHYSICS

FOR UNDERGRADUATES AND GRADUATES

5. **MECHANICS OF SOLIDS AND FLUIDS** MESSRS. 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. 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. 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. 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 gauges, etc.)

11. DYNAMICS

MR. ERIKSON

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.

FOR GRADUATES

14. **THE THEORY OF LIGHT** MR. JOHN ZELENY
 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 5 and 6, 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 conduc-

tion 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*.

POLITICAL SCIENCE
FOR UNDERGRADUATES AND GRADUATES

2. COMPARATIVE GOVERNMENT

MR. ALLIN

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

A description and analysis of the government as the agent of the state; 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.

7. MUNICIPAL ADMINISTRATION

MR. SCHAPER

Three credits (three hours per week)

Second semester

Open to those who have completed course 1.

A comparative study in 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.

A study of the theory of the state, its origin, nature, purpose and justification, the elements of population and territory. Important 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 completed course 1.

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

Two credits (two hours per week)

MR. ALLIN
Second semester

Open to those who have completed course 1.

The object of this course is to outline the growth of the 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. A survey will be made of the history of American diplomacy and of contemporary international politics. Text, lectures, and supplementary reading.

12. COLONIAL ADMINISTRATION

Three credits (three hours per week)

MR. ALLIN
Second semester

Open to those who have completed courses 1 and 2.

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 reading, and special topics.

15. STATE AND LOCAL ADMINISTRATION

Two credits (two hours per week)

MR. SCHAPER
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.

FOR GRADUATES

4. AMERICAN CONSTITUTIONAL LAW

Four credits (two hours per week)

MR. SCHAPER
Both semesters

Open to those who have completed courses 1, 2, and 8; both semesters must be completed before credit is given for the first semester; given in alternate years; not offered in 1908-9.

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

Six credits (three hours per week)

MR. ALLIN
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.

11. SEMINAR IN POLITICAL SCIENCE

Six credits (three hours per week)

MESSRS. SCHAPER AND ALLIN
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.

14. ADMINISTRATIVE LAW

Two credits (two hours per week)

MR. SCHAPER
Second semester

Open to those who have completed courses 1, 2, and 8, and to graduates.

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.

ROMANCE LANGUAGES

FOR UNDERGRADUATES AND GRADUATES

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, etc. Compositions.
6. ADVANCED FRENCH CONVERSATION MR. BENTON
 Four credits (two 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.
 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 the 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 semester.
 Lectures on the phonetical development of the French and other Romance languages 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*.
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's *El Sombrero de Tres Picos*. Lectures and collateral readings of representative Spanish authors.
14. ROMANCE LANGUAGES: OLD FRENCH MR. BENTON
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.
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

FOR UNDERGRADUATES AND GRADUATES

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.
 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. Special attention paid to Ejrnson and Ibsen.
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) First semester
 Open to qualified students upon the approval of the department. Lectures and readings.
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.

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE
13. HISTORY OF THE SCANDINAVIAN LANGUAGES
 For courses in Scandinavian philology, see the statement of the department of comparative philology.

SEMITIC LANGUAGES

FOR UNDERGRADUATES AND GRADUATES

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 reading of some book 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
Second semester

Three credits (three hours per week)

Open to those who have completed course 1.

The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockelman'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.

FOR GRADUATES

1. CRITICAL STUDY OF ONE OF THE FOLLOWING OLD TESTAMENT BOOKS

MR. DEINARD

Isaiah, The Minor Prophets, The Psalms, or Job.

2. EARLY ARABIC POETRY

MR. DEINARD

And the relation of the Arabic, grammatically considered, to the Hebrew.

3. READING OF THE ARAMAIC PORTIONS OF THE OLD TESTAMENT

MR. DEINARD

And a review of Aramaic grammar.

4. HISTORY, PROPHECY AND THE MONUMENTS

MR. DEINARD

Studies in the early history of the Semites.

SOCIOLOGY AND ANTHROPOLOGY

FOR UNDERGRADUATES AND GRADUATES

5. SOCIAL GROUPS

MR. SMITH
First semester

Three credits (three hours per week)

Open to those who have completed course 1.

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
First semester

Three credits (three hours per week)

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

Three credits (three hours per week)

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 also 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.

MR. JENKS
First semester

8. ETHNOLOGY

Three credits (three hours per week)

Open to juniors and seniors who have completed courses 1, 2, or 7, and to graduate students.

This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of the 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.

MR. JENKS
Second semester

9. THE PHILIPPINE PEOPLE

Three credits (three hours per week)

Open to juniors, seniors, and graduate students.

This course presents the geography, natural resources, and ethnology of the Philippine 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 affect 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 benefit students for government business or missionary service in the orient. Lectures, illustrated lectures, assigned readings, and thesis.

MR. JENKS
Second semester

10. PHYSICAL ANTHROPOLOGY

Three credits (three hours per week)

Open to juniors and seniors who have completed course 7 or 8, 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.

MR. JENKS
Second semester

11. THE AMERICAN NEGRO RACE

Three credits (three hours per week)

Open to juniors, seniors, and graduate students; not given in 1908-9.

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.

MR. JENKS
Second semester

12. THE AMERICAN PEOPLE

Three credits (three hours per week)

Open to juniors, seniors, and graduate students.

MR. JENKS
First semester

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.
 Lectures, and the Old Testament as a text book.
14. MODERN SOCIAL INSTITUTIONS MR. REEP
 Three credits (three hours per week) First semester
 Open to those who have completed course 7.
 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, Briuton and others.

STRUCTURAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

14. STRUCTURAL DESIGN MR. CONSTANT
 Five credits (ten hours per week) First semester
 Post senior. Open to students who have completed courses 12 and 13.
 Theory and design of steel structure, 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.
15. STRUCTURAL DESIGN MR. CONSTANT
 Five credits (ten hours per week) Second semester
 Post senior, continuation of course 14, C. E.
 With special reference to the design of a steel railway bridge and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.
17. MASONRY CONSTRUCTION MR. CONSTANT
 Four credits First semester
 Post senior, preparation required course 12, C. E.
 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, three hours per week; drawing room work, four 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.
18. REINFORCED CONCRETE MR. CONSTANT
 Three credits (six hours per week) Second semester
 Post senior. Preparation course 17, C. E., optional.
 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.

FOR GRADUATES

16. SWING BRIDGES

Four credits (eight hours per week)
Post senior, C. E. course.

MR. CONSTANT
Second semester

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, 13 M. E., first semester, senior year.

19. HIGHER STRUCTURES

Theory and design of cantilever, suspension and arch bridges. Analysis of indeterminate structures and complex portal bracing. General theory of flexure and application to special problems.

MR. CONSTANT

IX
DEGREES GRANTED IN 1908

Degrees Granted in 1908

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

FOR THE DEGREE OF BACHELOR OF ARTS 214

Aneta Agnes Anderson, Maple Hill, Iowa.	Lloyd L. Duxbury, Caledonia.
Francis F. Anderson, St. Paul.	Carl T. Ebeltoft, Lake Park.
Theodora Henrietta Anderson, Montevideo.	Marjorie Edwards, Minneapolis.
Tryphena Rebecca Anderson, Montevideo.	Edwin G. Eklund, Moorhead.
Mary E. Armstrong, Minneapolis.	Janet Grace Elliott, Minneapolis.
Franz A. Aust, Minneapolis.	Elmer W. Elmquist, St. Paul.
Edwin Aygarn, Choice.	Margaret Allen Elwell, Minneapolis.
Albert Leroy Aylmer, Baltimore, Md.	Cecile Leffingwell Enegren, Minneapolis.
Marion Louise Barber, Minneapolis.	Albert Grant Evans, Duluth.
Emma Beckman, Minneapolis.	Minnie Faegre, Flandreau, S. D.
Laura Hall Benz, St. Paul.	Edith L. Farwell, Zumbrota.
Vera Doris Billings, St. Paul.	Agnes Esperance Feeny, St. Paul.
Naneen Mary Blanchard, St. Paul.	Murlen Fellows, Minneapolis.
Guy Coe Bland, Anoka.	Alice Maude Finch, Clinton Falls.
Nina Mae Blossom, Algona, Iowa.	Kate Maud Firmin, Minneapolis.
Rena Claire Brainerd, Blooming Prairie.	Lou Burrows Fleming, St. Paul.
Elizabeth Marie Breen, St. Paul.	Marguerite Beryl Fleming, St. Paul.
Emma Lillian Brock, Minneapolis.	Ruby Hope Fletcher, Minneapolis.
Mildred Brown, Minneapolis.	Victor Wilbert Fletcher, Farmington.
Ellen M. Bruce, St. Paul.	Leah A. Fligelman, Minneapolis.
Catherine Casey, St. Paul.	Grace L. Gaghagen, Minneapolis.
Elizabeth Clapp Bruchholz, Minneapolis.	Walter Judson Gessell, Hanley Sask, Can.
Margaret McD. Buchanan, Minneapolis.	Albert Nicolay Gilbertson, Willmar.
Raymond Cassius Cannon, Watertown, S. D.	Bertha Louise Gippe, Watson.
Lee Clough, Minneapolis.	Caroline Joanna Gleason, Minneapolis.
Vivian G. Colgrove, Minneapolis.	Jessie Celestine Goddard, Minneapolis.
Lillian Edith Colter, St. Paul.	Florence Helen Godley, Minneapolis.
Ruth Marion Colter, St. Paul.	Fannie Elizabeth Gordimier, St. Paul.
Jennie G. Craven, Faribault.	Kate Greeley, Stillwater.
William Howard Crawford, Hampton, Ia.	Alice Evangeline Green, Minneapolis.
Helen Sherwood Cummings, St. Paul.	Florence Lavinia Grime, Minneapolis.
Fay Cuzner, Minneapolis.	Ella Josephine Halvorson, Dawson.
Juanita H. Day, St. Paul.	Jack Ellis Haynes, St. Paul.
Florence D. Deal, Truman.	Julie Hille, Fergus Falls.
Harold C. Deering, Minneapolis.	Emma Mae Hillesheim, Sleepy Eye.
Robert Lane Deering, Minneapolis.	Vinnie Hitchings, Sutherland, Iowa.
Margarethe Denfeld, Duluth.	Minnie C. Hoffman, St. Paul.
Kathryn Dougherty, Mankato.	Julia Amanda Holen, Minneapolis.
Anastasia Doyle, St. Paul.	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 Maria 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 Linnau, St. Paul.
 Jessie F. Lockman, Minneapolis.
 Clara Louise Lougee, Minneapolis.
 Mary Amanda Lucas, Minneapolis.
 Stella M. Lumley, Minneapolis.
 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, Minneapolis.
 Harriett M. MacKenzie, 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 Mikesch, 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.
 Hildegard L. E. Ott, Minneapolis.
 Matthias Norberg Olson, Belview.
 Catherine E. Osia, Humboldt, Iowa.
 Orlando E. A. Overn, Albert Lea.
 Andrew H. Palmer, Minneapolis.
 James W. Papez, Hector.
 Florence Eula Paul, Minneapolis.
 Albert Sanford Peterson, Wheaton.
 Paul Willis Peterson, Minneapolis.
 Bernard Pettersen, St. Paul.
 Aura I. Phelps, Minneapolis.
 Alfred Ault Pickler, Minneapolis.
 Lillian Rosabelle Plummer, Minneapolis.
 Alice Greenleaf Pope, Minneapolis.
 Alice Elizabeth Putnam, Minneapolis.
 John Henry Ray, Jr., Minneapolis.
 Horace Garner Reed, Chicago.
 Charles F. Remer, Minneapolis.
 Walter Clarence Robb, Minneapolis.
 Signe Aurora Rosdahl, Wheaton.
 Claude Willard Rossman, Minneapolis.
 Honore Veronica Rouse, Minneapolis.
 Herbert C. Rowberg, Hanley Falls.
 Olive Madge Runey, Minneapolis.
 Maurice E. Salisbury, Minneapolis.
 LeRoy Woodworth Sanford, Minneapolis.
 Alma Pearle Sawyer, Minneapolis.
 Mina L. Schaetzel, Minneapolis.
 Pauline G. Schmidt, Minneapolis.
 Albert Gregory Schneiderhan, Jordan.
 Emily Schons, St. Paul.
 Susie S. Schow, Minneapolis.
 Florence Catherine Schroeder, Perham.
 John Robert Schulnecht, Minneapolis.
 Fay N. Seaton, Jewell City, Kan.
 Ella Sevatson, Minneapolis.
 Elsie Anna Shadewald, Minneapolis.
 Wilber 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 Russel Smith, Minneapolis.
 Winifred R. Smith, Duluth.
 Rudolph T. Solensten, 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.

FOR BACHELOR OF SCIENCE 9

- Leon A. Barney, Minneapolis.
 Henry Bryan Dorr, Asbury 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

FOR BACHELOR OF ARTS—In Education 11

- Carrie Bush, Minneapolis.
 Ethel Bush, Minneapolis.
 Maude Gertrude Bush, Minneapolis.
 Louise Kathleen Catur.
 Nellie Margaret Duniwon, 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

FOR MASTER OF ARTS 21

- Donald C. Babcock, Grand Forks, N. D., berg; Some Aspects of Their Ideas and Their Technic.
 B. A. '07, Minnesota.
 Major, Sciology and Anthropology; George Rupert Eichholzer, Owatonna.
 Minors, Philosophy, Psychology. B. A. '07, Minnesota.
 Thesis, Origin and Development of Religious Experience. Major, Political Science.
 John M. Brendal, Glenwood. Minors, History, Economics.
 B. A. '06, Luther College, Iowa. Thesis, The Merit System as Applicable to the Various Administrative Departments of Minnesota.
 Major, English; Minors, Comparative Philology, Scandinavian. Lucius Arnold Frye, St. Paul.
 Thesis, Scandinavian Influence upon English. B. A. '07, Minnesota.
 Ernest J. Colberg, St. Peter. Major, Political Science; Minors, Economics, Sociology.
 B. A. '06, Gustavus Adolphus. Thesis, A Suggested Method of Controlling the Public Service Corporations of Minnesota.
 Major, English; Minors, Scandinavian, Latin.
 Thesis, The Dramas of August Strind-

- 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 Shakespeare as Thinkers and Writers.
- Albert Eddy Julien, Braham.
B. A. '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.
- Migio Miyazaki, Tokio.
B. A. '02, Waseda University, Japan.
Major, Philosophy; Minors, Sociology, Education.
Thesis, Japanese Morality, a Criticism.
- 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*.
- Sedona Fesenbeck Nelson, Minneapolis.
B. A. '04, Michigan.
Major, English; Minors, German, Philosophy.
Thesis, Shakespere 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.

FOR MASTER OF SCIENCE 2

- Frank F. Grout, Minnesota.
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.

FOR 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.	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
Frederick C. Miller, St. Paul. B. A. '03, M. A. '07, Minnesota. Major, Political Science; Minors, History, Geology.	

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

FOR 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. Pierce Powers Furber, Minneapolis. Hugh Newton Gage, Winona. Andrew P. Hustad, Granite Falls. Herbert Hamilton Knowlton, Minneapolis. William Louis Krauch, St. Paul.	Fred E. Lang, Austin. Dwight Webster Longfellow, Minneapolis. Harry John McCall, Minneapolis. Andrew J. McCree, St. Paul. 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. Edward C. Schlattman, Alberta. George William Walker, Minneapolis. Gustaf Frederick Widell, Mankato. Roy Willis, St. Paul. Oscar Frederick Wodrich, Dubuque, Ia.
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FOR MECHANICAL ENGINEER 16

Ole Andreas Anderson, Hawley. Stanley Eugene Bingham, New Ulm. Halstad Powell Councilman, Minneapolis. Richard Ferguson Cox, Graceville. Harvey Cole Estep, Minneapolis. Frank R. Fleming, St. Paul. Hobart Dickinson Frary, Minneapolis. Stanley Gordon Harwood, Minneapolis.	Percival Hetherton, Minneapolis. Thomas C. Morris, Minneapolis. Emil Francis Norelius, Luverne. Clyde Wood Norton, Lisbon, N. D. George T. Peterson, New Ulm. George Walter Priedeman, St. Paul. James Walsh, Northfield. Erwin L. F. Weber, Helena, Mont.
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FOR ELECTRICAL ENGINEER 25

Frank Arthur Anderson, Wells. Alfred Bachrach, Faribault. George J. Brown, Minneapolis. Robert J. S. Carter, Austin. James William Casberg, Minneapolis. Neil Currie, Jr., Minneapolis.	Alfred Richard Frahm, Rochester. Glenn H. Hoppin, Minneapolis. Henry Hovelson, Minneapolis. Roy Kauffman, Minneapolis. Alfred Benjamin King, Clark, S. D. Allan Lindsay McAfee, St. Paul.
--	--

Frank Joseph Pancratz, Perham.	Leonard B. Sperry, Wasioja.
Clarence Alfred Peterson, Blooming Prairie.	Percy Granville Sturtevant, Detroit.
Robert Shaffer Prentice, Minneapolis.	George Peter Svendsen, Minneapolis.
Wm. F. H. Schildt, Hastings.	Frank Swanstrom, Lake Park.
Alfred Walter Schoepf, Appleton.	Oliver Sweningsen, Austin.
Francis George Scobie, Duluth.	William Mathias Weibeler, Belle Plaine.
Louis Peter Zimmerman, Waseca.	

FOR BACHELOR OF SCIENCE—In Engineering 6

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

THE SCHOOL OF MINES

FOR ENGINEER OF MINES 15

Patrick James Boyle, Indianapolis, Ind.	Ole G. Hoas, Fertile.
James Alexander Cullyford, Duluth.	John Joseph Kennedy, St. Paul.
Christen Frederick Dahl, St. Hilaire.	Arthur Knickerbocker, Staples.
William Albert Deichen, St. Paul.	Alfred Monroe Locke, Minneapolis.
Frank Raymond Edwards, Minneapolis.	John Stanley Olmstead, Brownsville, Texas
William Robert Goodwin, Minneapolis.	Andrew Peterson, Red Wing.
John Alden Grimes, Minneapolis.	Joseph S. Peterson, Minneota.
John Lawrence Strong, St. Paul.	

THE SCHOOL OF CHEMISTRY

FOR BACHELOR OF SCIENCE—In Chemistry 7

Edward X. Anderson, Minneapolis.	John M. Lowe, Minneapolis.
Walter Lucius Badger, Minneapolis.	Russell S. McBride, Minneapolis.
Charles Royal Cressy, Minneapolis.	Allen Harold Porter, Minneapolis.
Oric Ogilvie Whited, Jr., Minneapolis.	

THE COLLEGE OF AGRICULTURE

FOR BACHELOR OF SCIENCE—In Agriculture 4

George Gooding Ainslie, Rochester.	Hall B. White, Winnebago.
Thomas Poe Cooper, Minneapolis.	William White, Camden, N. J.

FOR BACHELOR OF SCIENCE—In Home Economics 2

May Erwin, St. Paul.	Inez Martha Hobart, Minneapolis.
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FOR BACHELOR OF SCIENCE—In Forestry 1

Georges de S. Canavarro, Honolulu, Hawaii

THE COLLEGE OF LAW

FOR MASTER OF LAWS 6

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

FOR BACHELOR OF LAWS 86

Lawrence Russell Allison, Minneapolis.	Franz O. G. Jevne, Meridian, Wis.
James Bradford Baker, Brownton.	Robert E. Johnson, Minneapolis.
Reinhold K. Batzer, Royalton.	Wilbur Birch Joyce, Minneapolis.
Herman J. Bott, Minneapolis.	Laurel L. Kells, Sauk Centre.
Marcus Edward Brown, St. Paul.	Helon Edwin Leach, Spring Valley.
Edward Timothy Burk, Valley City, N. D.	Charles Emory Lockerby, Mapleton.
Harvey B. Burk, Minneapolis.	Lewis Kent Lohn, Fosston.
Edward Phillip Cady, Pipestone.	Mark M. McLaughlin, Minneapolis.
Roy English Campbell, Minneapolis.	Raymond A. McOuat, St. Paul.
Harry Summers Carson, Minneapolis.	Karl Adolph Machetanz, St. Paul.
Clifford C. Champine, Minneapolis.	Charles E. W. Maloy, St. Cloud.
Algernon O. Colburn, Minneapolis.	Edward K. Massee, Minneapolis.
Henry J. Coleman, Minneapolis.	Francis A. Molyneaux, Jr., Winnebago.
Lester William Crowthall, Minneapolis.	Russell L. Moore, St. Paul.
Walter Francis Dacey, Minneapolis.	Frank Leonard Morse, Minneapolis.
Murray T. Davenport, Minneapolis.	James Henry Mulally, Danvers, Mass.
William Henry Dempsey, Minneapolis.	Olin Cornell Myron, Vermillion, S. D.
Francis Marion Dolan, St. Paul.	Jared Augustus Perkins Neal, Minneapolis.
William John Donohue, Minneapolis.	Severt Ambrose Nelson, Minneapolis.
David Wilfred Doyle, Great Falls, Mont.	Edward Herbert Nicholas, Minneapolis.
Reuben E. Edquist, Minneapolis.	Frank E. Norton, Minneapolis.
Abelius Eenkema, Clara City.	Joseph A. S. O'Gordon, Minneapolis.
Eliza P. Evans, Minneapolis.	Brynjolf Oyen, Watson.
Frank Taggart Everhard, Minneapolis.	Edward S. Pattison, Durand, Wis.
Andrew Fawcett, Minneapolis.	Samuel James Radcliffe, Larimore, N. D.
Milton Phillip Firestone, St. Paul.	Horace Wills Roberts, Minneapolis.
Willie Kerr Foster, Renville.	Clarence H. Running, Ada.
David Langdon Fulton, Minneapolis.	John C. Russell, Fairfax.
Leroy A. Gage, Minneapolis.	Garfield H. Rustad, Moorhead.
Cassius E. Gates, Minneapolis.	John Saari, Sparta.
Harry Gavere, Minneapolis.	Louis Benjamin Schwartz, St. Paul.
Hammond Bey Greene, Sheldon, N. D.	Spencer Judd Searls, Fairbault.
Charles William Greening, Grand Meadow.	Henry B. Senn, Kasson.
Benjamin Feland Groat, Minneapolis.	Edward Sigerfoos, Minneapolis.
William Harold Gurnee, Minneapolis.	Lloyd Edward Sigmond, Zumbrota.
William Hanson Haas, St. Paul.	William Reed Simmons, Minneapolis.
Alfred Ulysses Hamrum, Franklin.	Henry LeFevre Smiley, St. Paul.
George Norman Henderson, Red Wing.	William C. Smiley, St. Paul.
Harry Getchell Higgins, Minneapolis.	Niles Madison Sorenson, Hayfield.
Virgil Goodman Hinsbaw, Minneapolis.	Paul D. Stratton, Granite Falls.
Stanley B. Houck, Summit, S. D.	George Francis Sullivan, Shakopee.
Joseph A. Hosp, Hopkins.	Ingman Swinland, Halstad.
Henry N. Jenson, Detroit.	Derwood Washington, Glendive, Mont.

THE DEPARTMENT OF MEDICINE

FOR DOCTOR OF MEDICINE 35

THE COLLEGE OF MEDICINE AND SURGERY 32

Ida Mary F. Alexander, B. A., Carver.	William Sidney Hitchings, Jr., Minneapolis.
Roy Newbery Andrews, Mankato.	Edward James Johnston, St. Cloud.
Charles Joseph Bloom, Whitehall, Mich.	Edward John Lawrence, Marshall.
Rolland A. Bock, Pharm. C., St. Paul.	Arvid C. Lindberg, Harris.
August Edward Bostrom, B. S., Minneapolis.	William Francis Maertz, New Prague.
Leon Morelle Boyd, Alexandria.	Gustav Alfred Magnusson, Harris.
John C. Brown, Minneapolis.	James Rollin Manley, Duluth.
Herbert Arthur Burns, Hutchinson.	Melvin Sylvanius Nelson, B. S., Dawson.
Henry E. Dahleen, Granite Falls.	Carl M. Roan, Minneapolis.
Frederick Alonzo Engstrom, Cannon Falls.	Dennis E. Ryan, Shakopee.
John Esser, Austin.	Clarke Sherwood Smith, Bozeman, Mont.
George Bysshe Eusterman, Lewiston.	Eugene Benson Stebbins, Minneapolis.
Edward Louis Fortier, Little Falls.	Arthur Clarence Strachauer, Minneapolis.
Henry Oswald Grangaard, Kindred, N. D.	George Hamilton Walker, Pawnee City, Nebr.
Ernest Eugene Hemingway, Minneapolis.	John Franklin Walker, St. Paul.
Charles Norton Hensel, St. Paul.	Tolbert Watson, Casiel, N. D.

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY 3

Arthur Duncan Sinclair, Minneapolis.	Justin Thomas Smallwood, Worthington.
K. Ward Wilder, Minneapolis.	

THE COLLEGE OF DENTISTRY

FOR DOCTOR OF DENTAL SURGERY 43

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

THE COLLEGE OF PHARMACY
FOR BACHELOR OF PHARMACY 18

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

Arthur A. Morse

Harold C. Deering.

Fay N. Seaton.

IN ENGLISH

Mary Alice Winter.

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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.

X
STUDENTS

Students

The College of Science, Literature, and the Arts

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.
 Klimenthagen, 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 L., 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.
 Nowell, 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, Caldonia.
 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 Belie, 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.
 Gaylor, 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, Ethelcen, 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.
 Mable, 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.
 McPetridge, 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 Vail, 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.
 Witche, Hazel M., Minneapolis.
 Wretling, Hilma E., Alexandria.

SOPHOMORES—308

Alnsworth, 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.
 Brandle, G. Herbert, Minneapolis.
 Branham, Alice, Minneapolis.
 Breen, Genevieve R., Minneapolis.
 Brooks, Ida, Mausfield, 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.
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 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.
 Fægre, 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. Labrd, 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.
 Hefner, 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., Rhineland, Wis.
 McGregor, Della, St. Paul.
 McHugh, Helen, Goodhue.
 McKeen, Edwin, Minneapolis.
 McKenzie, John Wallace, Groton, S. D.
 McMillan, Effie, 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.
 Melke, 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.
 Senescail, Cleve, Ortonville.
 Shan on, 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.
 Stadsvoold, 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.
 Wynman, 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.,
 Baillie, Earle C., Minneapolis.
 Baker, Virginia, Brownton.
 Barnaby, Anne L., Minneapolis.
 Barnes, Mildred, Minneapolis.
 Barry, Arthur, Minneapolis.
 Bates, Wilbur K., Lake City.
 Beeher, 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, Truna 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, Mahanomen.
 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.
 Glynych, Frank, Minneapolis.
 Goodwin, G. E., Webster, S. D.
 Gould, 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, Ilding, 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, Cast'eton, 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, Solvej, 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.
 Wynan, Vincent, Minneapolis.
 Zeches, Georgia R., St. Charles.

UNCLASSIFIED—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.
 Bleber, 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, Ordin 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, Dart 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, Lydia 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, Minnepolis.
 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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 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. Berry, Minneapolis.
 John B. Bieri, Minneapolis.
 Zingel, Birnberg, St. Paul.
 Frederick W. Buck, Duluth.
 John E. Buhl, Graceville.
 Donald M. Fortar, 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. Nemeck, 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.	Herman R. Johnson, Minneapolis.
Alvah E. Brockway, Luverne.	Eugene V. Kaplan, Owatonna.
Rollo J. Cobban, Luverne.	George A. Kruschke, Duluth.
Louis M. Converse, St. Paul.	Charles G. Lindelef, Rush City.
Ralph M. Davies, Minneapolis.	Lauren F. McKenzie, Glencoe.
Joel A. Fitts, Minneapolis.	Frederic E. Murrish, Minneapolis.
Frank R. Fleming, St. Paul.	Orson B. Poore, Bird Island.
Lester H. Gadsby, Minneapolis.	James W. Powles, St. Paul.
Fred R. Grant, Windom.	Archer R. Robinson, Windom.
Clayton Harris, Minneapolis.	Marcus H. Stillman, Austin.
Albert J. Hitzker, Winona.	Milo E. Todd, Minneapolis.
Mark L. Hopkins, Minneapolis.	Leslie E. Turner, Minneapolis.
James W. Hornbrook, Tower.	Theodora Vita, New Prague.
Barney G. Japs, Hopkins.	Benjamin B. Walling, Chicago, Ill.
Fred. M. Williams, Minneapolis.	

MUNICIPAL ENGINEERS—1

Sidney R. Oakes, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Charles P. Clarke, Elysian.	Arthur B. Fruen, Minneapolis.
Lindsley B. Curtiss, Minneapolis.	Arthur O. Olsen, Minneapolis.

JUNIOR CLASS—81

CIVIL ENGINEERS—27

Ben W. Adams, Pine Island.	Rupert V. Hauser, St. Paul.
Hans Asleson, Minneapolis.	George W. Jevne, Minneapolis.
Joseph G. Bazil, Montgomery.	Edward W. Leach, Winona.
Ole M. Bohme, Sperry, N. D.	Edward D. Macmillan, Minneapolis.
Otto E. Brownell, Ely.	Reuben Mark, St. Paul.
Berton L. Chapman, Westbrook.	Lewis H. Merrill, Hutchinson.
Philip L. Dahlquist, Minneapolis.	Clyde Methven, Minneapolis.
J. Walter Dickinson, St. Paul.	C. Foerster Meyer, Minneapolis.
Chas. T. Eckman, St. Paul.	Charles L. Mote, Alpha.
Herbert C. Frahm, Rochester.	George Nason, St. Paul.
Conrad G. Fredin, Duluth.	Emerson D. Sawyer, Minneapolis.
George M. Garen, Minneapolis.	Ernest Schluter, Hutchinson.
James R. Graham, Fort Worth, Texas.	Adolph Sommerfeld, Sleepy Eye.
Wm. D. Timperley, Minneapolis.	

MECHANICAL ENGINEERS—24

Armin G. Albrecht, St. Paul.	Wallace H. Martin, Willmar.
Wm. B. Atkinson, Barnesville.	Bernard A. Meixner, Owatonna.
John C. Bush, Minneapolis.	Paul A. Mencke, St. Paul.
Fred R. Comb, Minneapolis.	Amos F. Moyer, Montevideo.
Robert A. Cone, Minneapolis.	Browning Nichols, Jr., Montevideo.
H. C. Cook, Red Wing.	Oscar A. Olstad, Minneapolis.
George Du Toit, Minneapolis.	Harley G. Overholt, Minneapolis.
Laurence T. Fleming, Minneapolis.	Maynard W. Pease, Minneapolis.
Jenness B. Frear, Wayzata.	Willis R. Salisbury, Minneapolis.
Ole H. Gierberg, Red Lake Falls.	Martin Tolstad, Starbuck.
Frank Johnson, Minneapolis.	Alvah H. Warren, St. Paul.
Martin S. Larson, Red Wing.	Donald M. Wesbrook, Minneapolis.

ELECTRICAL ENGINEERS—28

Oscar P. Anderson, Wells.	Leonard T. Johnson, Minneapolis.
Oscar V. Anderson, Hudson, Wis.	Eliot B. Josephson, Red Wing.
Roy H. Ashworth, Mankato.	Arrid G. Landeen, Garfield.
Vernon S. Beck, Minneapolis.	Phiney O. Larson, Fosston.
Wilfred E. Conley, Lake Mills, Ia.	Jesse I. Layman, Minneapolis.
Raymond E. Dahlstrom, St. Paul.	C. Hugo Nelson, Minneapolis.
Leon R. Drinkall, Spring Valley.	Henry H. Peterson, Monticello.
Raymond V. Duffy, Kalispell, Mont.	Ray R. Phelps, St. Paul.
Walter J. Finke, Charles City, Ia.	Harry A. Reid, Mankato.
Earl L. Grinols, Minneapolis.	Ernest E. Skythe, St. Paul.
Herbert E. Hagstrom, Minneapolis.	Joseph H. Soulek, Montgomery.
Christian Hansen, St. Paul.	Henry G. Stahlmann, St. Paul.
Byron P. Hustad, Minneapolis.	Lester A. Stoner, Minneapolis.
Clarence M. Jespersion, Minnetonka Beach.	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.	Michael J. Hoffman, St. Paul.
Arthur F. Ainslie, Rochester.	Wm. Raleigh Hosfield, Faribault.
Sidney S. Alvin, New Ulm.	Karl L. Hullsiek, St. Paul.
Herbert P. Arnesen, Benson.	C. Arthur Johnson, Minneapolis.
Wm. H. Bailey, Minneapolis.	Paul Johnson, Minneapolis.
Frank C. Boermer, Duluth.	Rolland A. Judson, Crookston.
Thomas J. Buhl, Graceville.	Ingwald, Kirtrud, Minneapolis.
Will P. Cottingham, Minneapolis.	Robert L. Latham, Minneapolis.
Edward D. Coughlan, Mankato.	Howard C. Libby, New London, Wis.
George E. Crokard, Britton, S. D.	George A. Maney, Minneapolis.
Ernest B. Croft, Minneapolis.	George C. Mattison, Minneapolis.
Thomas H. Curtis, Fairmont.	Benjamin A. Pratt, Minneapolis.
Axel E. Elfstrom, Willmar.	Alfred G. Ranney, St. Paul.
Edward H. Euger, Minneapolis.	Lewis M. Roth, St. Paul.
Walker Ferguson, Mankato.	Irving H. Russell, Minneapolis.
David Fieldman, Duluth.	Sigvel J. Siverson, Minneapolis.
August L. Flygare, Winthrop.	Sidney H. Smith, Mitchell, S. D.
George Fossen, Ferguson Falls.	Randall, D. Stanton, St. Paul.
Marion H. Goodnow, Minneapolis.	William B. Tuttle, Minneapolis.
Kenneth D. Hauser, St. Paul.	Arthur C. Walby, Minneapolis.
Ralph M. Hodnett, St. Paul.	Benjamin O. Wold, Barron, Wis.
Henry E. Wolff, St. Paul.	

MECHANICAL ENGINEERS—19

Marvin C. Barnum, Minneapolis.	Harry S. Bronson, St. Paul.
Ira L. Bishop, Mapleton.	William P. Brown, Yankton, S. D.

George Christensen, Robbinsdale.	Leo E. Owens, Minneapolis.
Vernon G. Dickey, Princeton.	Porteus B. Palmer, St. Paul.
Julian P. Farnam, Minneapolis.	Lars Rand, Minneapolis.
Ralph M. Hoffman, Minneapolis.	Lester M. Sears, Minneapolis.
Walter F. Kasper, Owatonna.	Jack Sneve, St. Paul.
James C. Markoe, St. Paul.	Russell W. Watrous, St. Paul.
Robert C. Oran, Willmar.	Guy L. Willits, Minneapolis.
Joseph C. Woodman, Minneapolis.	

ELECTRICAL ENGINEERS—51

Arthur R. Anderson, Willmar.	George W. Hyser, Minneapolis.
Fred A. Andert, Morris.	Henry C. James, St. Paul.
Earl M. Bill, Minneapolis.	John Ewald Johnson, Minneapolis.
Peter P. Bisek, New Prague.	William C. Koch, St. Paul.
George W. Blossom, Minneapolis.	John P. Lane, Minneapolis.
Herbert Brunkow, Delano.	Roy P. Lutz, Minneapolis.
Robert P. Burrows, St. Paul.	Ira C. McCoy, Rochester.
Allan C. Butterworth, Minneapolis.	C. Elliott Magraw, St. Paul.
Ernest F. Carpenter, Redwood Falls.	Oscar Markuson, Fertile.
J. Philip Carson, St. Paul.	Albert H. Mittag, Elizabeth.
Sprague L. Chapin, Luverne.	Walter H. Nebel, Braham.
Arthur G. Chapman, Minneapolis.	Fred C. Nelson, Chatfield.
Charles S. Chapman, Lanesboro.	Raymond J. O'Brien, St. Paul.
Charles S. Demarest, Minneapolis.	Joseph H. Pengilly, Osseo.
Albert P. Dorrance, St. Paul.	James C. Peterson, Elbow Lake.
Lynn A. Emerson, Elmore.	Leland E. Purves, Eyota.
Benjamin Ferriss, St. Paul.	Clyde Richely, Minneapolis.
Peter W. Forsberg, Minneapolis.	Louis F. Riegel, Rochester.
Harry Frederickson, Minneapolis.	William G. Shane, Gladstone.
Milton L. Guderian, Alexandria.	Fred R. Stinchfield, Robbinsdale.
Walter B. Anderson, Minneapolis.	Will V. Stinson, Minneapolis.
Maurice J. Hansen, Hopkins.	Harry C. Striech, Winona.
Fred W. Wjelm, Minneapolis.	William A. Walker, Moorehead.
Herbert Huevelmann, New Ulm.	Harvey E. Webb, Aberdeen, S. D.
Howard R. Hush, Minneapolis.	Glenn Wilson, Dover.
Charles N. Young, St. Paul.	

MUNICIPAL—1

Hal R. West, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Joseph S. Bookwalter, Minneapolis.	Frank J. Robischon, Sank Centre.
Paul E. Klopsteg, Henderson.	Christian B. Thvedt, Minneapolis.

FRESHMAN CLASS—155

CIVIL ENGINEERS—55

Arthur E. Anderson, Goodhue.	Arthur D. Cambell, Anoka.
Harvey B. Anderson, Hopkins.	William N. Carey, St. Paul.
Thomas W. Bernard, Minnetonka Beach.	Harold S. Chapin, St. Paul.
John Bathhurst, Minneapolis.	Edward G. Chilton, Frazee.
Wm. J. Bingen, Webster, S. D.	Elmer F. Cummings, Luverne.
George H. Boland, St. Paul.	Robert E. Cummings, St. Paul.

Allan H. De Wolf, Bonners Ferry, Idaho.	Clarence C. Pagenhart, Rochester.
Grover W. Dimond, Minneapolis.	Carl H. Parks, Montivideo.
Frank A. Donaldson, Rochester.	Raymond A. Pease, Minneapolis.
Harry Edwards, St. Paul.	Roland O. Peteler, Minneapolis.
Robert A. Fruen, Minneapolis.	Barney J. Peterson, Alvarado.
Ernest A. Gatje, Rochester.	Conrad N. Peterson, Lyle.
Marcus Giersten, Minneapolis.	Hewitt Richmond, Minneapolis.
Edward L. Haberle, Minneapolis.	Chester F. Robbins, Verndale.
Frederick W. Hoorn, Red Wing.	James W. Routh, Duluth.
Robert D. Jorgens, Minneapolis.	Loiel S. Ryan, Little Falls.
Raymond J. Kappahn, Brandon.	John S. Siverts, Morris.
Frank Kaufman, St. Paul.	Niels C. Sorenson, Monticello.
Charles R. Knox, Fairmont.	Willard A. South, Blue Earth.
Joseph J. Kriz, Hopkins.	M. Edwin Souther, Colman, S. D.
Ralph B. Lake, Fergus Falls.	Norman H. Stevens, St. Paul.
Laurence La Plant, Anoka.	Hjalmer S. Swenson, Willmar.
John A. McCree, St. Paul.	Irving E. Torgerson, Lanesboro.
William E. McCrum, Thief River Falls.	Grover Umbehoeker, Princeton.
Dale R. McEnary, Minneapolis.	Reginald Van Cleve, Minneapolis.
William J. McHale, Preston.	Oscar H. Wangaard, Minneapolis.
Rufus H. Milne, Crookston.	Arthur Welin, Argyle.
George R. Zieske, Sleepy Eye.	

MECHANICAL ENGINEERS—34

Fred C. Acomb, Minneapolis.	Guy A. McGlone, Minneapolis.
Laurence D. Barnard, Minneapolis.	Charles L. Melvin, Moline, Ill.
Eugene C. Becker, Hope, N. D.	Martin A. Mikesh, Spillville, Ia.
Ernest W. Bolingren, Minneapolis.	Clinton K. Moore, Minneapolis.
James S. Brodie, St. Paul.	Harold S. Morton, Minneapolis.
Eugene C. Crane, Minneapolis.	George M. Orr, Afton.
Earl M. Darrow, Minneapolis.	Paul S. Parker, Minneapolis.
Arthur T. Dinsmore, Minneapolis.	Sydney, A. Patchin, Rochester.
Willis F. Geib, St. Paul.	Emil Ruemmele, Hudson, Wis.
Warren W. Getchell, Minneapolis.	Bert. R. Sansen, Taylors Falls.
Charles F. Haglin, Jr., Minneapolis.	Newell E. Storms, Minneapolis.
Leon R. Hartman, Minneapolis.	Harold H. Sullwold, St. Paul.
Raymond M. Helm, Rockford, Ill.	Ernest M. Tollefson, Minneapolis.
Arthur C. Hubbell, St. Paul.	Frederick Layton Tooker, St. Paul.
John Huseby, Cloquet.	Harold E. Wade, Fairmont.
Milton W. Johnson, Stillwater.	Carlyle D. Weston, Minneapolis.
Clifford N. Lockwood, Chaska.	Wm. Albert Yunker, Hecla, S. D.

ELECTRICALS—66

John Arthur Anderson, Hinckley.	William G. Clark, Stillwater.
Samuel Lee Avis, Jamestown, N. D.	Claude C. Clifton, St. Paul.
Neil M. Bain, Albany, Ore.	Allen S. Crawford, Rochester.
Carl Beede, Minneapolis.	Elmer E. Daniels, Pine Island.
Claude F. Benham, St. Paul.	Henry Arno Daum, Albert Lea.
Eugene F. Bennett, Preston.	Richard M. Falley, Wahpeton, N. D.
Byron H. Bradley, Hudson, Wis.	Albert E. Fischer, Canby.
William E. Brewster, Minneapolis.	William H. Fischer, Winona.
Hal E. Brown, Duluth.	Milton M. Goldstein, Minneapolis.
Edward S. Byron, Minneapolis.	Mark Grady, Foley.
Paul K. Cesander, Buffalo.	Errald C. Green, Minneapolis.

Wm. Hecklesmillier, Ellendale, N. D.
 Ernest A. Hedenstrom, St. Paul.
 Raymond Herrmann, Henderson.
 C Kirk Hillman, St. Paul.
 Vern T. Hohans, Winona
 Conrad G. Hoveden, 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. Mather, 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.

UNCLASSIFIED—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. Lamphear, 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. Schroader, 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

The College of Agriculture

POST GRADUATES—6

CANDIDATES FOR MASTERS DEGREE. AGRICULTURE

Gaumnitz, Carl, St. Cloud
 Grout, G. P., St. Anthony Park
 Howell, D. B., St. Anthony Park
 Metcalf, Isaac F., Buford, Ontario

CANDIDATES FOR BACHELORS DEGREE FORESTRY

Clark, Stephen G., Stillwater

Deering, Robt. L., Minneapolis.

SENIORS—25

Arny, Albert C., St. Anthony Park
 Baker, George J., St. Paul.
 Bergstrom, Chester H., Minneapolis.
 Carroll, Harry B., Jr., St. Paul.
 Crandall, LeRoy V., Red Wing.
 Donovan, Raymond L., Dundas.
 Frear, Dana W., Minnetonka.
 French, Anna May, Minneapolis.
 Gore, John E., San Dimas, Cal.
 Hartzell, Mary K., Minneapolis.
 Hillman, Frank M., Minneapolis.
 Hohle, Ola A., Hector.
 Knowlton, Edith V., Minneapolis.
 McNelly, Chester L., Caledonia.

Marsden, Edith Viola, Edgerton, Wis.
 Mayland, Edwin, Rushford, R. 3.
 Miller, Ralph C., Sta. F. R. 1, Minneapolis.
 Moore, Walter M., St. Paul.
 Orr, George Raymond, Michigan City, Ind.
 Paterson, Thomas G., Wayzata.
 Peterson, Elvin L., Olivia.
 Pond, Harold H., Sta. F. R. 1, Minneapolis.
 Potter, Alden A., Minneapolis.
 Ware, John F., St. Paul.
 West, Ralph L., Grand Rapids.

JUNIORS—12

Benson, Arnold O., Glenwood.
 Benzin, Basil, Minneapolis.
 Berry, J. Bert, St. Paul.
 Crimmins, Ellen M., Minneapolis.
 Gaumnitz, Florence, St. Cloud, R. 1.
 Jacobson, Norman, Port Washington, Wis.

Krauch, Herman, St. Paul.
 Laate, Gurid, St. Anthony Park.
 Lewis, Charles L., Jr., St. Paul.
 Merrill, Alfred S., Minneapolis.
 Underwood, Clarence, Hutchinson.
 Waller, Conrad J., St. Paul.

SOPHOMORES—45

Arrivee, David A., St. Paul.
 Baker Norman M., Davenport, Ia.
 Bilsborrow, James D., Wolverton.
 Brewster, Donald R., Minneapolis.
 Bryan, Wm. J., Red Wing R. 2.
 Christopherson, Edna H., Sioux Falls, S. D.
 Collin, William H., Northwood, Ia.
 Crysler, Flossie W., Sioux Falls, S. D.
 Dvorachek, Henry E., Glencoe.
 Erickson, Richard E., Stillwater.
 Evans, Hannah Vaughn, Tracy.
 Forsman, John A., Duluth.
 Gilbertson, Henry W., Jasper.
 Gillis, James R., St. Anthony Park
 Glotfelter, Madge L., Minneapolis.
 Hagerman, Wm. F., Morris.
 Hamilton, Carl L., Minneapolis.
 Hartzell, Dorothy, Minneapolis.
 Hauge, Adolph G., Alber, Lea.
 Haw, John W., St. Anthony Park.
 Hayford, Ruth, Minneapolis.
 Hofmann, Julius V., Janesville.

Howard, Leola M., Rochester.
 Johnson, Fred O., St. Anthony Park
 McElmeel, Stephen P., St. Paul.
 Matthews, Charles A., Ortonville.
 Miles, Lee O., West Concord.
 Nash, Malcolm A., Tracy.
 Noble, William E., Albert Lea.
 Older, Frank E., Luverne.
 Peterson, Roy M., Olivia.
 Ple, Richard M., Cannon Falls.
 Rowe, Bess M., Minneapolis.
 Rust, Jay B., St. Paul.
 Sargeant, Forrest H., Red Wing, R. 2.
 Strong, Florence S., St. Paul.
 Thompson, Mark J., Winsted.
 Tolaas, Arne G., St. Paul.
 Uptegrafft, Leroy, St. Anthony Park.
 Vancura, Edward, Lakefield.
 Weber, Henry G., Minneapolis.
 White, Frank W., Excelsior.
 Williams, Donald T., Minneapolis.
 Williams, Ruth J., St. Louis Park.
 Young, John P., St. Paul.

FRESHMEN—104

- Adams, Emma T., Owatonna.
 Arrivee, Agnes E., St. Paul.
 Aust, Clara L., Minneapolis.
 Beard, Frank W., St. Anthony Park.
 Berg, Joseph H., Willmar.
 Berkey, Andrew D., St. Paul.
 Beyer, Walter F., St. Paul.
 Billings, Carlos R., Audubon.
 Blodgett, Harvey P., St. Paul.
 Bohn, George J., St. Paul.
 Bowen, Clarence W., Minneapolis.
 Brandt, Henry P., Morris.
 Branyen, Wm. H., Minneapolis.
 Brazell, Clarence A., Tacoma, Wash.
 Brooks, Elizabeth F., Grand Rapids.
 Brownlie, James R., Davenport, Ia.
 Buhler, Ernest O., St. Anthony Park.
 Bush, Harvey M., Minneapolis.
 Cameron, Gladys M., St. Paul.
 Campbell, Hugh B., Stillwater.
 Carpenter, Paul J., Sleepy Eye.
 Chase, Alice K., Fergus Falls.
 Chase, Arthur G., Minneapolis.
 Chase, Ethel E., Minneapolis.
 Clark, Miles D., St. Paul.
 Clymer, William R., St. Paul.
 Coffin, Clinton, Minneapolis.
 Conzet, Grover M., Nevis.
 Corniea, Francis A., Plato.
 Danish, Samuel, Minneapolis.
 Dieh, Winn J., Omaha, Neb.
 Donovan, Harold T., Stillwater.
 Dvorachek, Daniel C., Glencoe.
 Elwell, Georgia Belle, Minneapolis.
 Morton, Agnes, Elmwood, Ill.
 Mueller, Martha J., St. Paul.
 Norman, Sigvald, Ortonville.
 Norsen, Knute, St. Anthony Park.
 Olson, Andrew J., Renville.
 Oppel, Arthur F., Fulda.
 Orr, John E., Michigan City, Ind.
 Peake, George W., Eagle Bend.
 Pearce, William R., Minneapolis.
 Peck, Francis W., St. Anthony Park.
 Peterson, Ralph W., Olivia.
 Pickett, Tressa A., Chatfield.
 Punderson, James M., St. Paul.
 Records, Percy C., Farmington.
 Regan, Mabel E., St. Paul.
 Rice, Maude B., Windom.
 Rich, George S., Minneapolis.
 Ricks, Nelson D., Minneapolis.
 Savre, Oliver M., Northwood, Ia.
 Emerson, Robert C., West St. Paul.
 Erickson, Richard E., Stillwater.
 Field, Edmund T., Minneapolis.
 Francis, Llewellyn H., Hutchinson.
 French, Clarence L., St. Paul.
 Gage, Richard C., Minneapolis.
 Gleason, Clara T., Minneapolis.
 Harris, S. Grant, Jr., St. Paul.
 Hart, Bernice, Minneapolis.
 Hobbs, Fowler K., Minneapolis.
 Hodgman, Arthur W., St. Paul.
 Hopkins, Rachael, Sta. F., R. 1. Minne-
 apolis.
 Horn, Charles L., Ida Grove, Ia.
 Husby, John, McIntosh.
 Ireland, Max A., Minneapolis.
 Johnson, Lloyd K., Wabasha.
 Jordan, Philip S., Minneapolis.
 Josephson, Elvira, Minneota.
 Josephson, Victor, Minneota.
 Kenety, William H., Fulda.
 Lawson, Elsie, Anoka.
 Lees, Frank B., Minneapolis.
 Lewis, Pauline L., Long Lake.
 Lewis, Rhoda, St. Paul.
 Lydiard, Susie C., Long Lake.
 McIntosh, Marguerite F., St. Paul.
 McNamee, Ruth, Helena, Mont.
 Magraw, Charles E., Jr., St. Paul.
 Mather, Wm. S., Groton, S. D.
 Marthinson, Norman O., Austin.
 Martin, Dean W., Minneapolis.
 Merrill, Frederic B., Stillwater.
 Moffat, Frederic R., Dubuque, Ia.
 Schwedes, Carl H., Wabasha.
 Shannon, Wm. M., Bemidji.
 Shaughnessy, Clark D., N. St. Paul.
 Smith, Stella H., Austin.
 Spellerberg, Frederick E., Dubuque, Ia.
 Stevenson, John A., Minneapolis.
 Stewart, Charles D., Sherburn.
 Sturges, Paul E., Buffalo.
 Swedberg, Jasper I., White Bear.
 Todhunter, Roxie E., Hamilton, O.
 Taylor, Ruth, Pipestone.
 Valleau, William D., St. Anthony Park.
 Vancura, Edward W., Lakesfield.
 Voelker, James M., Winona.
 Werner, Henry, Fulda.
 Wilson, Robert, Stillwater.
 Wise, Kate A., Minneapolis.
 Youngren, Fridolph N., Minneapolis.

The School of Agriculture

STUDENTS—1908-9

Intermediate year.....	7	
A Class.....	108	
B Class.....	171	
C Class.....	368	
		654
Teachers' Summer School.....	90	
Summer Forestry School.....	18	
Farmer's Short Course.....	169	
Dairy School.....	107	
Crookston School of Agriculture.....	101	
		192
College course.....	192	
Total in Department of Agriculture.....	1,331	
Less thirteen duplicates.....	13	
		1,318
TOTAL.....		1,318

INTERMEDIATE CLASS—7

Corser, Frederick, Minneapolis.	Staples, Myrtle C., West Side Sa. R. 2., St Paul.
Dorn, Ivan C., Robbinsdale.	Trieloff, Hattie L., Carver.
Harrison, Earl D., Osseo, R. 1.	White, Sherman L., Excelsior.
Lane, George E., Wayzata, R. 1.	

A CLASS—108

Albers, Mary W., Northfield.	Carlson, Mabel H., Minneapolis.
Anderson, Fred. A., Hutchinson, R. 1.	Chase, Vere E., Minneapolis.
Anderson, Phillip A. W., Forest Lake.	Connick, Bertha J., Westbrook.
Anderson, Sophus H., St. Anthony Park.	Corser, John, Minneapolis.
Ashbach, Otto B., Ada.	Crippen, Lee A., Langdon.
Baker, George J., St. Paul.	Dubbels, Joe P., Viola.
Beckstrand, Andrew C., Brookfield, R. 1	Dvorachek, Henry E., Glencoe.
Benson, Edwin B., Jackson, R. 4.	Ehlers, L. Fred., Marshall.
Berg, Edgar F., Dundas.	Ferraby, Ethel S., Minneapolis.
Bilsborrow, James D., Wolverton.	Forbes, Charley S., West Side Sta., St. Paul.
Blackburn, Robert A., Royal, Neb.	Forsman, John A., Dututh.
Blackburn, Ralph G., Royal, Neb.	Frentz, Frederic H., Waseca.
Bouman, A. W., Minneapolis.	Gammon, Lee M., Wayzata, R. 3.
Braxtan, Robert S., Paoli, Ind.	Gardner, Harriet R., Ortonville, R. 3.
Bredvold, Jacob S., Belview.	Gilbertson, Henry W., Jasper.
Briggs, George McS., Rock Springs, N. D.	Hallan, Henry A., Spring Grove.
Briggs, Mary O., St. Anthony Park.	Hamilton, Vida L., Osseo, R. 1.
Brownell, Max C., Minneapolis.	Hancock, Morris W., Mankato.
Busse, Rose, Merriam Park, R. 8.	Hardisty, Frank J., Minneapolis.

Helgemoe, Julia E., Canby.
 Hillman, Frank M., Minneapolis.
 Hoffman, Ernest D., Marshall.
 Hofmann, Julius V., Janesville.
 Holmberg, Mabel O., Center City.
 Holt, Harry G., Delhi.
 Jacobson, Henry, Marshall.
 Jaquith, Harold H., Hopkins, R. 3.
 Johnson, Clara V., Star Prairie, R. 1, Wis.
 Johnson, Ernestine M., St. Paul.
 Johnson, Stella A., Cannon Falls, R. 3.
 Kelley, Lloyd S., Markville.
 Knuteson, Einar George H., St. Cloud.
 Krefting, Carl L., Minneapolis.
 Lamb, Harvey H., Mazeppa.
 Lambert, Lenore M., Withrow.
 Larson, Sallie Marie, North Branch.
 LaRue, Mary E., St. Paul.
 Lawrence, Frank E., Litchfield, R. 4.
 Lemke, William A., Albert Lea, R. 4.
 Lenz, Valentine L., Albert Lea.
 Lindall, Oscar R., Parker's Prairie.
 Ludlow, Herbert D., Worthington.
 McNelly, Mary E., Caledonia.
 Mallery, Ema, Lakeville.
 Manning Nydia A., St. Paul.
 Matthews, Charles A., Ortonville.
 Meck, Ethel B., St. Paul.
 Minton, Harry S., Francis, Sask., Can.
 Moore, Fred F., Stewart.
 Morrison, Earl B., Fergus Falls.
 Nelson, Arthur O., Stillwater, R. 7.
 Nelson, Arthur S., Afton.
 Nelson, Ellen L., Hector.
 Nelson, Emil R., Canby.
 Nelson, Ida C., Alexandria.
 Older, Frank E., Luverne.
 Ott, J. Cyrus, Albert Lea, R. 4.
 Padden, Roscoe L., Stewart.
 Patten, Norman B., Jr., Minneapolis.
 Pederson, Inga M., Irwin, Ia.
 Pemberton, Ada M., Eden Prairie.
 Pengilly, Alice L., Osseo, R. 1.
 Person, Fred A., Withrow, R. 21.
 Peterson, Ellen W., Lafayette.
 Phillips, Dinah S., LeSeur.
 Pratt, Hiram E., Woodstock, Ill.
 Robb, Clarence P., Winona.
 Robertson, Charles J., Merriam Park, R. 8.
 Sargent, Clara A., Red Wing, R. 2.
 Sather, Arnold A., Clear Lake, Wis.
 Smith, Ralph V., Parkers' Prairie.
 Southunayd, Winthrop S., Braham.
 Stone, Allen W., Park Rapids.
 Sullivan, Jessie, Minneapolis.
 Thompson, Mark J., Winsted.
 Thornton, Henry A., Appleton, R. 1.
 Torgrimson, Theofred, Hanska.
 Tripp, Harry P., Beardslay.
 Turner, Amelia H., St. Peter.
 Utter, Gustaf W., Ceylon.
 Victor, Emmy M., Lindstrom.
 Viets, J. J. Minneapolis.
 Watson, Irene, Merriam Park.
 Wessel, Anthony A., White Bear.
 Westmark, Arthur A. Minnetonka
 Mills, R. 2.
 Wilcox, Richard S., White Bear Lake.
 Wilson, Lillian M., Granite Falls, R. 1.
 Workman, George, Villard.
 Wright, A. D., St. Cloud.

B CLASS—171

Adkins, Alice E., Minneapolis.
 Allen, Percy R., Winona.
 Anderson, Walter R., Belgrade.
 Ash, Julia A., Wendell.
 Balstad, Henry O., Fosston.
 Balstad, Manda C., Fosston.
 Barclay, Madge, Stillwater.
 Barsness, Alfred, Brandon.
 Barsness, Thilda B., Glenwood.
 Bartlett, Howard, Ellsworth, Wis.
 Bartlett, Irving J., Mound.
 Bede, Russel, Pine City.
 Behnke, Gretchen, New Ulm.
 Bennett, William P., Austin.
 Biscoe, Julius W., St. Paul Park.
 Bjorka, Knute, Fergus Falls, R. 7.
 Boe, George R., Lanesboro.
 Bondeson, Calextus C., Lafayette.
 Brann, Alonzo S., Minneapolis.
 Brown, Jessie, Merriam Park.
 Budde, Theodore G., Kellogg.
 Busse, Florence A., Merriam Park R. 8.
 Butterfield, James, Long Lake.
 Byrne, Fred, Hart.
 Cantine, Hester E., Walnut Grove.
 Cantine, Sarah A., Walnut Grove.
 Carlson, Elvera S., Minneapolis.
 Carlsted, Alfred, Dassel, R. 5.
 Carr, Elmer B., Excelsior R. 3.
 Chase, Willis H., Farmington.
 Cleator, Ralph A., Minneapolis.
 Conaughy, Laura C., Minneapolis.

- Cooper, Edgar, Adrian .
 Corbett, Alice A., Minneapolis.
 Cunningham, Leon C., Pipestone.
 Dahlquist, Anna V., North Branch.
 Dodds, Ralph F., Wheaton.
 Dodds, Warren, Wheaton.
 Dorn, Earl O., Brooklyn Center.
 Doten, Allan L., Osseo R. 1.
 Dunning , John W., Osseo, R. 6.
 Durfey, Phineas D., Chatfield.
 Einarson, Baldwin, Duluth.
 Ellsworth, Mildred, St. Paul.
 Elsborg, Ellen, Minneapolis.
 Ericson, Elmer, Hector.
 Farrell, Edward, Franklin.
 Feustel, Nettie C., Fairmont.
 Finkbinder, David E., Royersford, Pa.
 Flaten, Peter M., Granite Falls.
 Fowler, Audrey M., Bethel.
 Francis, Merritt, Minneapolis.
 Frear, Aureline J., Minnetonka Mills.
 Gaynor, Fred A., Milbank, S. D.
 Gilles, Arthur P., Minneapolis.
 Groger, Bruce W., St. Charles.
 Hammerberg, Arvid, Shafer.
 Hansen, Martin, Eyota.
 Hanson, Elben, Stillwater.
 Hart, Charles C., Farmington.
 Hartkopf, Baldwin, Osseo.
 Hauge, Effie M., Minneapolis.
 Helgeson, Emma S., Sacred Hart.
 Hellie, Clara, Hanley Falls.
 Hellzen, Wilhelm, Clarkfield.
 Hennessy Claudia S., West St. Paul.
 Hewitt, Wyman H., Nassau
 Hodorff, Gustave, Dixville
 Hoel, Frank, Minneapolis
 Holbrook, David W., Markesan, Wis.
 Holman, Peter A., Minneapolis
 Howard, Raymond W., St. Paul Park
 Hoyt, Corrinne, R., Fridley
 Huntley, Herbert C., Hancock
 Ingberg, Joseph, Hendrum
 Jackson, Hjalmer M., St. Anthony Falls
 Sta., Minneapolis
 Jackson, Joel F., Minneapolis
 Joerns, Emelyn R., St. Anthony Park
 Johanson, Algott B., Wheaton
 Johnson, Elida S., St. Paul W
 Johnson, Ella J., Cambridge
 Johnson, Mabel C., Milan
 Johnson, Myrtle E., Minneapolis
 Kain, Raymond, Benson
 Keefe, George P., Chatfield
 Kernkamp, Howard C., St. Paul
- Keenholts, Raymond J., Sta F., Minne-
 apolis
 Koehler, George W., Mound
 Krueger, Elsie S., Bellingham
 Kueffner, Frederick J., St. Paul
 Lathrop, æByron G., Hugo
 Liberg, Benj. A., Haug
 Lindeman, Otto., North Redwood
 Locke, Elmer B., Osseo
 Lundgren, Herbert P., Minneapolis
 McKenney, Richard E., Minneapolis
 McNee, William W., Spring Valley
 Madden, William C., Waseca R 6
 Manahan, Mathew, Chatfield
 Mark, Levi E., Goodhue, R 5
 Mason, Grafton Jr., St. Paul
 Miller, Carl A., Fawndale
 Miller, Charles E., St. Paul
 Myrah, Olga G., Spring Grove
 Neal, Winifred E., St. Paul
 Newhouse, Carl O., Brandon
 Noltmier, Victor B., St. Paul Park
 Norcross, Everett W., Minneapolis
 Norris, Bessie M., Minneapolis
 Nygaard, Hartvick, Hartland
 Ohland, Frederick H., Gibbon
 Oliver, Chauncey R., Granada
 Olson, Burke A., Alberta
 Olson, Frederick H., Anoka
 Olson, Henry A., Grove City R 4
 Olson, Otto, Emmons
 Ostendorf, Alford, Somerset, R 2 Wis
 Ostrem, Lewis, Lanesboro R 1
 Palmer, Calude E., Minneapolis
 Palmer, Leone, Red Wing
 Parten, Blanda R., Minneapolis
 Paterson, Andrew, Wayzata
 Pemberton, Joseph B., Eden Prairie
 Peterson, Alget M., Camden Sta., Minne-
 apolis
 Peterson, Herbert Charles, White Bear
 Peterson, Mancel, Waubay, R 3 S. D.
 Peterson, Olaf O., Hanska
 Pfeil, Edward F., St. Charles
 Precourt, Claude W., Plover, Wis R 1
 Pye, Robert B., Faribault
 Qualle, Gunder, Kenyon
 Randal, James H., Hinckley
 Raymond, Ernest A., Summit, S. D.
 Rignell, Agnes D., Winthrop
 Roberts, Henry, Fergus Falls
 Routhe, Oscar V., Redwood Falls R 4
 Rudser, Lorentz O., Rudser, N. D.
 Running, Alma C., Minneapolis
 Sanders, Amy I., Houston

Sandlie, Hjalmer E., Rushford R 3
 Schmidt, Paul Hugo R 1
 Schramm, Lillian, Cottage Grove
 Schwab, Francesca L., Bennettville
 Schwantes, Anna M., New Ulm
 Shaw, Bertha J., Minneapolis
 Smith, Esther Louise, New Duluth
 Smith, George G., Chicago
 Sorenson, John A., Clinton
 Spencer, Smith W., West Duluth
 Stensrud, Hans G. Watson
 Stephl, Otto E., LaCrosse, Wis.
 Stewart, Alton R., St. Paul
 Stewart, Clarence E., Forest Lake
 Strong, Hazel C., Bethel
 Stutzman, Harry J., Newport R 19
 Theilmann, Edward C., Hancock
 Theilmann, Ivy A., Excelsior
 Thompson, Milton C., Franklin
 Thorson, Neil, Minneapolis
 Trovatten, Rollef A., Hanley Falls R. 1
 Van Doren, Arthur L., Farmington
 Warwick, James T., Goodhue R 5
 Weidt, Elsie W., Merriam Park R 8
 Weium, Olaf M., Mabel
 White, Clifford K., Monticello R 2
 White, Glenn B., Minneapolis
 Wickstrom, Hattie, Anoka R 1
 Wilkins, Stanley D., Minneapolis
 Wood, Harold W., Granada
 Woodward, Arthur I., St. Paul Park
 Young, John C., Montrose

O CLASS—368

Aamodt, Arne Wergeland, St. Paul
 Aanes, Hans G., Clarkfield
 Aiton, Albert Rankin, Minneapolis
 Allen, Winthrop D., Wolverton
 Anderson, Amil, Houston
 Anderson, Arthur Lawrence, St. Paul
 Anderson, Carl M., Alpha
 Anderson, Louisa C., Hopkins R. 3
 Anderson, Mabel J., Hills
 Anderson, Reuben E., Goodhue
 Anderson, Ruth L., Marine
 Anderson, Serena B., Ortonville
 Andreasson, Sigurd K., Minneapolis
 Arhart, Henry H., Thief River Falls
 Arneson, Leonard, Shelly
 Arneson, Millard E., Shelly
 Atwood, Warren C., Mineapolis
 Bahls, Ernest J., Round Lake
 Baitinger, Alice L., Hutchinson
 Baker, Ernest C., Monticello
 Barnes, Leslie A., Lockhart
 Bartlett, Marion G., Ellsworth, Wis.
 Baukol, Marcus, Starkbuck
 Bean, Wm. Elliot, Anoka
 Beck, Joseph N., St. James
 * Bengston, Arthur T., Hopkins
 Benson, Noel C., Gibbon
 Berg, Jesse F., Dundas
 Bestland, John, Hanley Falls
 Billings, Benjamin R., Audubon
 Billingsley, H. Fay., Minneapolis
 Blaycock, Edna L., St. Paul
 Bless, Marie E., Wolf Creek, Wis
 Blien, Oscar A., Hanska
 Boettcher, Henry C., Isanti
 Bonney, Harold B., St. Louis, Mo.
 Borraas, Joseph A., Dawson
 Borden, Wilber D., New Brighton
 Bork, Carl A., Paynesville
 Bostad, Lawrence S., Fosston
 Bowers, Earl W., Monticello
 Bowers, Roland U., Monticello
 Boyles, Edward M., St. Paul
 Bradford, Frank H., Farmington
 Branch, Uriah C., White Bear
 Brandt, Conrad R., Morris
 Brewster, James S., Brown Valley
 Brewster, Nancy S., Brown Valley
 Broadbent, Esther M., Cedar
 Brooks, Hollis K., Lake City
 Brown, Harry J., Paynesville
 Brown, Jesse F., Cedar
 Brown, Mabel Fannie, Hopkins
 Brown, Paul C., Cresco, Ia.
 Bruesehoff, Bertha M., Norwood
 Bruesehoff, Rose D., Norwood
 Burtnes, Edwin O., Caledonia R. 1
 Cadwell, Guy, Windom
 Calvert, Luella A., St. Paul
 Canton, Adolph G., Watson
 Carlberg, Lydia, Pennock
 Carlisle, Fisher A., Wyoming
 Carnes, Floyd Edward, Jackson
 Caswell, A. Mildred, Anoka
 Caulfield, Clark E., Byron
 Caulfield, Harold S., Byron
 Chamberlain, Glenn W., Minneapolis
 Chamberlain, Morris A., Hastings
 Chapman, Lloyd E., River Falls, Wis
 Chesley, Henry Geo., Beardsley
 Christianson, Richard, Dawson
 Clark, Gale L., Stillwater

- Clark, Merritt C., South Park
 Cleland, Lawrence E., Merriam Park, R 3
 Clinton, Irving J., Watkins
 Colberg, Benjamin J., Gladstone R. 2
 Cole, Bernice M., Minneapolis
 Cole, Lillian V., Minneapolis
 Collins, Benjamin F., Minneapolis
 Connor, Ralston I., Albert Lea
 Cox, Eleanor M., St. Paul
 Crandall, Austin, Medford
 Cronin, Charles P., Sutton, Nebr.
 Cross, David, Childs
 Currie, Margaret E., Vesta
 Cutler, N. Irwin, Glencoe R. 6
 Dahlberg, Sella A., St. Paul
 Dahley, Thomas, Hanley Falls
 Dale, Manley H., Renville
 Danielson, Howard H., Hendricks
 Davis, Arthur W., Clear Lake
 Davis, Frank L., Clear Lake
 Davis, Ormel H., Walnut Grove
 Delp, Lester E., Hancock, R. 3
 Dernell, Adolf, Chicago, Ill
 Dick, Frank C., Afton
 Dittbenner, Emily M., Minneapolis
 Dixon, Charlotte M., North St. Paul
 Dixon, Leon M., Mora
 Dobbedal, Justin L., Guthrie
 Doyle, Marquis, St. Cloud
 Drake, Victor E., Ruthton
 Durkee, Victor I., Winnebago
 Eastman, Abel F., Beardsley
 Edwards, Harry D., Wauchope, Sask. Can
 Edwards, Thomas H., Garvin
 Eggar, Mathew C., St. Paul
 Ekman, Ruth M., St. Paul
 Eliason, Martin A., Artichoke Lake
 Ellickson, Guy R., Madison
 Enright, William J., Rose Creek
 Evjen, Hilmar, Haug
 Falde, Alma Judith T., West St. Paul
 Falling, Albert, Dassel
 Farness, Orrin, Milan
 Feist, Arnold A., Gladstone R. 7
 Fenlason, Roy S., Minneapolis Sta. F.R. 1
 Findahl, Clara S., St. Paul
 Findahl, Norman T., St. Paul
 Fink, Anna M., Waconia
 Fink, Rosalie H. T. Waconia
 Finney, Carl, Georgetown
 Flaten, Alice L., Granite Falls
 Forster, Bess I., Minneapolis
 Friedman, David., St. Charles, Ill.
 Gardner, Heber Wm., Long Lake
 Garvey, Marian L., Minneapolis
 Garvey, Olive R., Minneapolis
 Gilbert, Henry C., White Bear Lake
 Gilbertson, Julian G., Utica, R. 1
 Gill, James N., Northfield
 Gillis, Ernest B., Walnut Grove
 Gossman, Paul E., Canton
 Grandstrand, Ruth M., Otisville
 Gregson, Kenneth S., Minneapolis
 Grevstad, Johanna E., St. Paul
 Griffiths, Benjamin, Ottawa
 Grothe, James, Hendrum
 Haaland, Odin., Hendrum
 Haatvedt, Edward B., Kensington
 Hagestande, Thea O., Madelia
 Haggard, Charles H., Worthington
 Hamilton, Carrie L., Osseo, R. 2
 Hamilton, Juna M., Osseo., R. 2
 Hansen, Otto C., Centuria, Wis
 Hanson, Arthur Melviu, Herman
 Hanson, Harry M., Fergus Falls
 Hanson, Wallace W., Hendricks
 Harris, William M., Dundas
 Harrison, Harold H., Red Wing
 Hauck, Percy, Madison
 Heales, Robert L., Canton
 Heebink, Laura D., Baldwin, Wis.
 Hendrickson, Mabel P., Mahtomedi
 Henry, James A., Dover
 Hermanson, Albert H., Utica
 Herum, Arthur S., River Falls
 Higbie, Floyd C., Eden Prairie
 Hilden, Marie G., Watson
 Hillman, Grover W., Minneapolis
 Hodge, Helen F., Minneapolis
 Holen, Julia A., Minneapolis
 Hollihan, Thomas J., Litchfield
 Holm, Mabel S., St. Paul
 Houske, Joseph A., Halstad
 Howe, Blanche, Robbinsdale
 Hughes, John S., Ellsworth, Wis
 Huke, Herbert, Nerstrand
 Hundebly, Irving, Beardsley
 Hunt, Helen L., St. Cloud
 Hursh, Mertie L., Henning
 Husebo, Elmer H., Madison
 Istrup, Inez M., Minneapolis
 Ingbert, Benhard, Hendrum
 Iverson, Edwin I., Watson
 Iverson, Henry A., Watson
 Jalley, Ida M., Minneapolis
 Jalley, Mary F., Minneapolis
 Jirik, Thomas A., Webster
 Johanson, Ruth C., St. Paul
 Johnson, Emma C., Hector
 Johnson, Victoria J., Hopkins, R. 3

- Jones, Laurence G., Minneapolis
 Jorgenson, Waldemar, Tyler
 Kalmoe, Hjalmar, Montevideo
 Kalstrom, Oscar J., Milan
 Kanton, Emma J., Milan
 Kempton, James H., San Antonio, Texas
 Kendal, Eva, St. Cloud
 Kendal, Guy B., Minneapolis
 Kingsley, Arthur R., Stranton, N. Dak
 Kinsey, Grace M., Ottawa
 Kratt, John A., Morrystown
 Krieg, Paul N., Johnson
 Krueger, Louis B., Stillwater
 LaCrosse, Charles F., Audubon
 Lancaster, Charles E., Wheaton
 Lang, Raymond W., St. Paul
 Lange, Otto H., Marietta
 Larson, Edna V., Nelson
 Larson, Elmer V., Nelson
 Larson, Elsie S., Pennock
 Larson, Grace O., Nelson
 Larson, Lars J., Hendrum
 Lathrop, Leslie T., Forest Lake
 Leaf, Bernard P., Parkers Prairie
 LeBorius, Frank, Minneapolis, Sta. F., R 3
 Lemke, Henry A., St. Francis
 Leonard, Bessie P., Rock Springs, N. Dak
 Lilly, Elma E., Houston
 Lindberg, Hattie H., Robbinsdale
 Loftness, Olga E., Gibbon
 Long, Lloyd D., Luverne
 Lord, Herbert S., Barnsum
 Lyngen, Edward, Wat on
 McCausland, Frank, Robbinsdale
 McNary, James W., Kellog
 McNeil, Earl A., Dayton
 Madson, Merlin M., St. Paul
 Mahlum, Howard J., Brainerd
 Maltrud, Olaf L., Granite Falls
 Mann, C. Howard, Excelsior, R. 1
 Marget, Arthur, Isanti
 Matthews, Ralph F., St. Paul
 Mattimore, Arthur R., St. Paul
 May, Elgie L., Wayzata, R. 1
 Mecklenburg, Edward J., Cedar
 Mecklenburg, Daniel O., Cedar
 Melin, Robert, Monticello
 Merdink, Ray, Stephen
 Messner, George W., Hancock
 Meyer, Carrie F., St. Paul
 Meyer, William, St. Paul
 Miles, Hattie A., St. Paul
 Miller, Ralph M., Robbinsdale
 Mills, Elmer C., Brookfield
 Moldenhauer, Ernst, Owatonna
 Moline, Carl C., Excelsior, Box 87
 Monson, Clifford E., Elbow Lake
 Monson, Minnie, Belview
 Morken, Oscar E., Bellingham
 Morrill, Lee W., Granite Falls
 Munger, Rai P., Ellsworth, Wis.
 Munsell, Ray D., Morton
 Munson, Helma A., St. Paul
 Nelson, Dan M., St. Paul
 Nelson, Elmer V., Nelson
 Nelson, Walter O., Dwight, N. Dak.
 Newhall, Webb A., Clinton Falls
 Newquist, Linnea B., Minneapolis
 Nodell, Mabel V., Minneapolis, Sta. F. R. 4
 Nolan, Frederick E., St. Paul
 Nordtomme, Anna, Watson
 Novak, Frank, Effington, S. Dak.
 O'Grady, May L., St. Paul
 O'Reilly, Robert E., St. Paul
 Olson, Agnes M., Watertown
 Olson, Fred W., Maple Plain
 Orton, Irvin J., Elk River
 Osbloom, Marie, St. Paul
 Ostenso, Helga C., Montevideo
 Ostrem, Oscar U., Lanesboro
 Ouren, John B., Hanska
 Oyen, Emma, Watson
 Patterson, Hazelle E., St. Charles, R. 1
 Pearson, Carl A., Louisburg
 Pederson, Wellington E., Hopkins
 Penniman, William C., St. Paul
 Peterson Amy A., Otisville
 Peterson, Berier, Haug
 Pfeilsticker, Linn, Wabasha
 Philley, Clarence G., Mazepa
 Ponthan, Harold A., St. Paul
 Praught, William V., Rogers
 Prince, Edward B., Minneapolis
 Quist, Axel L., Cannon Falls, R. 7
 Rasmusson, Albert, Pomonkey, Md.
 Reeve, Pomeroy P., Tenstrike
 Richardson, Forrest E., New Brighton
 Richardson, Harold I., New Brighton
 Ritchell, Willis, St. Anthony Sta., Minne-
 apolis
 Robertson, George L., Merriam Park, R 8
 Robertson, Harry A., Merriam Park, R. 8
 Rogers, Clarence E., Ellsworth, Wis.
 Rodgers, Vincent B., Nashwauk
 Rorrison, Lawrence P., Minneapolis
 Rosander, Thomasine, Minneapolis
 Ruedlinger, Louise S., Minneapolis
 Samuelson, Ruth V., Lafayette
 Sandager, Kristian, Tyler
 Sandager, Nels S., Tyler

- Sanvik, Andrew T., Starbuck
 Satchell, Ethel C., Minneapolis
 Sawhill, Donald, Nimrod, Mont.
 Schanche, Clara E., Star Prairie, Wis.
 R. 1
 Schillinger, Emma M. Sta. F., R. 2, Minneapolis
 Schmidt, Herbert, West Concord
 Schuette, Daniel C., Waseca, R. 3
 Searles, Dewitt M., New Brighton
 Searles, Monna B., New Brighton
 Seekins, Clinton B., St. Paul
 Selthun, Ennis A., Rolette, N. D.
 Sewal Dorothy D., St. Anthony Park
 Shelp, Mabel F., Litchfield
 Siemer, Edward C., Moose Lake
 Sillerud, Martin, Greenbush
 Silsbee, Lella, Chatfield
 Simon, Peter, Altura
 Sindt, Albert H., Rock Rapids, Iowa
 Skow, Morris, Springfield
 Skrukud, Gust B., Fountain
 Sletta, Ida O., Madelia
 Smith, Bertram A., Osseo
 Smith, Clara May, Ortonville
 Smith, David E., Ortonville, R. 3
 Smith, Frank, St. Cloud
 Smith, Ida F., Robbinsdale, R. 3
 Smith, John F., San Antonio, Texas
 Smith, Randolph H., Minneapolis
 Snell, Ruth E., Merriam Park
 Solberg, Elmer C., Spring Grove
 Sorlien, Oscar C., Bode, Iowa
 Spencer, Hamilton, H., Henderson
 Spencer, Henry J., Minneapolis
 Steffens, Bonnie R., Racine
 Stensrud, Edward, Watson
 Stensrud, Louise L., Watson
 Stensrud, Martin, Watson
 Stoddard, Mildred, St. Paul
 Stoltenberg, Frank, Elk River
 Sundberg, Daniel, Foreston
 Swedberg, Joseph L., White Bear
 Sybilrud, Ella O., New Richland
 Sybilrud, Nora M., New Richland
 Tangen, Olena A., Hazel Run
 Thompson, Charles L., Wayzata
 Thompson, Thomas B., Hendrum
 Thorwick, Arthur J., Thief River Falls, R. 2
 Tolaas, Gudrun Marian, St. Paul
 Torkelson, Carl A., St. James
 Tulin, Nels O., Hardwick
 Turnham, Alice, Long Lake
 Turnquist, F. Arthur, Cleron, N. Y.
 Ulrich, John, Wabasha
 Underdahl, John A., Nerstrand, R. 2
 Veitch, Leora M., Rush City
 Villars, Wendel D., Minneapolis
 Voak, Jay P., Worthington
 Waterman, John F., Minneapolis
 Waters, Henry B., Forest Lake
 Waters, Luella E., Forest Lake
 Weldy, Bertha M., Marietta
 White, Leslie A., Minneapolis
 Whiting, Laura M., Sta. F., R. 2 Minneapolis
 Wilkinson, Ora J., Minneapolis
 Willford John C., Garvin
 Williams, Floyd J., Sta. F. R. 4, Minneapolis
 Wilson, Bessie M., Ihlen
 Wilson, Selmer C., Clarkfield
 Winter, Harry A., Lowell, Mass.
 Winters, Laurence M., Mazeppa
 Wood, Edgar R., Warren
 Woodbury, Dora L., Minneapolis
 Woodfill, Charles H., Litchfield, R. 1
 Wright, Dean A., Austin
 Youngren, Ruth A., Minneapolis
 Zimmerman, Robert, Browton
 Zwick, Harry R., Lake City.
 * Died Oct. 29th, 1908

TEACHER'S SUMMER SCHOOL—90

- Alexander, Wm. A., Morristown
 Aylesworth, Vivian, Litchfield, R. 8,
 Baldwin, Mary E., Pipestone
 Bebermeyer, H. J., Redwood Falls
 Bigelow, Mary, 4323 Dupont Av. S.,
 Minneapolis
 Bigelow, Mrs. Mary L., 4323 Dupont Av.
 S., Minneapolis
 Bodin, George, Young America, Minn.
 Boer, Ellen M., Coleraine
 Booth, Hattie F., Grand Rapids
 Borchardt, Otilie, Madison
 Brodt, Lillie, 819 Reane St., St. Paul
 Burgess, Edith, Allen, Neb.
 Bush, Ethel, 1119 6th St., S. E., Minne-
 apolis
 Butler, P. J., Chaska
 Carlson, Oscar, Preston
 Carter, Mrs. Sine, Drayton, N. D.
 Cedergren, Edwin A., Lindstrom
 Crowe, Edward J., Dresbach
 Cummings, Emogene, White Bear Lake

Cunningham, Eugenia, Pipestone	Le Gro, Emma, Bertha
Cunningham, Mabel, Pipestone	Le Gro, Fannie, Bertha
Edwards, Lucile, Little Falls	Lewis, J. H., Fairbault
Elmer, Margaret, Chatfield	Lipp, Mrs. C. C., St. Anthony Park
Erickson, Ellen, Alexandria	Lommen, Georgine, Caledonia
Erickson, T. A., Aleandria	Lord, Eva, Ghent
Falney, Nellie, 311 13th St., St. Paul	McAulty, H. T., Red Lake Falls
Farrell, Margaret, Franklin	McCormick, Mrs. Harrie, Grand Rapids,
Faunce, C. S., 1100 15th Av. S. E., Minneapolis	Martin, Florence, Rochester
Finnegan, Wm., Thief River Falls	Mithun, L. M., Warren
Freeman, C. J., Herman	Nelson, Arthur, Ivanhoe
Granger, E. M., Breckendrige	Neville, Clara, Eyota
Hall, Grace, Morris	Olson, Hermina, Lonsdale
Hargrave, A. W., Cokato	Peake, Laura, Eagle Bend
Hargrave, Mrs. A. W., Cokato	Pickard, A. E., Hinckley
Harrington, Frank, Hutchinson	Plough, Betty, Rice
Hegel, Newton H., Cambridge	Pulver, Anna D., Canton
Higbie, E. C., Canby	Richard, Belle, St. Cloud
Holzinger, J. M., Winona	Roberts, R. S., Morris
Hoover, Harriet, Duluth	Robinson, Katherine, Rochester
Hov, I. S., Bagley, Minn.	Roddis, Bertha F., Long Prairie
Howell, Mrs. D. B., St. Anthony Park	Schlutz, Dorothy, M., New Richland
Howell, Sarah, Dawson, Wis.	Sherwood, Grace, Austin
James, Mrs. Mary B., Minneapolis	Siemer, Minnie, Moose Lake
Johnson, Ella A., Hancock	Smith, Sarah A., New Duluth
Kent, A. R., Lanesboro	Swanson, E. N., Stillwater, R. 7
Kerkamp, Clara, Newport	Swenson, Alma, Maynard
King, Katherine A., Duluth	Thorson, M. A., Winthrop
Kittleson, Arthur, Montevideo	Tidd, John N., Meadowlands
Knebel, Celia, Pequot	Toevs, Frank J., Mountain Lake
Kranz, Daisy M., 3821 Stevens Av., Minneapolis	Trask, Mrs. A. M., Herman
Kranz, Kate M., 3821 Stevens Av., Minneapolis	Waldron, Ruth, Rochester
Krayenbuhl, Emilie, Excelsior	Walkup, Jessie E., Pipestone
Krueger, Mary E., Bellingham	Webb, Florence B., Dawson
	White, Hope, Winnebago
	Wilcox, Myrtle E., Hancock
	Wilson, Mrs. A. D., St. Anthony Park

SUMMER FORESTRY SCHOOL—18

Baker, Norman M., Davenport, Ia.	Foss, Elizabeth H., Minneapolis.
Beebe, W. L., Jr., St. Cloud.	Garland, N. R., Minneapolis.
Berry, James B., St. Paul.	Hamilton, Carl L., Minneapolis.
Blades, W. F., Dubuque, Ia.	Mears, Louise, Peru, Neb.
Bohn, George J., St. Anthony Park.	Merrill, F. B., Stillwater.
Canavarro, George DeS., Honolulu, Ha.	Schwedes, Carl, Wabasha.
Cochrane, H. H., Minneapolis.	Wanberg, Richard, Benson.
Collin, William H., Northwood, Ia.	Wilson, Leila, Gridley, Ill.
Dummer, R. C., New Ulm.	Witbeck, Fanny, Colorado Springs, Colo.

FARMER'S SHORT COURSE—169

Aamodt, Carl, St. Paul.	Amundson, Ole, Hanska.
Abrahamson, H. B., Dassel.	Anderson, Anton, West Concord.
Akins, Arthur T., Mayer.	Anderson, Awley, Hallock.

- Anderson, Carl, Oberon, N. D.
 Anderson, D. O., Meadowlands.
 Anderson, Fred C., Glyndon.
 Anderson, Oscar C., Hendricks.
 Asquith, Ralph, Windom.
 Aubrecht, Joseph, Beroun.
 Axness, Melvin, Pelican, Rapids.
 Bang, Andrew, Madison.
 Benjamin, Camille, Faribault.
 Bennett, Norval, Anoka Route No. 1.
 Bieder, J. T., Belle Plaine.
 Bjorgum, Martin, Jackson.
 Blanksma, D. W., Dodge Center.
 Bolland, Dick Henning R. 2.
 Boraas, Albert, Hallock.
 Bosin, Bruno, Mankato.
 Bradley, Walter, Anoka.
 Brandon, J. O., Kensington.
 Brant, August, Woodstock.
 Brazell, Curinne, Minneapolis.
 Brazell, C. A., Minneapolis.
 Bredemeier, William, Barnesville.
 Broms, Henning, Excelsior.
 Burke, J. W., Deephaven.
 Burtness, Peter, Cook.
 Burtman, Roy, Pipestone.
 Cameron, Douglas, Hallock.
 Chalupnik, J. J., Beroun.
 Champion, Mrs. Dagmar, Braham.
 Chapman, Carl S., Westbrook.
 Cheney, Eugene, Northfield.
 Cheney, Jesse L., Northfield.
 Conrad, John, Luverne.
 Craven, John, Faribault.
 Crawford, George L., St. Paul.
 Dahleen, Arthur A., Maynard.
 Dime, O. E., Grove City.
 Dupuis, Ralph, New Richmond, Wis.
 Ekegron, Oscar, Otisville.
 Erickson, Arthur, Cambridge.
 Erickson, C. R., Hagar, Wis.
 Forfang, Egill, Hallock.
 Franz, Jacob, M., Mountain Lake.
 Flynn, D. H., Beardsley.
 Frederick, Paul, Ottertail.
 Frederickson, C. A., Hanska.
 Frederickson, Clarence, Hanska.
 Gackstetter, Harry W., Iner Grove.
 Gasink, William, St. James.
 Gran, Walter, Spring Grove.
 Grant, A. D., Redvers, Sask. Can.
 Gulbrandson, R. M., Albert Lea.
 Haatvedt, Ole M., Kensington, R. 2.
 Halvorson, Syverind, Hancock.
 Handke, J. B., Waltham.
 Hansen, Albert W., Baldwin, Wis.
 Hanson, Jens L., Raymond, R. 5.
 Hanson, Walter, Hallock.
 Hector, Emery, Worthington.
 Hegseth, Nels, Fergus Falls, R. 6.
 Hertel, A. G., Braham.
 Hilden, Herman, Watson.
 Hilgers, John P., Barnesville.
 Hohenstein, Albert, Loretto.
 Holen, Melvin, Parkers Prairie.
 Howard, John, Hammond.
 Hunt, F. K., St. Cloud.
 Iverson, Eddie, Watson.
 Jensen, Alfred, Nelson.
 Johnson, Carl, Pelican Rapids.
 Johnson, John C., Langford, S. D.
 Johnson, C. S., Albert Lea.
 Jorstad, Melvin, Kenyon.
 Kaeder, Leo, North St. Paul.
 Kalmoe, George, Montevideo, R. 6.
 Kelly, Michael Jr., Garfield.
 Kepler, R. J. Jr., Nisswa.
 Kepler, Mrs. R. J., Nisswa.
 Knutson, Albert, Pelican Rapids.
 Knutson, Ed., Adams.
 Koehnen, Lawrence, Cologne.
 Kunkel, Reinholdt, Rapidan.
 Kurtz, Louis, Milwaukee, Wis.
 Larson, Harry W., Murdock.
 Larson, Swend, Rothsay.
 Lawrence, O. A., Minneapolis.
 Leach, William, Bird Island.
 Lees, John D., Benton.
 Lermon, Guy Starbuck.
 Lien, Allie, Garvin.
 Lindberg, Nelbert, Deer Park, Wis.
 Lynn, Frank, Grand Rapids.
 McCall, Thomas, Mankato.
 Malcolm, Wm Jr., Bigelow.
 Marien, Frank, Highwood.
 Martinson, Lawes, Correll.
 Mergen, Henry E., Hutchinson.
 Mickelson, Martin, Groningen.
 Miller, Freeman, Lakeville.
 Miller, R. F., Olivia.
 Moen, Anton, Esmond.
 Monson, Sture, Dassel.
 Moran, Catherine, Farmington.
 Moran, William, Farmington.
 More, Clarence, Elmore.
 More, George H., Elmore.
 Morrison, F. G., Otisville.
 Morton, C. H., St. Louis Park.
 Munson, Edward, Pelican Rapids.
 Munson, Martin, Pelican Rapids.

Murphy, William, Lakefield.
 Nelson, Carl J., Nelson.
 Nelson, Edwin, Garvin.
 Nelson, Hans, St. Anthony Falls, Sta.,
 Minneapolis.
 Nelson, Oscar E., Lakeland.
 Nissen, Carl, Lake Wilson.
 Nystrom, Axel, Foreston.
 Oberg, Ole, Hanley Falls.
 O'Dwyer, Robert M., St. Cloud.
 Ogren, John Langford, S. D.
 Orban, William, Silver Lake.
 Ostenso, Olaf, Motevideo.
 Peterson, Albert, Sleepy Eye.
 Peterson, Arthur, Cambridge.
 Peterson, Charles Effle.
 Peterson, Otto, Lake Benton.
 Peterson, Peter, Isanti.
 Pfeil, George, Worthington.
 Pridal, Joseph, Taunton
 Quevli, Antony, Lakefield.
 Roach, C. E., Minneapolis.
 Roppnen, Matt, Embarrass.
 Ryden, Carl J., Kennedy.
 Saue, Hans O., Montevideo.
 Saue, Peter P. Jr., Montevideo.
 Schneider, John Walter, White Bear
 Lake.
 Schooley, Clayton, Minneapolis.
 Severtson, Severt, Hills.
 Sharkey, William J., Belle Plaine.
 Shearer, Clarence, Osseo.
 Skarphol, John, Madelia.
 Skinner, O. M., Kenyon.
 Stennes, Alfred, Halsted.
 Svendsen, Hans C., Tyler.
 Swanson, Adolph, Litchfield.
 Swenson, Victor T., Otisville.
 Threde, Harry, Lake Park, Ia.
 Tisdell, Thomas, Olivia.
 Toelle, Andrew, Browne Valley.
 Untiedt, Albert, Lake Park.
 Vollum, Martin, Hayward.
 Voss, A. R., St. James.
 Webb, Charles P., Medford.
 Webster, Paul, Minneapolis.
 Westermo, Alfred, Kenyon.
 Westlie, Carl, Beaver Creek.
 Whitcomb, Noyes H., Monticello.
 Wicklund, Lawrence, Atwater.
 Wigdahl, Gabriel, Rothsay.
 Williams, Charles G., Minneapolis.
 Wilson, Frank, Gridley.
 Wright, Dean A., Austin.
 Zimmerman, Robert, Brownton,

DAIRY SCHOOL STUDENTS—107

Abbe, Herman F., Meriden.
 Anderson, Par O., Garvin.
 Anderson, Peter Lewis, St. Hilairo
 Bakken, John H., Scarrville, Ia.
 Bartelt, Frank H., Royalton, R. 4.
 Beberstein, Hugo, West Concord.
 Belknap, George A., Isanti.
 Benson, Charlie, Clear Lake.
 Berthney, Edward, La Crosse, Wis
 Borgmann, V. W., Mayer.
 Borgmann, Victor, Mayer.
 Brestad, Lars G., Appleton.
 Brookins, Harry L., Cokato, R. 3.
 Bullis, V. L., Washburn, Wis.
 Call, Anton E., St. James, R. 4.
 Camp, Alfred, Ellendale.
 Carswell, Robert A., Clear Lake, Wis.
 Cassidy, Charles M., Springfield.
 Chalupnik, James J., Beroun.
 Chancellor, Floyd, Delano.
 Clarke, Frederick B., Fergus Falls
 Dahlgren, Theodore, Freedham.
 Dahlvig, Gustav A., Atwater.
 Denison, Earl, Hutchinson.
 Derosier, F., Terrebonne.
 Donney, W. H., Glencoe, R. 3.
 Elfstrom, Henry W., Lindstrom.
 Elseth, H., West Valley.
 Findell, Eric A., Cambridge, R. 5.
 Fish, Lee, St. Peter.
 Flom, Anthony, Flom.
 Gonen, Frank, Cologne.
 Greethurst, Thomas M., Lewiston.
 Grundeen, B. F., Murdock.
 Gunderson, Marcus J., Royalton R. 4.
 Hanson, E., Edgerton, Wis.
 Hanson, Hans L., Albert Lea.
 Harth, Frank, Minneapolis.
 Hedlund, N. J., Annandale, R. 2.
 Herbison, R. H., Fargo, N. D.
 Hogoot, Clarence, Berlin.
 Hudovernik, Frank, Rice, R. 2.
 Huro, John W., Annandale.
 Ipsen, August, New Holstein, Wis.
 Jacobs, L. M., Cold Springs.
 Johnson, Carl A., Beresford, S. D.
 Johnson, Eval L., Clarissa.
 Jones, Allen W., Garvin.
 Kane, James, Minneapolis.
 Knutson, John A., Rapidan

- Kollmann, Peter, Buckman.
 Kreinbring, Louis E., Stockton.
 Krogstad, Oscar J., Eau Claire, Wis.
 Kuist, Gordon F., Odessa.
 Laabs, W. C., New Auburne.
 La Chance, Peter, Huot.
 Lhotka, Victor, Silver Lake.
 Lindberg, Christ, Beltrami.
 Lougren, Oscar, Richardson, Wis.
 Ludke, Rinhold, Sebeka.
 Lund, Otto, J., Lake Mills, Ia.
 Matti, Louis, Mantorville.
 Meyer, John K., Webster.
 Miller, Edward E., Kasson.
 Miller, J. C., Augusta, Wis.
 Nelson, Henry K., Lake Mills, Ia.
 Nereson, Albert, Gary.
 Nielson, Martin A., Shafer.
 Norskog, Theodore, Portland, N. D.
 Nyflot., Ole O., Jr., Newfolden.
 Paulson, Henry Clarissa.
 Peterson, Erick, Long Prairie.
 Peterson, Henry W., Clarke Grove.
 Pier, Roy D., New York Mills.
 Place, Leonard, Ellsworth, Wis.
 Poppler, John Jr., Chaska.
 Precht, Fred, St. Claire.
 Regnstrand, W., McIntosh.
 Robinson, Percy, Houston.
 Roed, Jorgen, Fertile.
 Rohe, Fred M., Osseo.
 Rosemeist W., Rosco.
 Rouse, Fred, Lewiston.
 Rude, Alfred, Gary.
 Schroeder, Henry C., Lester Prairie.
 Schuster, Louis, Owatonna.
 Scott, John E., Dover.
 Seibel, John A., Bowbells, N. D.
 Shoquist, George W., Withrow.
 Skoglund, Martin, Eagle Bend.
 Solheid, John A., Belle Plaine.
 Sederberg, E. M., Cannon Falls.
 Sorensen, Einer, Kandiyohi.
 Spjut, Herman, Strathcona.
 Stadheim, John O., Austin.
 Stomsvik, Ole, Badger.
 Swinghamer, A. W., Albany.
 Schwinghammer, John, Springfield.
 Taftner, John L., Gary.
 Thorsell, Berger, Argyle.
 Thoen, Christian C., Wannaska.
 Wallin, Walter E., Atwater.
 Weist, Fred. L., Dakota.
 Winnberg, Ola A., Leon.
 Wilson, Henry, Spring Grove.
 Witte, Henry W., St. Cloud.
 Woodfill, Elmer J., Owatonna.

The College of Law

FOR THE DEGREE OF DOCTOR OF CIVIL LAW 5

- Bates, William Earl, LL.M., Minneapolis
 Denegre, James D., LL.M., St. Paul
 Willis, Hugh E., LL.M., Minneapolis
 Hermann, Arthur L., LL.M., Minneapolis
 Mercer, Hugh Victor, LL.M., Minneapolis

FOR THE DEGREE OF MASTER OF LAW 29

- Allison, Lawrence R., LL.B., Minneapolis
 Brill, Harry H., Minneapolis
 Brown, Marcus Edward, LL.B. St. Paul
 Buell, Mrs. Irene C., LL.B., St. Paul
 Crawhall, Lester Milliam, LL.B.
 Minneapolis.
 DeVaney, John P., LL.B. Minneapolis.
 Davies, Otto N., LL.B., Minneapolis.
 Dolan, John A., Minneapolis
 Doran, James E., LL.B., St. Paul.
 Eenkema, Abellius, LL.B. Minneapolis
 Evans, Eliza P., LL.B., Minneapolis.
 Foster, Willie Kerr, LL.B. Minneapolis
 Groat, Benjamin Feland, LL.B.,
 Minneapolis.
 Hewitt, Harry R., LL.B., Minneapolis.
 Hough, Stanley B., LL.B., Minneapolis.
 Kennedy, John C., LL.B., Minneapolis
 Luxon, Harry A., LL.B., Minneapolis.
 Machatanz, Karl A., LL.B., St. Anthony
 Park
 Roberts, Horace W., LL.B. Minneapolis
 Sigerfoos, Edward, LL.B., Minneapolis
 Swinland, John, LL.B., St. Paul
 Swinland, Ingman, LL.B. St. Paul.
 Schwartz, Louis L., LL.B., Minneapolis.
 Simmons, William R., LL.B.
 Minneapolis.
 Smiley, William C., LL.B. St. Paul.
 Smiley, Henry LaFevre, LL.B., St. Paul.
 Swee, John A., LL.B., Minneapolis.
 Teisberg, Alfred., LL.B., St. Paul.
 Vernon, A. H., LL.B., St. Paul.

SENIOR DAY—55

- Anderson, Arthur Harragut Minneapolis
 Bartlett, James. Minneapolis.
 Bingham, Charles B., Sleepy Eye.
 Boyle, Edward Lewis, Duluth.
 Bremer, Paul Grover, St. Paul.
 Brin, John Leonard, Stewartville.
 Brown, Montreville J. (A. B. U. of M.)
 Minneapolis.
 Donohue, Keron Daniels, Minneapolis.
 Duff, Hartman Blaine., Superior, Wis.
 Duffy, Thomas E. J., Minneapolis.
 Erickson, Harold, Hancock.
 Flachsenhar, Walter Roscoe, Mankato.
 Forbes, Vernon Alex., St. Croix Falls, Wis.
 Forbes, Mason Merrill (A. B. U. of M.)
 Minneapolis.
 Logan, Carlton, Pelican Rapids.
 McCoy, Charles Vaughan, Duluth.
 McMillan, Malcolm Dana, St. Paul.
 McNally, Walter Harry, Cedar Falls, Ia.
 Muloy, Charles Edward Hill, St. Cloud.
 Muir, Robert W. (3 yrs. U. of M.) Hunter,
 N. Dakota.
 Murphy, Eugene Horton, Minneapolis.
 O'Brien, Giles Patrick, Brainerd.
 Peterson, Adolph C. (A. B. U. of M.)
 Minneapolis.
 Prigge, Lambert F. Ada.
 Rasmussen, William J., (1 yr. U. of Wis.)
 Phillips, Wis.
 Reitz, Alfred E., Chaska.
 Regan, John H., Chippewa Falls, Wis.
 Wooley, Mark. J. Howard Lake.
- Garberg, Peder, Mariat
 Hanson, Thorwald, (A. B. U. of M.)
 Benson.
 Houck, Norman Albert (1 yr. U. of M.)
 Minneapolis.
 Huber, Earl Eldon, Ellsworth, Wis.
 Hudson, Irving M. Benson.
 Kelehan, James H. L., Granite Falls.
 Kohn, Louis, Minneapolis.
 La Palme, Camille, Minneapolis.
 Lauderdale, Henry Williams (2 yrs. U.
 of M.) Minneapolis.
 Leak, John Roy, Brainerd.
 Little, George Rudd (A. B. U. of M)
 Kasson.
 Linn, C. August. Fegrus Falls.
 Senn, Fred William, Kasson.
 Spicer, Fred Hopper, Minneapolis.
 Spooner, Paul Lord (A. B. U. of M.)
 Morris.
 Stearns, Harry I. St. Paul.
 Stern, Sam. Fargo, N. Dak.
 Strand, Oscar Bernard, Zumbrota.
 Taylor, Wilfred Brunson, Litchfield.
 Walker, Arthur J. Minneapolis.
 Walker, Charles John, Spencer Brook.
 Watts, William A. Crookston.
 Webster, Clarence Bernhardt, St. Peter
 Wendtlandt, Edward W., Manchester, Wis.
 Wheeler, George Charles, Kekoskee, Wis.
 Williamson, Roy F., Oronoco
 Wilmsen, Harry Robert, Hecla, S. Dak.

MIDDLE DAY—89

- Berge, Henry S., (2 years Carleton),
 Minneapolis.
 Berry, Howard Morgan, Mapleton.
 Blanding, Howard D., St. Croix Falls, Wis.
 Bonner, John Farrington, Winona.
 Brazell, Edward Joseph, Minneapolis.
 Bringleston, August E., Dassel.
 Brown, Harry Lee, Alexandria, S. Dak.
 Burdick, Ralph E., International Falls.
 Campbell, Heil Stillman, Mantorville.
 Canterbury, James Ralph, Minneapolis.
 Christofferson, Lewis Christian,
 Pewaukee, Wis.
 Carleton, H. G., Minneapolis.
 Chase, John Armstrong, Farmington.
 Colgrove, Chester Walker, Minneapolis.
 Comer, Cloyde E., Round Lake.
 Dahl, Theodore R. (B. S. St. Olaf) Minne-
 apolis.
- Dahl, Sigvert S., Virginia.
 Doud, Fred L. (1 yr. Carleton), Chatfield.
 Elwell, Edwin S., Minneapolis.
 Eickhorn, Edmund P. Minneapolis.
 Finkelburg, Karl Augustus, Winona.
 Fligelman, Sol, Minneapolis.
 Flynn, Timothy George, Minneapolis
 Gardner, John William, Jr., Ortonville.
 Green, Raymond J., Austenburg, Oh.
 Hanrahan, Morgan John (A. B. Creighton),
 Clare, Ia.
 Ganssle, George E., Minneapolis.
 George, James McBride., Renville.
 Glaser, John, Appleton, Wis.
 Granbeck, Joseph., St. Paul.
 Grant, Malcolm E., ault Farib.
 Haas, Charles Theodore (A.B. St. Thomas),
 St. Paul
 Haller, Adolph Ignatius, Red Wing.

- Hamilton, John A. J. (2 yrs. U. of M.)
Minneapolis.
- Hallet, Otis Albert, Minneapolis.
- Harris, George D., (1 yr. Ames) Cedar
Falls, Ia.
- Held, Julius W., St. Louis Park.
- Helgerson, Lynn S., Plainview.
- Holen, Oscar M. (1 yr. U. of M.) Argyle.
- Howes, William A., Tomah, Wis.
- Hughes, Raymond Mark., Aitkin.
- Irwin, Harry A., Belle Plain.
- Jeppeson, Frederick J., Hopkins.
- Kelehan, William, Granite Falls.
- Kendall, John Catlin, Minneapolis.
- Kjomme, Hans O. (A. B. Luther College)
Decorah, Ia.
- Lampert, Jacob, Minneapolis.
- Lindberg, Carl A., Appleton.
- Larkin, Jay A., (A. B. Redfield) Alden.
- McCanna, Simon M., Minneapolis.
- McGovern, John, Arlington.
- McGrath, Thomas J., St. Paul.
- McMahon, John Francis, Huron, S. Dak.
- Martin, John F., Minneapolis.
- Murray, Frank James, London.
- Miller, Harvey J., Buffalo, N. Dak.
- Miller, Herschel Frederick, Minneapolis.
- Mohl, Everett, Adrian.
- Molstad, Alfred G. (1 yr. U. of M.)
Clarkfield.
- Moore, Earl M., Minneapolis.
- Morgan, Hiram., Lake City.
- Nelson, Clarence O., Granite Falls.
- Nichols, Chester., Appleton.
- Ostensoe, Oliver Julian, Canby.
- Owen, D. Cavour, Osseo.
- Pettijohn, Lyle. (1 yr. U. of M.)
St. Paul.
- Phinney, Brinton Harry, Herman.
- Priebe, John Gustav., Minneapolis.
- Quayle, Harley Mansfield, Rush City.
- Radermacher, Walter Henry, Minneapolis.
- Randall, Frank E., (2 yrs. Hamline,)
Hamline.
- Schlehr, Arthur E., Frazee.
- Sevaried, Ephraim (1 yr. Luther),
Kenyon.
- Shaw, Wilbur D., (A. B. U. of M.)
Minneapolis.
- Sachs, Gustav (A. B. U. of M.),
Minneapolis.
- Sischo, Kenneth, St. Paul.
- Skahen, Vance E. (2 yrs. L. Stanford).
Minneapolis.
- Smith, James Russell (A. B. U. of M.)
Minneapolis.
- Smith, Julian C., Aberdeen, S. Dak.
- Stewart, Earle William Russell,
Princeton, Wis.
- Stone, Alfred Finney, (2 yrs. Carleton)
Morris.
- Stockland, George Alfred, Minneapolis.
- Sundberg, John Edward Garfield,
Kennedy.
- Thoreen, Reuben, Stillwater.
- Torrison, Anker Osul (A. B. Luther),
Manitowac, Wis.
- Warren, Earl William, St. Paul.
- Weiland, Walter F. (1 yr. U. of M.),
Brainerd.
- Wigen, Joris, Sargent.
- Young, Gerald, Minneapolis.

JUNIOR DAY—203

- Ackley, Edward, Chippewa Falls, Wis.
- Ainsworth, C. L., Minneapolis.
- Adams, Innis, Minneapolis.
- Anderson, Carl Anton, (A. B. U. of M. '09),
Hutchinson.
- Anderson, Albert A., Hendricks.
- Barnes, Walter, Minneapolis.
- Begin, Zephyr Louis, Robbinsdale.
- Bell, Edward Earl, Minneapolis.
- Berry, Frank Chas., Minneapolis.
- Bintliff, Claude Addison, Minneapolis.
- Bland, John Lewis, Anoka.
- Blanchett, Frederic J., (A. B. U. of M., '09)
Elk River.
- Block, Arthur B., St. Paul.
- Bollum, Alfred E., Red Wing.
- Bradley, F. G., Paynesville.
- Branyan, Leon Peary, Minneapolis.
- Bromley, George Francis, (1 yr. U. of So.
Dak.), Redfield.
- Brown, Roy Stuart, Minneapolis.
- Bulen, Leon Lester, (2 yrs. U. of M.) Minne-
apolis.
- Bullard, John R., Waseca.
- Burgess, Joseph Henry, Cresco.
- Cady, Harry Charles, Minneapolis.
- Campbell, John, Wabasha.
- Card, Elbert R., Minneapolis.
- Carlson, Charles E., (A. B. U. of M., '09),
Albert Lea.
- Carleton, George Alfred, (2 yrs. U. of M.),
Minneapolis.

- Chase, Sidney March, St. Paul.
 Coan, John Robert, Minneapolis.
 Cole, Loyal N., Minneapolis.
 Compton, Alvin R., Webster.
 Conley, Arthur, Bristol, S. D.
 Cooper, William James, Minneapolis.
 Crocker, Richard, Minneapolis.
 Cutter, Ross, Anoka.
 Cutter, Edward B., Anoka.
 Cutter, Leeds Hancock, Anoka.
 DeReu, Charles Louis, Marshall.
 Daggett, Elliott, Minneapolis.
 Danielson, Peter, Minneapolis.
 Davenport, Darlington, (B. Ph. Yale),
 Minneapolis.
 Davs, William W., Minneapolis.
 Deaver, Harry Gilbert, Minneapolis.
 Dennis, Lawrence E., Winslow, Ill.
 Digen, Gilbert M., (1 yr. U. of M.), Minne-
 apolis.
 Door, Lester Arthur, Mankato.
 Downham, Howard, Minneapolis.
 Durham, Frank H., Minneapolis.
 Edwards, DeWitt Clinton, Casselton, N. D.
 Ellis, ³Lynn, Kasson.
 Elwell, Alden Worcester, Minneapolis.
 Elwell, Joseph T., Jr., Minneapolis.
 Erdall, Leonard, Minneapolis.
 Falk, Harold Newton, Minneapolis.
 Fish, Franklin S., (1 yr. U. of Wis.), Minne-
 apolis.
 Flor, Albert J. D., New Ulm.
 Flynn, William Edward, Caledonia.
 Fogarty, Edward Leo, Buffalo.
 Foley, Daniel Francis, Barry.
 Frank, Leonard, St. Paul.
 Frisbie, Earl J., LeRoy.
 Gibbs, Myron F., Tracy.
 Gilbert, George McCall, (1 yr. Hamline),
 Duluth.
 Ginsberg, Abe, Minneapolis.
 Gonska, Walter, Duluth.
 Goodman, Frank Peter, Sheldon, N. D.
 Goodrich, Robert Earl, St. Paul.
 Greeley, Burnham H., Mapleton.
 Green, Harlow B., Minneapolis.
 Grimes, Gordon, (A. B. U. of M. '09), Minne-
 apolis.
 Groettum, Richard Elbert, Minneapolis.
 Haglin, Edward C., Minneapolis.
 Halliday, Herbert Lewis, St. Cloud.
 Halvorsen, Gustav (Augsburg Seminary),
 Wanonningo.
 Handy, Harold B., Willmar.
 Hayes, Charles Leo, St. Paul.
 I Harrison, Clyde J., Minneapolis.
 Hedman, Victor A., St. Paul.
 Heidel, Albert Weiser, Minneapolis.
 Hendricks, Edwin Albert, Minneapolis.
 Herman, Morris, Minneapolis.
 Hessian, Maurice R., LeSeur.
 Hoag, Richard Lawrence, Minneapolis.
 Hobart, Walter B., (C. E. U. of M. '07),
 Minneapolis.
 Hobbs, Edwin Arnold, Canton, Ill.
 Holen, Gustav Samuels (2 yrs. U. of M.),
 Minneapolis.
 Hull, Harold J., (A. B. U. of M. '09),
 Wahpeton, N. D.
 Hunt, Ray Nelson, Redfield, S. D.
 Huntington, William H., Paynesville.
 Jenness, Mauric V. (A. B. U. of M. '09),
 Willmar.
 Johnson, Waldemar R., Menomonie, Wis.
 Johnson, Lindahl, Hamilton, Mont.
 Johnson, Frederick Edward, Bird Island.
 Johnson, Buford Paul, Minneapolis.
 Johnston, Edgar C., San Francisco, Cal.
 Jones, Levi R., Lake Crystal.
 Joyce, Thomas Jefferson, Superior, Wis.
 Jumper, Paul H., Minneapolis.
 Kelly, Charles F., Minneapolis.
 Kingsley, Kenneth, Minneapolis.
 Knox, Arthur Roy, Fulda.
 Knublauch, Frederick Beek, Minneapolis
 Knutson, Robert, Albert Lea.
 Kranz, Ferdinand Alaxzius, Hastings.
 La Grange, Orrin D., Brown's Valley.
 Larrabee, Walter F., (2 yrs. U of M.),
 Minneapolis.
 Larrabee, Orrin H., Minneapolis.
 Larson, J. Leonard, Merriam Park.
 Lane, John, Minneapolis.
 Leathers, Robert Earl, Minneapolis.
 Lee, Theodore Lawrence, Ellendale, N. D.
 Lee, Walter G., Fargo, N. D.
 Lewis, Addison, Minneapolis.
 Lillis, John Hugh, Davenport, Ia.
 Little, John T., Jr., (1 yr. Hamline)
 Kasson.
 Lindgren, Harold Clarence, Adrian.
 Lindgren, Verner Vivian, Adrian.
 Lonquist, E. W., (1 yr. U. of M.), Minne-
 apolis.
 Long, Dan, Superior, Wis.
 Loomis, Paul N., Minneapolis.
 McCallum, Raymond E., Langdon.
 McCanna, George M., McCanna, N. D.
 McCrady, Willis G., Frontier.
 McDonald, Francis T., Minneapolis.

- McDonald, Millard Halpin, Minneapolis
 McGregor, Donald A., Minneapolis.
 McHardy, John Alexander, Minneapolis.
 McKinnon, John (B. S. Ia. Wesleyan),
 Mt. Pleasant, Ia.
 McMahon, Albert Edward, St. Cloud.
 Madden, Attalus John, Fairfax.
 Markham, William Hugh (1 yr. Law-
 rence), Independence, Wis.
 Melin, Ebin Luther (U. of M. '09),
 Minneapolis.
 Mellquist, Fredolph V. H. (3 yrs. Gus-
 tavus Adolphus), Sioux Falls, S
 D.
 Miller, Frederick Joseph, St. Paul.
 Muir, John Sherman (2 yrs. U of M.)
 Minneapolis.
 Naeseth, John Richard, (Luther Col.)
 Zumbrota.
 Nelson, Harold S., Owatonna.
 Noonan, Howard S., Madefia.
 Ochu, John, Minneapolis.
 Paddock, Henry A., Oak Park.
 Parker, Alonzo Eugene, Guthrie Centre,
 Ia.
 Parker, Ralph Seth, Bloomington
 Patten, Floyd J., (1 yr. Carleton), Mor-
 ton.
 Patterson, Joseph E., Minneapolis.
 Paul, Spurgeon, Wheaton.
 Pickering, Earle Thomas, Geneva.
 Piper, Lee H., St. Paul.
 Swanson, Benjamin, Minneapolis.
 Swenson, Sidel Bernhardt, Minneapolis.
 Taylor, Harold R., Chaska.
 Thoen, Carl, Grove City.
 Trace, R. F., (Carleton), St. Cloud.
 Trogner, Walter J., (1 yr. U. of M.),
 Minneapolis.
 Ueland, Elsa, (A.B. U. of M. '09),
 Minneapolis.
 Utendorfer, Ray E., Gaylord.
 Vandever, Albert K., Minneapolis.
 Vesta, Olaf, Northfield.
 Vollbrecht, Oscar Arthur, Minneapolis.
 Vrooman, Frank Perry, Minneapolis.
 Washburn, Abbott McConnell (A. B.
 Yale), Duluth.
 Way, Marshall, Minneapolis.
 Wendlandt, Waldemar Frank, Manches-
 ter, Wis.
 Welsh, H. A., Cameron.
 Werring, Arthur, Minneapolis.
 White, Guy A., Monticello.
 White, Jay Torpey, Waseca.
 Whiting, Ami Nelson, Balaton.
 Wilson, Knight Blackwood, Royalton.
 Wilson, Chester S., Stillwater.
 Wishard, Dwight Milton (2 yrs. Yale),
 Minneapolis.
 Woodward, Earl Raymond, Minneapolis.
 Woodward, Harold Elmer, Marshall-
 town, Ia.
 Wright, Fred B., Jr. Minneapolis.
 Yates, Clyde Raymond, Minneapolis.
 Place, Bryan W., Minneapolis.
 Pomeroy, C. H., Moorhead.
 Porter, Herbert Merwin, Minneapolis.
 Ravicz, Harry, Minneapolis.
 Reineke, Christian, Norristown.
 Rhoads, Luke C., Minneapolis.
 Rigler, Benjamin, Minneapolis.
 Robinson, Frederick Hilton, (A. B. U.
 of M. '09), Minneapolis.
 Rudesill, Henry Amos, Minneapolis.
 Sands, Mabel, Minneapolis.
 Sanford, Roy LeVerne (1 yr. U. of N.
 D.), Minneapolis.
 Schain, G. S. (2 yrs. U. of M. Eng.)
 Brownsville.
 Schroeder, Herman William (1 yr. U. of
 M.), Minneapolis.
 Schreyer, William Edward, Minneapolis.
 Schuster, Paul, Rochester.
 Schuster, Carl H., Rochester.
 Searle, Ralph O., Minneapolis.
 Severson, Lawrence, Forest City.
 Sheldon, Edward Abbott, Minneapolis.
 Sinclair, Francis Howard, Glendive.
 Sjoselius, Geo. B., Duluth.
 Sletwold, Albert, Elizabeth.
 Smith, Joseph G., Morton.
 Smith, Albert K., Minneapolis.
 Spaulding, Edmund, Mapleton.
 Spencer, Clement A., St. Chares.
 Starkey, Joseph Harold, Mapleton.
 Stevens, Lewis Cornelius, Granite Falls.
 Swanjord, Ole, Balaton.
 Young, Ralph D., Minneapolis.

THIRD YEAR (NIGHT)—34

- Akutsu, Kenji, Tochigi, Japan.
 Anderson, Albert George, Starbuck.
 Ballou, Ellis L., Larrabee, Ia.
 Bowen, Oscar (B. A. Cent. U. of Ia.),
 Minneapolis.
 Broderick, George M., Minneapolis.

- Broderick, Leo C., Minneapolis.
 Brouillard, Thomas L., (Thomas City, Col.), Charles City, Ia.
 Campbell, P. P., Mayer.
 Christiansen, Christian Theodore (A. B. U. of M.), Minneapolis.
 Clutter, Guy Earl (A. B. U. of M.), Anoka.
 Cowles, Ray John, West Concord.
 Dart, Ray H., (A. B. U. of M.), Litchfield.
 Easton, Dana M., Minneapolis.
 George, David Wickham, Minneapolis.
 Hinshaw, Virgil G. (A. B. Penn.), Minneapolis.
 Huntley, Earl W., (A. B. U. of M.), Spring Valley.
 LaBelle, Dezara E., Minneapolis.
 Moe, Herman (3 yrs. Ausberg) Minneapolis.
 Morse, David Lawrence (3 yrs. Cornell, Belmont, Ia.
- Ohman, John, Greenwood, Wis.
 Persinger, Floyd T., (Ph. B. Hamline) Minneapolis.
 Peterson, Albert Victor Anfield, Minneapolis.
 Peterson, William Leroy, St. Cloud.
 Randall, Claud David (A. B. U. of M.), St. Paul.
 Schwestka, Claude Burr, (Ph. B. Upper Ia), West Union, Ia.
 Sinclair, John Franklin, (A. B. U. of M.), Minneapolis.
 Skaug, Julius, Minneapolis.
 Speeter, Harold J., St. Charles.
 Stine, Harry Irwin, Minneapolis.
 Stratton, Paul D., Granite Falls.
 Vallbrecht, Robert (2 yrs. Col. City of N. Y.), Minneapolis.
 Velikanje, Emil Borguwell, Minneapolis.
 Woods, George William, St. Paul.
 Youngquist, Charles A., Minneapolis.

SECOND YEAR (NIGHT)—34.

- Baker, Harold Irwin, Minneapolis.
 Behrens, Verner George, LeRoy.
 Brearley, Charles S., (3 yrs. U of M.), Minneapolis.
 Brockway, Hart Lubert, Balatos.
 Broderick, John J., (3 yrs U. of M.), Minneapolis.
 Cheroske, Louis Sebald, Minneapolis.
 Coakley, Raymond James, Minneapolis.
 Corcoran, Frank Richard, Minneapolis.
 Currier, George William, Jr., St. Paul.
 Deering, Harold Cleaves (A. B. U. of M.) Minneapolis.
 Dexter, Arthur H., Minneapolis
 Ferguson, E. S., Minneapolis.
 Hetzler, Henry Benedict, Minneapolis.
 Lewis, William H., Minneapolis.
 Marr, Gibson Atherton, Washington, D. C.
 Marsh, Fayette Elaine, Stillwater.
 Marwin, Paul, (1 yr. U. of), Minneapolis.
 Oulman, Orrin M., Minneapolis.
- Palmer, Charles Addison, Minneapolis.
 Pearson, William Edward, Fisher.
 Plankerton, Roy Earle, Minneapolis.
 Quigley, James Joseph, Minneapolis.
 Rausch, Harry, Minneapolis.
 Rowberg, H. C. (A. B. U. of M.), Hanley Falls.
 Safford, Orren E., (3 yrs. U. of M.), Minneapolis.
 Schuknecht, John Robert (A. B. '08, U. M.), Minneapolis.
 Simer, Jerome Kenneth, (A. B. U. of Ill.), Tolono, Ill.
 Smith, Amos Delbert, Minneapolis.
 Smith, J. Raymond, Minneapolis.
 Streissguth, Thomas, Arlington.
 Struthers, James A., Minneapolis.
 Swenson, Charles A. (C. E. U. of M.), Winthrop.
 Wassing, Ole M., Minneapolis.
 Zoerb, Albert J., (Ph. B. U. of Wis.), Algomah, Wis.

FIRST YEAR (NIGHT)—67

- Auerbach, Abraham, Ashley, N. D.
 Blythe, Mrs. Virginia B., Minneapolis.
 Cady, Charles Frederick, St. Louis Park.
 Cant, Harold G., (A. B. U. of M. '09), Duluth.
- Connelly, John (A. B. U. of M. '09), Savage.
 Critchlow, Walter E., Dallas, Ore.
 Dahleen, Harry William, (A. B. U. of M. '09), Maynard.

- Davids, Charles Edgar, Alexandria.
 Deming, Norma, Minneapolis.
 Dibble, Karl A., Minneapolis.
 Ford, James Martin, Minneapolis.
 Gerth, Otto Arthur, Minneapolis.
 Gleason, John Joseph, (2 yrs. St. Thomas) Minneapolis.
 Greene, John Joseph (3 yrs. Upper Ia), Minneapolis.
 Hamblin, Fred Luther, Minneapolis.
 Hansen, John Henry, Minneapolis.
 Hansen, Lewis, Waseca.
 Hasselberg, Arthur Wilhelm, Minneapolis.
 Herrick, Henry E., (2 yrs. Carleton), Minneapolis.
 Higgins, Clarence H., (2 yrs. U. of M.), Minneapolis.
 Hill, Albert E., Elk River.
 Hughes, Emory St John, Wells.
 Jenson, Carl J., Minneapolis.
 Johnston, Lisle A., St. James.
 Kotz, Otto Von Bismark, Minneapolis.
 Kacher, James, Aloysius, (St. Thomas), Minneapolis.
 Killen, F. H., Dubuque, Ia.
 Lanterman, Ernest (A. B. U. of M. '09), Manden, N. D.
 Linstroth, Clarence P., Preston.
 Leuthold, Walter M., (A. B. U. of M '09), St. Paul.
 Lyford, Kenneth, Minneapolis.
 McCune, Robert H. (A. B. U. of M. '09), Benson.
 McDonald, Walter, Minneapolis.
 Maland, Joseph O. (A. B. U. of M. '09), Elmore.
 Matchan, Roy W., (A. B. U. of M. '09), Newgood, William O., Minneapolis.
 Oberg, Ezra Nathaniel, Minneapolis.
 Peabody, Orley M., Minneapolis.
 Pearson, Waldemar G., Minneapolis.
 Plank, George Webster, Minneapolis.
 Reed, Harry C., (A. B. U. of M. '09), Sleepy Eye.
 Rehnke, Edgar B., (A. B. U. of M. '09), Kenyon.
 Richardson, Walter (A. B. Yale), St. Paul.
 Ringdahl, Robert (A. B. U. of M. '09), Minneapolis.
 Rothschild, William Warner, St. Paul.
 Saxton, Robert H., (1 yr. Dartmouth), Minneapolis.
 Schall, Mrs. T. D., (A. B. U. of M.), Minneapolis.
 Sheild, Rexford M., Winona.
 Sivright, David C., Minneapolis.
 Sleeper, Raymond Allen, (A. B. U. of M. '09), Minneapolis.
 Smiley, William Yale, (A. B. U. of M. '09), Minneapolis.
 Smith, Walter Herbert, (U. of M. Dental College), Minneapolis.
 Smith, Wilbur, Minneapolis.
 Sponberg, Ernest Albert, Minneapolis.
 Strelow, Harry C., Minneapolis.
 Swagler, Ralph Waldo, St. Peter.
 Swenson, Edward F., Minneapolis.
 Thurber, Orrin Merrill (1 yr. Hamline), Chatfield.
 Torelle, Arthur M., Minneapolis.
 Van Rhee, George Jacob, Milaca.
 Van Valkenberg, Harry, Minneapolis.
 Weeks, Frederick William, Minneapolis.
 White, Dan, Elk River.
 Wichkaemper, Richard (A. M. Ia U.), New Braunsfels, Texas.
 Williams, Clarence Strong, Minneapolis.
 Williams, Lorenzo, Minneapolis.
 Wright, Charles Parsons, Minneapolis.

SPECIAL STUDENTS—98

- Abel, Ernest, Butterfield.
 Ashley, Lynn, River Falls, Wis.
 Barker, Emil V., Atwater.
 Beim, Nels C., Minneapolis.
 Bielejewske, Casimer F., Minneapolis.
 Bradison, George C., Minneapolis.
 Bradley, Carleton E., Soldier's Home.
 Brown, Hosner A., Brownsdale.
 Brunsvold, Olindo M., Hannaford, N. D.
 Bryant, B. Moon, Minneapolis.
 Butler, John Edward, St. Paul.
 Callaghan, Gerald J., Minneapolis.
 Cameron, George Artymus, Minneapolis.
 Cappelin, Felix Grover, Minneapolis.
 Chalgren, Edward A., Sauk Rapids.
 Casserly, Bernard Ambrose, Minneapolis.
 Cheney, Christopher A., Minneapolis.
 Cohen, Julius, Minneapolis.
 Cook, Russel Dwight, Minneapolis.
 Davies, Clifford, Minneapolis.
 Donaldson, Sidney E., Minneapolis.
 Evans, William H., Minneapolis.
 Fitchette, Elwood D., Minneapolis.
 Fountain, Percival T., Hawley.

- Freudenfeld, Alfred J., Minneapolis.
 Fuller, Nathaniel Hayes, Minneapolis.
 Garrett, Arthur T., St. Paul.
 Gaus, Fred William, Minneapolis.
 Gran, Arthur W., Minneapolis.
 Gobbels, Victor A., Minneapolis.
 Gorham, George T., Minneapolis.
 Gray, Walter Baker, St. Paul.
 Gullings, Tolen E., Detroit.
 Gunderson, Lewis C., Poynette.
 Hanson, George W., Minneapolis.
 Harkee, Charles D., Minneapolis.
 Hennessey, Walter H., Minneapolis.
 Hjort, Carl Lyng, Minneapolis.
 Hoffman, Edward, Rochester.
 Holland, Henry, St. Paul.
 James, George M., Minneapolis.
 Johnson, Charles William, Minneapolis.
 Keenan, Raymond Miles, Austin.
 King, William A., Grand Rapids.
 Kremer, William A., Minneapolis.
 Langen, Leonard Henry, Battle Creek.
 Laybourn, Charles Guy, Jr., Lake
 Minnetonka.
 Liebenstein, Ernest A., Whittemore, Ia.
 Martin, Gerald R., Minneapolis.
 Martin, Paul Works, Minneapolis.
 McNamara, Charles, Montello, Wis.
 McAlmon, Herbert Ross, Madison, S. D.
 McDowall James K., Seattle, Wash.
 McDermott, Eugene Mills, Minneapolis.
 Mather, Vernon T., Minneapolis.
 Miller, Allan T., St. Paul.
 Michlieson, Fred Russell, Minneapolis.
 Mitchell, John W., Minneapolis.
 Morrison, Neal, Minneapolis.
 Murphy, Clement Paul, Minneapolis.
 Nallen, James Clark, Minneapolis.
 Nelson, Claus M., Minneapolis.
 Newlin, Walter D., Minneapolis.
 Ness, Carl O., Minneapolis.
 Norton, John, St. Charles.
 Olson, David H., Minneapolis.
 Peterson, Adolph Martin, Minneapolis.
 Peterson, Harold R., Minneapolis.
 Proctor, George E., Minneapolis.
 Poucher, Jay Colton, Minneapolis.
 Roak, Frank, Minneapolis.
 Repke, Leonidas, St. Paul.
 Robertson, Aleck D., Minneapolis.
 Ryan, Arthur, Duluth.
 Samels, John Philip, Minneapolis.
 Schaeffer, Jacob P., Kenoshe, Wis
 Scharf, Charles, Robbinsdale.
 Scherven, Alfred William, Minneapolis
 Skahen, Sorenus Paul, Princeton.
 Skiles, Thomas Daggo, Minneapolis.
 Skotheim, Olof H., Tacamah, Wash.
 Soukup, L. F., St. Paul.
 Smith, George Edward, Minneapolis.
 Sorum, Gustav Edward, Minneapolis.
 Stafford, Lac Frank, Minneapolis.
 Strand, Oscar Carl, Minneapolis.
 Spencer, L. W., Minneapolis.
 Swain, Hubert A., Minneapolis.
 Swenson, H. G., Rush City.
 Templeton, Clarence Allen, St. Paul.
 Thompson, A. R., Minneapolis.
 Throbeck, Samuel Tollef, Minneapolis.
 Turner, Joseph Walter, Rochester.
 Wanvig, Orlando, Minneapolis.
 Waters, Murray R., Minneapolis.
 Wendland, Theodore, Minneapolis.
 Weisel, Paul Rudolph, Minneapolis.
 Vollin, Henry Richard, Minneapolis.

The College of Medicine and Surgery

GRADUATE STUDENTS---3

- Hennings, A. J., Taylor, N. D. MD., Minnesota Hospital Medical College, '87.
 Sioux City College of Medicine, '98. Tilderquist, David L., Superior, Minn.
 Keats, Julia M., Minneapolis, Minn. M.D., M.D., University of Minnesota, '03.

GRADUATES OF 1908

- Alexander, Ida Mary, Carver, Minn. A.B., Bock, Rolland, St. Paul. Minn. Phar. C.
 University of Minnesota. University of Minnesota.
 Andrews, Roy Newberry, Mankato, Minn. Bostrom, August Edward, Minneapolis,
 Bloom, Charles Joseph, Clear Lake, Wis. Minn. B.S., '06, University of Minne-
 A.B., '04, Carleton College. sota.

- Boyd, Leon Morelle, Alexandria, Minn. Lawrence, Edward John, Marshall, Minn.
 Burns, Herbert Arthur, Hutchinson, Minn. Lindberg, Arvid C., Harris, Minn.
 Brown, John C., Minneapolis, Minn. A.B., Maertz, Will Francis, New Prague, Minn.
 '99, Leland Stanford University. Magnusson, Gustaf Alfred, Harris, Minn.
 Dahleen, Henry, Granite Falls, Minn. A.B., University of New Mexico.
 Engstrom, Fred Alonzo, Cannon Falls, Minn. Manley, James Rollin, Duluth, Minn.
 Minn. Nelson, Melvin Sylvanius, Dawson, Minn.
 Esser, John, Austin, Minn. B.S., '06, University of Minnesota.
 Eusterman, George Bysshe, Lewiston, Minn. Roan, Carl Martin, Minneapolis. B.A.,
 Minn. Augsburg.
 Fortier, Edward L., Little Falls, Minn. Ryan, Dennis Edward, Shakopee, Minn.
 Grangaard, Henry Oswald, Kindred, N. D. A.B., St. Thomas.
 A.B., Luther College. Smith, Clarke S., Bozeman, Mont.
 Hemingway, Ernest Eugene, Minneapolis, Minn. Stebbins, Eugene Benson, Barron, Wis.
 Minn. B.A., '98 Ripon, M.A., '03, Univer- Strachauer, Arthur Clarence, Minneapolis,
 sity of Minnesota, Ph.D., '04, Univer- Minn.
 sity of Minnesota. Walker, John Frank, St. Paul, Minn.
 Hensel, Charles Norton, St. Paul, Minn. Walker, George Hamilton, Minneapolis,
 Hitchings, William Sidney, Sutherland, Minn. B.S., University of Nebraska.
 Iowa. Watson, Tolbert, Albany, Minn. B.A.,
 Johnston, Edward James, St. Cloud, Minn. Malcaester.

FOURTH YEAR---1908-09---55

- Anderson, Oscar H., Star Prarie, Wis. Foshager, Henry T., Pennock, Minn. B.S.,
 Baker, Ernest L., Minneapolis, Minn. '05, St. Olaf's College.
 Barney, Leon A., Gettysburg, S. D. B.S., Gardner, Ray, Mantorville, Minn. B.S.,
 '07, University of Minnesota. '07, University of Minnesota.
 Beede, Ethel R., Minneapolis, Minn. Glycer, Richard T., Superior, Wis. B.A.,
 Black, William, Minneapolis, Minn. A.B., '07, Carroll.
 '03, Wabash College. Greaves, Jay, Glencoe, Minn.
 Blakeley, Clement C., Neenah, Wis. Griebenow, Frederick, Alexandria, Minn.
 Blogen, Hallward M., Minneapolis, Minn. A.B., '04, University of Minnesota.
 A.B., '04, Augsburg College. Hayes, Michael F., Lanesboro, Minn. B.S.,
 Booren, Clifton A., Stillwater, Minn. B.S., '07, University of Minnesota.
 '07, University of Minnesota. Healy, Raymond T., Minneapolis, Minn.
 Brimmer, Archie E., St. Paul, Minn. B.S., Iverson, Anthon B., Beldenville, Wis.
 '07, University of Minnesota. Johnson, Selmer M., New Richland, Minn.
 Brooks, Charles N., Minneapolis, Minn. Kellogg, Paul M., Red Wing, Minn.
 Buckley, John J., Portland, Ore. Kurz, John W., Alden, Minn.
 Caldwell, James P., St. Paul, Minn. Larsen, Martin, Atwater, Minn. B.S., '07
 University of Minnesota.
 Campbell, Albert A., St. Paul, Minn. University of Minnesota.
 Coleman, Fred, Minneapolis, Minn. Ph.-McIntyre, Philip H., Litchfield, Minn.
 B., Hamline University. Maxeiner, Stanley R., Minneapolis, Minn.
 Critchfield, Lyman R., Hunter, N. D. Mendelson, Oscar, Minneapolis, Minn.
 B.S., '07, University of Minnesota. A.B., '05, University of Minnesota.
 Deimore, John L., Marshfield, Wis. B.S., Meyerding, Henry W., St. Paul, Minn.
 '07, University of Minnesota. B.S., '07, University of Minnesota.
 Doolittle, Leeroy E., Sioux Falls, S. D. Milner, Augustus F., Minneapolis, Minn.
 A.B., University of Minnesota. Mortensen, Nels G., St. Paul, Minn.
 Drake, Charles R., Rushford, Minn. Murphey, Ignatius J., Lakefield, Minn.
 Earl, George A., Minneapolis, Minn. A.B., B.S., '07, University of Minnesota.
 University of Minnesota. Olson, William P., St. Paul, Minn.
 Fiksdal, Mads J., Webster, S. D. Ostergren, Edward W., Gladstone, Minn.

Oyen, Martin, Watson, Minn. Stewart, Miss Elsie, Minneapolis, Minn.
 Paulsen, Edward L., Hansica, Minn. B.S., Sundt, Mathias, Minneapolis, Minn. A.B.,
 '07, University of Minnesota. '03, University of Minnesota.
 Perry, Clarence G., St. Paul, Minn. B.S., Sutton, Charles S., Prior Lake, Minn.
 '07, University of Minnesota. A.B., '06, University of Minnesota.
 Peterson, Henry F., Chisago City, Minn. Trowbridge, E. H., Minneapolis, Minn.
 A.B., '02, Gustavus Adolphus College. Walker, James D., Moorhead, Minn. A.B.
 Robertson, Archibald Wright, Litchfield, University of North Dakota.
 Minn. Zander, Chas. H., Rochester, Minn. Ph.C.,
 Schmidt, Henry A., Westbrook, Minn. '02, University of Minnesota.
 Stadfield, Clayton G., St. Paul, Minn.

THIRD YEAR--40

Allen, Charles C., Jr., Ada, Minn. B.S., Nordin, Charles G., St. Paul, Minn. B.S.
 '07, Carleton, College. '08, University of Minnesota.
 Binger, Henry E., Tulare, S. D. Ohage, Justus Jr., St. Paul, Minn.
 Brey, Frank, Lafayette, Minn. Oppegard, Manford, Madison, Minn. B.S.,
 '08, University of Minnesota.
 Cavanor, Frank T., Minneapolis, Minn. Papez, James W., Hector, Minn.
 A.B., '03, University of Illinois. Piper, Monte C., Mankato, Minn.
 Christianson, Andrew, St. Paul, Minn. Preine, Irving A., Minneapolis, Minn.
 Cole, Wallace, St. Paul, Minn. Satersmoen, Theodore, Lac qui Parle, Minn.
 Dickson, Thomas H., Jr., St. Paul, Minn. Schneider, Edwin H., St. Paul, Minn.
 A.B., Malcaester. Schrader, Herman, F., St. Paul, Minn.
 Flynn, Robert E., Caledonia, Minn. A.B., '02, A.M., '03, University of Min-
 nesota.
 Hasty, Miss Ella M., Minneapolis, Minn.
 Hayes, James M., Millville, Minn. B.S., Seham, Max, Minneapolis, Minn.
 '04, Carleton College. Simons, Jalmar H., Waseca, Minn. B.S.,
 Huff, Alf., St. Paul, Minn. B.S., '08, Uni- '08, University of Minnesota.
 versity of Minnesota. Smith, Leon G., Benson, Minn.
 Hoiland, Angell S., Benson, Minn. B.S., Souba, Frederick J., Hopkins, Minn. B.S.,
 '08, University of Minnesota. '08, University of Minnesota.
 Johnson, Carl John M., Pelican Rapids, Minn. Treat, Albert M., Blooming Prairie, Minn.
 Minn. Tyrrell, Alfred A., Waterville, Minn.
 Julien, Albert Edward, Braham, Minn. Vigeland, Jorg G., Nielsville, Minn. B.A.,
 A.B., '03, Hamline University. St. Olaf's College.
 Kjelland, Andrew A., Rushford, Minn. Watson, Earl M., Crawfordsvillle, Ind.
 Lysne, Henry, Northfield, Minn. B.S., A.B., '03, Wabash College.
 '06, St. Olaf's. Wyman, Kate, Northfield, Minn. A.B.,
 McCarten, Robert E., Fargo, N. Dakota. '00, Carleton College.
 McEwan, Samuel W., Alexandria, Minn. Yoerg, Otto W., Winthrop, Minn.
 Moore, Chas. Ulysses, Staples, Minn. A.B. Zimmerman, James, Vandalia, Ill. A.B.,
 University of Texas. Wabash College.

SECOND YEAR--30

Anderson, Francis W., Dickinson, N. D. Emert, Harry F., Lockport, N. Y. B.S.,
 *Barnard, Elizabeth, Minneapolis, Minn. '09, University of Minnesota.
 *Barron, Moses, Minneapolis, Minn. *Fulton, Philip R., Minneapolis, Minn.
 Berkman, David Mayo, Rochester, Minn. Geist, Geo Arthur, Minneapolis, Minn.
 B.S., '09, University of Minnesota. B.S., '09, University of Minnesota.
 *Craig, Russell, Souris, N. D. Heidel, Cecil T., Sherburn, Minn.
 *Dedolph, Karl, Minneapolis, Minn. *Hengstler, W. Howard, Wilmar, Minn.

- Kelly, Paul Harold, St. Paul, Minn. Ph.C., Rotnem, Thomas Peter, Madison, Minn. University of Minnesota. Rumreich, E. A., Pisek, N. D.
 Kremer, Walter John, Cold Springs, Minn. Ruud, Magnus, Fosston, Minn. B.A., Larkin, Chandler C., Minneapolis, Minn. North Dakota.
 *Leitch, Archibald, Minneapolis, Minn. Spear, Albert Edgar, Owatonna, Minn.
 McLaurin, Archibald A., Midland, S. D. Ph.B., '05, Hamline University.
 A.B., South Dakota. Strobel, William G., Mankato, Minn. B.S.,
 *Madsen, Christenia A., Minneapolis, Minn. '09, University of Minnesota.
 Mitchell, Whiting B., Chehalis, Wash. Thompson, Victor C., Preston, Minn.
 *Nicholson, Murdoch A., Wilcox, Ariz. *Turnacliff, Dale D., Waseca, Minn.
 Olson, Chas. A. St. Paul, Minn. Warner, Ohmer Hubert, St. Paul, Minn.
 Riddell, Edwin G., D.D.S., Northfield, Minn. Ziskin, Thomas, Chisholm, Minn.
 *Students of combined six-year medical course, B.S., M.D. *Students of combined six-year medical course, B.S., M.D.

FIRST YEAR---49

- Amundsen, Albert E., St. Paul, Minn. Hodge, Edwin (Special), Minneapolis, Baker, Willard R., Leavenworth, Kan. Minn.
 A.B., '08, Park College. Hughes, William V., Minneapolis, Minn.
 Benson, Ross D., Toledo, Ia. B.S., '07. *Kirsch, Ralph L., Minneapolis, Minn.
 Bergan, Otto, Spokane, Wash. B.S., '08, *Kittleson, Olaf L., Zumbrota, Minn.
 St. Olaf's College. *Klein, Harry, Duluth, Minn.
 *Borrisford, Paul D., St. Paul. Lawler, Frank J., Minneapolis, Minn.
 Borgman, Melville B., St. Paul, Minn. Long, Will H., Elysian, Minn.
 *Bratrud, Arthur F., Warren, Minn. *Michelson, Henry E., Bismarck, N. D.
 Bye, Richard, Lily, S. Dakota. B.S., '08, *Morris, Mary, Minneapolis, Minn.
 St. Olaf's College. Nelson, Peter E., Elk Mound, Wis. B.S.,
 *Carroll, William C., St. Anthony Park, St. Olaf's College.
 Minn. *Nordley, Harry R., Minneapolis, Minn.
 *Dedolph, Theodore, St. Paul, Minn. Nyvall, Yorgve J., B.A., Moorhead, Minn.
 *Dorge, Richard Irving, Minneapolis, Minn. Passer, Adolph A., Kenyon, Minn. A.B.,
 *Douglas, Jesse E., Blue Earth, Minn. '02, University of Minnesota.
 Drake, Charles B., Minneapolis, Minn. *Peppard, Thomas A., Minneapolis, Minn.
 B.A., Yale, '08. Phelps, Kenneth A., Fargo, N. D.
 *Eisengraber, G. A., St. Paul, Minn. *Pollock, Lee W., Rochester, Minn.
 Fagerstrom, Albert H., Minneapolis, Minn. Robb, Walter C., Minneapolis, Minn.
 Flom, Andrew O., Minneapolis, Minn. B.A., '08, University of Minnesota.
 B.S., '08, St. Olaf's College. Satterlund, Victor L., New Richmond,
 Freligh, Wilfred P., Stillwater, Minn. Wis.
 Fries, Lyman A., Minneapolis, Minn. *Seifert, Otto J., New Ulm, Minn.
 B.A., '07, Luther College. *Snyder, George W., St. Paul, Minn.
 *Frisch, Frank P., St. James, Minn. Undine, Clyde A., Minneapolis, Minn.
 Gardner, Edwin L., Minneapolis, Minn. *Weed, Frank E., Conway, N. D.
 *Griffin, Patrick J., St. Paul, Minn. *Whittier, Raymond W., Minneapolis,
 *Handy, John A., Minneapolis, Minn. Minn.
 Ph.C., University of Minnesota. Wilson, Paul White, St. Paul, Minn. B.S.,
 Hayes, Edward W., Minneapolis, Minn. '06, Iowa Wesleyan University.
 *Students of combined six-year medical course, B.S., M.D. *Workman, Warner G., Tracy, Minn.

SPECIAL STUDENTS---3

- McClintic, C. F., Anoka, Minn. B.A., Physiology.
 Randolph Macon College. Special Saari, John, Sparta, Minn. Law, University of Minnesota, '08. Special student taking Anatomy.
 Pearsall, Phebe L., Port Byron, Ill. B.S., taking Anatomy.
 Beloit College. Special student taking

SIX YEAR MEDICAL STUDENTS

SOPHOMORES—42

Bandeaux, George I., Brainerd.
 Boness, Hazel, Minneapolis.
 Bratrud, Edward, Spring Valley.
 Brodie, Walter D., St. Paul.
 Campbell, Lowell M., Minneapolis.
 Cooley, John Ford, Madelia.
 Critchfield, R. J., Minneapolis.
 Davis, Thayer, C., Akeley.
 Finley, William F., Ferryville, Wisconsin.
 Hall, Joseph M., Minneapolis.
 Hening, Robert M., Minneapolis.
 Hilger, Leo A., St. Paul.
 Howe, Archibald W., St. Paul.
 Josewitch, Alexander, Minneapolis.
 Kleinmann, Francis, Hutchinson.
 Kucera, William J., Hutchinson.
 Langworthy, Effie W., Minneapolis.
 Langworthy, Willis H., Minneapolis.
 McGuire, Lee, St. Paul.
 McIntosh, Harry C., St. Paul.
 McMillan, Ralph, Minneapolis.
 Mangan, Louis A., Crystal, N. D.
 Mariette, Ernest S., Minneapolis.
 Matthews, Ralph, St. Paul.
 Moersch, Fred. P., St. Paul.
 Morell, Clifford F., Verndale.
 Nesse, Silas Arthur, Mabel.
 Nordland, Martin, Minneapolis.
 Nuessle, Walter, Springfield.
 Quindell, Earle D., Neche, N. D.
 Reum, Arthur W., Minneapolis.
 Robilliard, Charles M., Faribault.
 Rydell, Charles B., North Branch.
 Senescall, Cleve M., Ortonville.
 Sjolas, Amly, Hoffman.
 Smith, Orrin Kenneth, Minneapolis.
 Stratte, Joseph J., Dawson.
 Strerath, Paul A., St. Paul.
 Warwick, Margaret M., Goodhue.
 Webb, Roscoe C., Tracy.
 Wohlrahe, Arthur A., Truman.
 Woltmann, Henry W., Minneapolis.

FRESHMEN—58

Aldworth, Harold M., Rochester.
 Anderson, Philip, St. Paul.
 Anderson, Stewart H., Wells.
 Brown, Florence C., Duluth.
 Brown, Harold J., Minneapolis.
 Carver, Roy, Wabasha.
 Coffin, Lela L., Minneapolis.
 Comfort, Russell D., Stillwater.
 Conley, Alva A., Cannon Falls.
 Cooperman, Harold O., Minneapolis.
 Dietz, Mrs. Mattie K. M., Kimball.
 Duckstad, John B., Fertile.
 Elston, Leo, Jr., Minneapolis.
 Everlof, Leonard, Minneapolis.
 Franchere, Fred W., Lake Crystal.
 Ghostley, George F., Minneapolis.
 Goetzenberger, Joseph J., Minneapolis.
 Gummesson, Karl C., Minneapolis.
 Halgren, John A., Waseca.
 Hammermeister, Theodore F., Morgan.
 Hansen, Harold N., Minneapolis.
 Hanson, Theodore L., Alden.
 Hartig, Hugo, J. A. J., Minneapolis.
 Hendrickson, Gilbert, Christine, N. D.
 Hermanson, Hermina, Wahpeton, N. D.
 Keller, Grover J., St. Paul.
 King, William, Chippewa Falls, Wis.
 Kline, Stella M., Anoka.
 Kvitrud, Gilbert, Minneapolis.
 Larson, Wilmer L., St. Paul.
 Leavenworth, Richard O., Minneapolis.
 McCarthy, Frank M., Brainerd.
 McCrady, Willis G., Frontier.
 McKeon, Joseph O., Montgomery.
 McLean, Thomas E., Devil's Lake, N. D.
 Mentzer, Edward, Duluth.
 Michael, Joseph C., Jordan.
 Miner, Leon W., Blue Earth.
 Myers, Thomas, St. Paul.
 Nelson, Arthur P., Minneapolis.
 Nye, Katherine, Minneapolis.
 Olson, Oscar B., St. Cloud.
 Preston, Paul J., Luverne.
 Russell, Thomas J., Fairfax.
 Schroeder, John, Minneapolis.
 Simonson, Alfred W., Minneapolis.
 Sohlberg, Olof I. A., St. Paul.
 Stone, Harold W., Morris.
 Sutter, Rose I., Minneapolis.
 Van Campen, George G., Cannon Falls.
 Vangness, Ingmar C., Goodhue.
 Walker, James C., Jr., Minneapolis.
 Way, Marshall, Minneapolis.
 Weiss, Raymond O., Minneapolis.
 Wheeler, Everett A., Minneapolis.
 Willius, Frederick, St. Paul.
 Wold, Karl C., St. Paul.
 Woodward, Floyd O., Minneapolis.

STUDENTS IN THE COLLEGE OF PHYSICIANS AND SUR-
GEONS, MEDICAL DEPARTMENT, HAMLINE UNIVERSITY

GRADUATES OF---1907-08

Beardsley, Grant Stanley, Yucca, No. Dak.	Kerrick, Stanley E., Minneapolis.
Cawgill, Charles Hall, Redwood Falls.	Kingsley, R. J., Anaconda, Mont.
Clay, Albert James, Waterville.	Lee, John W., Minneapolis.
Colp, Donald Gray, Robinsdale.	Masone, Edward, Minneapolis.
Dezell, Earl M., Sunset, Wash.	Miller, Troy S., Illinois.
Eichler, William C., Ada.	Moats, Virgil H., Ohio.
Froyland, T. J., Minnesota.	Nelson, Walter P., Barnesville.
Gibbs, W. H. G., Selkirk, Man., Canada.	Olson, Reinhart G., Nicollet.
Girvin, Richard B., Mankato.	Ostrander, Arley John, Minneapolis.
Hall, Henry H., St. Paul.	Patterson, Charles H., Barnesville.
Heron, Roy C., St. Paul.	Paulson, Theodore S., Dalton.
Hursh, Marion M., Henning.	Schons, Edward, St. Paul.
Hollands, William Howard, Canada.	Schmidt, George Fred, Minneapolis.
Jacquot, Gaston L., Stillwater.	Smith, Ray Edward, Minneapolis.
Johnson, Einer W., Minneapolis.	Soderquist, Arthur Richard, Lafayette.
Kells, Oakford A., Minnesota.	Wright, Swan G., Minneapolis.
Kennedy, Edward F., Minneapolis.	

FOURTH YEAR---21

Dickey, Robert Randolph, Minneapolis.	Plankers, A. F., Minneapolis.
Evarts, Arrah B. Miss, Mantorville, Minn.	Rosenwald, John Paul, Madison.
Gelz, John James, Minneapolis.	Schnache, Roy Alvin, St. Paul.
Ghostley, Fred J., Minneapolis.	Sewell, George Melville, Minneapolis.
Ghostly, Mary C., Minneapolis.	Skemp, Frank Scofield, Minneapolis.
Gilkey, Seth E., Minneapolis.	Thornby, Hallward J., Dawson.
Haverstock, Arthur David, Minneapolis.	Trenkle, Henry Landalynn, Minneapolis.
Kaufhold, George F., St. Paul.	Vadheim, Alfred Lyman, Garrison, S. D.
Lommen, Clarence Edgar, Buxton, N. D.	Van Beboget, Lewis Minneapolis.
McCarty, Edison Orin, Minneapolis.	Westerman, F. C., Montgomery.
MacDonald, Daniel A., Wabasha.	

THIRD YEAR---17

Anderson, William Austin, Hopkins, Minn.	Love, George Robert, Preston.
Beardsley, Wayne M., Minneapolis.	Lynch, Elizabeth Aileen, Hopkins.
Borglund, Charles, Minneapolis.	Martin, Seth Henstis, Alburgh, Vt.
Clay, Frank Homer, Minneapolis.	Perkins, James Robert, Minnesota.
Dady, Elmer Eugene, Wabasha.	Petit, Leon Julien, Minneapolis.
Floew, Arnt F., Minneapolis.	Russell, Fred George, Minneapolis.
Ingerson, Carl A., St. Paul.	Weibler, Earl B., Fargo, No. Dakota.
Johnson, George Luther, Minnesota.	Williams, John Taylor, Minneapolis.
Kramer, Edward R., Preston.	

SECOND YEAR---35

Arnson, Julius Ord, Eau Claire, Wis.	Corry, Earl Harrison, Buxton, N. Dakota.
Condit, Sannes Irving, Forest City.	Dailey, William John, St. Paul.
Cornwall, William B., Eveleth.	Daskoski, John Lawrence, Minnesota City

Goodheart, Charles Joseph, Fargo, N. Dak. McCarthy, William Reginald, Minneapolis.
 Hanson, Adolph Melanchthon, Red Wing. McDowell, John Perry, Minneapolis.
 Hedenstrom, Louis Henry, St. Paul. May, Clayton Eugene, Minneapolis.
 Holtan, Theodore, Washburn, N. Dakota. Raiter, Franklin Sol, Minneapolis.
 Hynes, Edward J., Minneapolis. Remington, Paul Archibald, Walnut Grove
 Jullen, Eric Alfred, Braham. Riis, Tonnes O., Bowbells, N. D.
 James, John Barlow, Mandan, N. Dakota. Rutherford, Hillmar Clifford, St. Paul.
 Kelly, John Vincent, St. Paul. Schumacher, Nicholas William, Minne-
 apolis.
 Kennedy, Claude Clement, Minneapolis. Shalett, Benjamin Joseph, Minneapolis.
 Kennedy, Roy Robert, Minneapolis. Spurbeck, Roy George, Two Harbors.
 Klint, John Alfred, Minneapolis. Wilder, Curtis Warde, Minneapolis.
 Lackey, Harry Munson, Minneapolis. Wilson, Clyde Earl, St. Paul.
 Lande, Benjamin, St. Paul. Wooster, Arthur Monroe, Minneapolis.
 Laurent, Antoine, Minneapolis. Ziegler, Edward Jerome, Frazee.

The College of Dentistry

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, Melville 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;
 Millbank, 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; Wilmar
 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
 Thullen, 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; Wilmar
 Allison, James Hawxhurst; Anoka
 Bantle, George Anthony; St. Paul
 Bellingham, Roscoe Charles; Bellingham
 Braafladt, Ole Andrew; Bellview
 Brekhus, Peter John; Minneapolis
 Commers, Leo Phillip; Minneapolis
 Dunbar, Francis Warren; Minneapolis
 Dvorak, Joseph William; Renville
 Eckman, Phillip; Granite Falls
 Goldbum, 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
 LaDue, Nelson Vivian; Fertile
 Little, Arthur Paul; Appleton
 Lyman, Harry Harlan; Caledonia
 McBeth, Ewing Cleveland; 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
 Suetana, 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
 Itis, Henry Charles; Chaska
 Johnson, George Edward; Minneapolis
 Johnston, Warren Wesley; Minneapolis
 Kelly, John Patrick; Minneapolis
 Larson, George; Atwater
 Luffman, Archie; Dorer
 Lundquist, Arthur; Minneapolis
 McCarthy, Francis Michael; Brainerd
 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	Thorburn, Lloyd Mungo; Marshall
Rosen, Maurice Calvin; Minneapolis	Van Gilder, Jesse Stillman; Cannon Falls
Rudolph, Charles Eugene; Annandale	Vig, Richard; Fosston
Seifert, Arthur Vincent; New Ulm	Walhus, Martin J.; Spring Grove
Sieberg, Edward; Oakes, N. D.	Walters, Kenneth Hugo; Caselton, N. D.
Smith, Harvey Willrad; Verndale	Washburn, Dwight Wells; Plainview
Steinfeldt, Abe Arnold; Minneapolis	Weeks, Arthur Freeman; Litchfield
Stickney, Truman Leander; Minneapolis	Williams, Robert Edgar; Akeley
Thomas, James Alfred; Spencer, Iowa	Wolf, George Emil; St. Paul
Ziegler, Sam; Stillwater	

SPECIALS--19

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

The College of Pharmacy

SENIORS

—Austin, Alberta J. Millbank, S. D.	Hooper, Archie J., Minneapolis.
Becker, Frank A. Olivia, Minn.	Hotveldt, Elmer L., Eau Claire, Wis.
Budde, Emil M., 502 Bryant Av. N., Minneapolis.	Kelly, John V., 237 St. Albans, St. Paul
Bugbee, Guy C., Paynesville, Minn.	Kleinhuizen, Albert E., Raymond, Minn.
—Carlson, Helma, Erskine, Minn.	Klovstadt, Thomas, Milan, Minn.
Carlson, A. E., Willmar, Minn.	Kusterman, Fred G., St. Cloud, Minn.
Casey, J. Ambrose, Aitkin, Minn.	Leikvold, Albert I., Waterville, Iowa.
—Caton, Charlotte E., 2441 Blooming- ton Ave., Minneapolis.	—Lyman, Emily L., Graceville, Minn.
Cleveland, Zina, Northfield, Minn.	—Maxwell, Hazel, 561 Oakland Ave. St. Paul
Colby, Hans C., Jackson, Minn.	McMiller, Paul R., Carrington, N. D.
Diessner, Chas. O., Waconia, Minn.	Munro, Will R., Cummings, N. D.
Doty, Archie C., Eyota, Minn.	Nesse, Ella H., Mabel, Minn.
Earle, Fred W., Rochester, Minn.	Orr, Merton J., Bismarck, N. D.
Errickson, Wm. A., Cashton, Wis.	Parker, Claude H.; 408 2nd Ave., S. E., Minneapolis.
Fratzke, Theodore, Eyota, Minn.	Paulson, Carl A., 3602 Central Ave., Minneapolis, Minn.
—Gjerdingen, Nathalia L., Halstad, Minn.	Peterson, Hugo, O., 1921 9th Avt. South, Minneapolis.
Green, Everard L., Hankinson, N. D.	—Peyton, Agnes, Wheaton, Minn.
Hamilton, Horace L., St. Louis Park, Minn.	Reierson, Carl R., Spring Grove, Minn.
Hawlish, Jos. E., Hopkins, Minn.	Root, Nelson W., Elysian, Minn.
—Heath, M. Grace, Riga, N. D.	Schreiter, Norman C., Red Lake Falls, Minn.
Hohn, Walter G., Buffalo, Minn.	

Sievert, Arthur F., New Richland, Minn. Welch, Leo S., Glencoe, Minn.
 Speidel, Harry W., Ladysmith, Wis. Wolf, George E., Olivia, Minn.
 Spellman, Clyde A., Montevideo, Minn. Yamagishi, Kozo, Kobe, Japan
 Tyrholm, Harold A., New Richland, Minn. Zender, Chas. H., Henry, S. D.
 Van Campen, Harry A., Cannon Falls,
 Minn.

JUNIORS

Adams, Edward M., Wayzata, Minn. Hughes, Stuart, 1369 Spruce Place, Minne-
 Ash, Benedict S., Delano, Minn. apolis.
 Bersing, Delbert E., Blair, Wis. James, Chas. W., Rochester, Minn.
 Butterfield, Frederick R., Industry, Ill. Janecky, Geo. A.; Hutchinson, Minn.
 Carman, J. A., Detroit, Minn. Jepson, Paul, Nashua, Iowa.
 Courtney, John F., Glenwood, Minn. Johnson, Theodore, Parker's Prairie, Minn.
 Doeltz, Otto Paul, 3335 Columbus Ave. Kellam, A. B., Heron Lake, Minn.
 Minneapolis. Kelly, Chas. F., Webster, S. D.
 Doerr, Harry, 327 Oak Grove, Minneapolis Lundberg, Wm. W., Brownton, Minn.
 Ebeltoft, William H., Lake Park, Minn. Marsh, Edward M., Pine Island, Minn.
 Emmans, Floyd, Minneapolis. —Mathewson, Vera M., 3617 Blaisdell
 Errickson, Carl A., Cashton, Wis. Ave., Minneapolis.
 —Meadowcroft, Grace, Ruso, N. D. Paulson, Carl M., 2602 Central Ave.,
 Minsky, Alfred, 427 Lyndale Ave., North, Minneapolis.
 Minneapolis. —Ponthan, Marie W., St. Paul.
 Monson, Martin J., Delhi, Minn. —Remes, Anastasia M., New Prague,
 Noer, Victor R., Colfax, Wis. Minn.
 Nordstrom, Burt A., Sacred Heart, Minn. Reum, Arthur, Minneapolis.
 Olverson, Oscar A., Clark, S. D. —Skartum, Juanita M., Lake Benton,
 Paine, S. S., Lake City, Minn. Minn.
 Peters, William M., 1016 13th Ave., South Slawson, Frank W., 511 15th Ave., S.E.,
 Minneapolis. Minneapolis.
 Parker, Claude H., 408 2d Ave., S. E. —Snyder, Bessie E., Hector, Minn.
 Minneapolis. Souba, Emil Geo., Hopkins, Minn.
 Hanson, Harry, Rochester, Minn. Spengler, W. A., 734 Ottawa Av. St.
 Harding, Chester E., Delta, Colorado. Paul.
 Hare, Joseph, Jr., Bismarck, N. D. Spiegel, Louis, 1523 East 19th St.,
 Haynes, Manley H., 703 River Road E., Minneapolis.
 Minneapolis. Steiner, F. A., Mankato.
 Henton, Jay C., Morton, Minn. Titus, James L., Berea, Kentucky.
 Homerberg, Victor, Hopkins, Minn. Whittemore, Andrew A., Detroit, Minn.
 Hoppe, William F., Breckenridge, Minn. Yamagishi, Kozo, Kobe, Japan.

The School of Mines

SENIORS—12

Cole, Willard, Lisbon, N. D. Hoyt, Samuel, Minneapolis.
 Conkey, Charles R., Minneapolis. Rood, Lynn, St. Paul.
 Crowley, Jay, Stillwater. Santo, Julius H., Janesville.
 Gavin, Lawrence T., Staples. Swanson, Axel, Monticello.
 Grant, Royal C., Duluth. Taylor, Harold G., Minneapolis.
 Hognason, Guy B., Minnesota. 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.	Michie, Roy G., Montevideo.
Edwards, Junius D., Minneapolis.	Murray, Emmett, London, O.
Englund, Arthur, Starbuck.	Olson, Alfred W., Argyle.
Fabian, John H., Campbell.	Olson, Walter S., St. Paul
Hagstrom, Leonard J., Minneapolis.	†Packard, William D., Jr., St. Paul.
Halloran, Joseph E., Langdon, N. D.	Patterson, William, Minneapolis.
Harrington, George L., Langdon.	Prouty, Roswell W., St. Paul.
Haskill, Isom W., Pipestone.	Quinn, Max F., Spokane, Wash.
Hawley, R. W., Minneapolis.	Schapler, Harry F., Pipestone.
Hayward, Josiah, St. Cloud.	Schultz, Max F., New Salem, N. D.
Hewitt, Ezra A., Minneapolis	Simons, Leighton, Virginia.
Jenswold, John D., Duluth.	Smith, C. C., St. Paul.
Johnson, Roy, Casselton, N. D.	Spicer, Raymond, Willmar.
Kennedy, Charles T., Eau Claire Wis.	Stevens, Howard, Stillwater.
Klossner, Howard J., New Ulm.	Taylor, W. L., Dundas.
Knox, Lafayette, Grand Rapids.	Teasdale William M., St. Paul
Kremer, Edward G., Grand Rapids.	Underhill, Russell, Stillwater
Larrabee, Orin Minneapolis.	Wallinder, Arthur, Duluth.
Lea, John, Minneapolis.	Walter, Rollie B., Delano
Lee, Theodore L., Ellendale, N. D.	Williams, James, Ely.
Lyon, Chalmer, Minneapolis.	Woodis, Clarke M., Amboy.
McAdams, Howard R., Duluth.	Youell, Harold, Minneapolis.
McClintock, Thomas, Rugby, N. D.	†Died Jan. 1909.

The School of Chemistry

SENIORS, 10.

Bacon, Charles B., St. Paul.	Nye, Lillian, Minneapolis.
Barnaby, William E., Minneapolis.	Roehrich, Victor H., St. Paul.
Dresser, Eva, Minneapolis.	Selvig, Walter, Willmar.
Kueffner, Otto K., St. Paul.	Sterling, Faith, Minneapolis.
Morey, George W., Minneapolis.	Walker, George Warren, Minneapolis.

JUNIORS, 17.

Bicknell, Henry R., Minneapolis.	Peterson, Andrew P., Lamberton.
Daniels, Farrington, Minneapolis.	Rockwood, Ralph H., Madelia.
De Witt, Joseph H., Red Wing.	Smith, Carolyn, Minneapolis.
Dietrichson, J. Gerhard, Menomonie, Wis.	Smith, Sheldon H., St. Paul.
Gutsche, Frank C., Glencoe.	Stone, G. Harwood, Omro, Wis.
Johnson, Einer, Minneapolis.	Taylor, Carl H., Minneapolis.
Johnston, William W., Minneapolis.	Tronson, Carl, Benson.
Kepner, Ben Hur, Appleton.	Woollett, Guy, Minneapolis.
Mitchell, Donald F., Minneapolis.	

SOPHOMORES, 7.

Baker, Russell E., Minneapolis.	Halvorson, Henry A., Minneapolis.
Callaway, Roy S., Minneapolis.	Leavenworth, Frank M., Minneapolis.
Dunn, Lewis E., Minneapolis.	Wanless, Lynn A., Anoka.
Guffin, Roy, Minneapolis.	

FRESHMEN, 27.

Birkholz, Emil, Minneapolis.	Brooks, Loren R., Minneapolis.
Blase, Henry G., St. Paul.	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, Ben C., St. Paul.
 Finke, Wilbur W., Charles City, Iowa.
 Hartnett, John D., Graceville.
 Hennessy, Hugh J., Minneapolis.
 McMiller, P. Raymond, Minneapolis.
 Myers, James, I., Great Falls, Mont.

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 College of Education

SENIORS—15

Alice Austin, Minneapolis.
 George Bakalyar, Lakefield.
 Ellen I. Burk, Minneapolis.
 Anna C. Carlson, St. Cloud.
 Melva A. Collins, St. Paul.
 John D. Gilpin, Minneapolis.
 Blanche Hellickson, Mabel.

Marie Alden Hewitt, Minneapolis.
 Frances McOuat, Minneapolis.
 Jennie Murfin, Minneapolis.
 William W. Norton, Minneapolis.
 Alice R. Quigley, Bird Island.
 N. Robert Ringdahl, Minneapolis.
 Mira M. Southworth, Minneapolis.

Amanda M. Whaley, St. Paul.

JUNIORS—13

Agnes Bryan, Rochester.
 Thomas Cahill, Minneapolis.
 Verna M. Hart, Minneapolis.
 Jessie M. Miller, Minneapolis.
 Richard Molenaar, Raymond.
 Abigail O'Leary, Wabasha.

Eva L. Pitts, Alton, Ia.
 Grace E. Richards, Minneapolis.
 Jessie S. Schneider, St. Paul.
 Charlotte Smith, Montevideo.
 Lillian Spain, Minneapolis.
 Esther Stoft, Minneapolis.

Olivia Trautman, Minneapolis.

UNCLASSED—13

Kate Bartholf, Minneapolis.
 Alline C. Bayrell, Minneapolis.

Annie M. Hayes, Minneapolis.
 Bridget T. Hayes, Minneapolis.

Harry W. Kavel, Minneapolis.	E. E. Heeter, Manchester, Ind.
Alice Kilgore, Minneapolis.	W. C. Herrmann, Winona.
Hermine R. Konig, Minneapolis.	M. Edna Morrison, Minneapolis.
Mary O. Lothrop, Minneapolis.	Ernest Reynolds, Minneapolis.
[Anna M. Schulte, Minneapolis.	

The Graduate School

CANDIDATES FOR DEGREES OF JUNE 1909

FOR DOCTOR OF PHILOSOPHY---4

Gustav O. Brohough, Red Wing. B. A. '89, LL.B., '93, Minnesota, M. A. '06, Wisconsin. Major, Economics. Minors, Public Finance, Sociology. Thesis, The Minnesota Pine Lands.	M. A. '03, Minnesota. Major, English. Minor, Scandinavian, Latin. Thesis, The Development of the English Essay.
Ernest C. Carlton, St. Peter. B. A. '98, M. A. '00, Augustana. Major, Scandinavian. Minors, Greek, English. Thesis, Oscar Levertin, A Study of Literary Development.	Alois F. Kovarik, Minneapolis. B. A. '04, M. A. '07, Minnesota. Major, Experimental Physics. Minors, Mathematical Physics, Mechanics. Thesis, The Effect of Changes in the Pressure and Temperature of a Gas upon the Velocity of the Negative Ions Produced by Ultra-Violet Light.
Ernest J. Colberg, St. Peter B. A. '06, Gustavus Adolphus.	

FOR DOCTOR OF SCIENCE---1

William Macdonald, Pretoria, S. Africa. B. S. '98, Ph. D. '07, Minnesota, M. S. Agr., '01, Cornell University. Major, Agriculture.	Minors, Dry-Farming and Land Settlement. Thesis, Agricultural Education.
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FOR MASTER OF ARTS---39

Bonnie F. Andrews, Sisseton, S. D. B. A. '03, Minnesota. Major, English. Minor, Latin. Thesis, Si Wahpa, A Historical Romance.	Edla G. Berger, St. Paul. B. A. '07, Minnesota. Major, Mathematics. Minors, Astronomy, Latin. Thesis, Line Geometry in the Plane.
Marion L. Barber, Minneapolis. B. A. '08, Minnesota. KEM— Major, English. Minors, German, French. Thesis, The Development of the Modern Theater.	Helen D. Donald, St. Paul, B. L. '06, Carleton. Major, Sociology. Minor, History. Thesis, The Associated Charities.
Laura H. Benz, St. Paul. B. A. '08, Minnesota. Major, English. Minors, Sociology, German. Thesis, The Play and the Playgoer.	Albert N. Gilbertson, Minneapolis. B. A. '08, Minnesota. Major, Sociology and Anthropology. Minors, Psychology, Philosophy. Thesis, Pre-Christian Survivals in the Festivals, Customs and Symbols of the Christian Church.

- Adella Hawes, Minneapolis.
 B. A. '08, Wells.
 Major, English.
 Minors, Physiology, Sociology.
 Thesis, Social Sympathy in the Drama.
- Edgar C. Higbie, Canby.
 B. A. '07, Minnesota.
 Major, Education.
 Minor, Agriculture.
 Thesis, The Present Problem in Agricultural Education.
- Jessie H. Horn, St. Paul.
 B. A. '06, Minnesota.
 Major, History
 Minors, English, Spanish.
 Thesis, Food-Price Legislation in Massachusetts from 1630-1649.
- Olaf Hovda, Minneapolis.
 B. A. '04, Minnesota.
 Major, Physics.
 Minor, Mechanics.
 Thesis, The Temperature Coefficients of Moving Coil Galvanometers.
- Drusilla Hutchinson, Minneapolis.
 B. A. '01, Minnesota.
 Major, History.
 Minors, Philosophy, English.
 Thesis, The Diplomacy in Connection with the Trade between the United States and the British West Indies from 1783 to 1830.
- Emil Johnson, Minneapolis.
 B. S. '06, St. Olaf.
 Majors, Education and Psychology.
 Thesis, Children's Difficulties in Arithmetic.
- A. Walford Johnson, Minneapolis.
 B. A. '08, Augustana.
 Major, Geology.
 Minors, Chemistry, Mineralogy.
 Thesis, The Glacial Geology of Minnesota.
- Arnold J. Lien, Delavan.
 B. A. '08, Minnesota.
 Major, Political Science.
 Minors, History, Economics.
 Thesis, Highway Legislation in Minnesota.
- Martin Lien, Atwater.
 B. S. '07, St. Olaf.
 Major, Education.
 Minors, Psychology, Scandinavian.
 Thesis, More Parochial Instruction among Norwegian Lutherans of America.
- Ingebrigt L. Lillehei, Luverne.
 B. A. '08, Minnesota.
 Major, Philosophy.
 Minors, English, French.
 Thesis, The Ethics of Nietzsche.
- Frank E. Moll, Wahpeton, N. D.
 B. A. '87, Charles City, Ia.
 S. T. B. '93, Northwestern.
 Major, German.
 Minors, French, Spanish.
 Thesis, The Satirical Element in the Writers of the Reformation, especially Braut, Murner, and Fischart.
- Peter O. Okkelberg, Goodhue.
 B. A. '06, Minnesota.
 Major, Embryology.
 Minors, Zoology, Ecology.
 Thesis, The Neuromast System in the Ichtheopsida Lepisosthius.
- Matthias N. Olson, Belview.
 B. A. '08, Minnesota.
 Major, Political Science.
 Minors, History, Economics.
 Thesis, Public Land Policy in Minnesota.
- Alice G. Pope, Minneapolis.
 B. A. '08, Minnesota.
 Major, History.
 Minors, English, Economics.
 Thesis, The Composition of the Council of the North during the Reign of Elizabeth.
- Frances S. Potter, Minneapolis.
 B. A. '87, M. A. '89, Elmira, N. Y.
 Major, English.
 Minors, Anglo Saxon, Milton.
 Thesis, Works of Fiction published by the Candidate.
- Lydia A. Schroedel, St. Paul.
 B. A. '08, Macalester.
 Major, Comparative Philology.
 Minors, German, English.
 Thesis, The Comparison of some Synonyms in Beowulf, the Heliand and Otrid.
- Eleanor Sheldon, Minneapolis.
 B. A. '04, Minnesota.
 Major, English.
 Minors, Rhetoric, German.
 Thesis, Gerhardt Hauptman, Dramatist and Poet.
- Maud H. Steward, Minneapolis.
 B. A. '05, Minnesota.
 Major, English.
 Minors, Drawing, Sociology.

- Thesis, The Spanish Drama.
 Peter A. Sveeggen, Minneapolis.
 B. A. '08, Minnesota.
 Major, English.
 Minors, Philosophy, Scandinavian.
 Thesis, The Formal and the Vital in Literature.
 Christian Trygstad, Rapid City, Ia.
 B. A. '05, St. Olaf.
 Major, German.
 Minors, Latin, French.
 Thesis, Heinrich von Kleinst and the Romantic School.
 Victor A. Valgren, Minneapolis.
 B. A. '05, Gustavus Adolphus.
 Major, Economics.
 Minor, Political Science.
 Thesis, The City and the Water Supply.
 Arland D. Weeks, Agric. College, N. D.
 B. A. '01, Cornell.
 Major, Education.
 Minors, Psychology, one-half graduate work done at Cornell.
 Thesis, The Place of Agricultural Education.
 John Hersey Wheeler, St. Paul.
 B. A. '96, Harvard.
 Major, Romance Philology.
 Minors, Italian, Comparative Philology.
 Thesis, History of the Literary Relations between France and the United States.
 Nellie A. Whitney, Minneapolis.
 B. L. '00, Minnesota.
 Major, English.
 Minors, Philosophy, German.
 Thesis, A Comparative Study of Some Types of the Essay.

FOR MASTER OF SCIENCE--6

- Walter L. Badger, Minneapolis.
 B. A. '07, B. S. '08, Minnesota.
 Major, Electro-Chemistry.
 Minors, Physics, Electrical Engineering.
 Thesis, The Electrolytic Preparation of the Alkaline-Earth Metals.
 Hobart D. Frary, Minneapolis.
 M. E. '08, Minnesota.
 Major, Mechanical Engineering.
 Minors, Electrical Engineering, Economics and Political Science.
 Thesis, A Study of Smoke Prevention in Steam Boiler Plants, especially in Minneapolis.
 George P. Grout, St. Paul.
 B. S. '08, N. Dak. Agric.
 Major, Animal Nutrition.
 Minors, Bacteriology of Milk, Animal Husbandry.
 Thesis, Farm Management.
 Daniel B. Howells, St. Paul.
 Ph. B. '06, Wisconsin.
 Major, Animal Nutrition.
 Minors, Chemistry, Dairying.
 Thesis, Relation of Feed to Product.
 Louis W. McKeehan, Minneapolis.
 B. S. '08, Minnesota.
 Major, Physics.
 Minors, Mathematical Physics, Astronomy.
 Thesis, An Experimental Determination of the Terminal Velocity of Fall of Small Spheres in Air.
 L. C. Tomlinson, Glencoe.
 E. E. '04, Minnesota.
 Major, Telephone Engineering.
 Minors, Gas Engines, Economics.
 Thesis, The Disturbance Caused by Electro-Magnetic Waves in Telephony

LIST OF CANDIDATES ENROLLED

FOR DOCTOR OF PHILOSOPHY--14

- Theodore A. Buenger, St. Louis
 B. A. '06, M. A. '07, Minnesota.
 Major, Latin.
 Kelvin Burns, Minneapolis.
 B. A. '03, Minnesota.
 Major, Astronomy.
 Minors, Mathematics, Physics.
 Thesis, A Study of the Proper Motions and Parallaxes of Stars in the Nebula of Orion.
 Lillian Cohen, Minneapolis.
 B. A. '00, M. S. '01, Minnesota.
 Major, Chemistry.
 Minors, Food Analysis, Physics.
 Hal Downey, Minneapolis.
 B. A. '03, M. A. '04, Minnesota.
 Major, Animal Biology.
 Minors, Anatomy, Neurology.
 Thesis, The Lymphatic Tissue of the Kidney of Polyodon Spathula.

- George R. Eichholzer, St. Anthony Park.
B. A. '07, M. A. '08, Minnesota.
Major, Political Science.
Minor, German.
- Francis C. Frary, Minneapolis.
B. S. '05, M. S. '06, Minnesota
Major, Chemistry.
Minor, Electrical Engineering.
- Charles E. Johnson, Minneapolis.
B. A. '06, M. A. '07, Minnesota.
Minors, General Physiology, Insect
Fertilization of Plants.
- Mrs. Julia M. Johnson, Macalester College.
M. A. '05, Minnesota.
Major, English.
Minors, Latin, Philosophy.
- Rasmus Malmin, Decorah, Ia.
B. A. '82, M. A. '06, Luther College.
Major, Hebrew.
Minors, Aramaic, Jewish History.
- Gustav Melby, Minneapolis.
M. A. '06, Minnesota.
Major, English.
- Minors, Comparative Philology, German.
- Carl M. Melom, Minneapolis.
B. L. '01, M. A. '02, Minnesota.
Major, Spanish.
Minors, Old Spanish, French.
Thesis, The True Sources of the Cid
- Rasmus E. Saby, Radcliffe, Ia.
B. A. '07, M. A. '08, Minnesota.
Major, Political Science.
Minors, Economics, Philosophy.
- Ray Albion Vickery, Washington, D. C.
B. A. '06, M. A. '07 Minnesota.
Major, Animal Biology.
Minor, Botany.
- John Hersey Wheeler, St. Paul.
B. A. '96 Harvard.
Major, Romance Philology.
Minors, Italian, Comparative Philology.
Thesis, The History of the Literary Relations of France and the United States.

FOR MASTER OF ARTS--33

- Franz A. Aust, Minneapolis.
B. A. '08, Minnesota.
Physics, Sociology, Political Science.
- Belle V. Bonsteel, Minneapolis.
B. A. '06, Minnesota.
English, German.
The Psychology of Blank Verse.
- Thyra Crawford, Minneapolis.
B. A. '03, Woman's College, Baltimore.
German, English, Philosophy.
- Helen S. Cummings, St. Paul.
B. A. '08, Minnesota.
Sociology, English.
- Niel S. Dugay, Northfield.
B. A. '04, Minnesota.
Embryology, Geology, Animal Behavior.
- Austin S. Edwards, Minneapolis.
B. S. '08, Columbia.
Education, Psychology.
- Josephine W. Elston, Minneapolis.
B. A. '08, Knox.
Economics, Political Science.
The Case of Socialism.
- Byron T. Emerson, Minneapolis.
B. A. '03, Minnesota.
Chemistry.
- Leland J. Farmer, Annandale.
B. A. '00, St. Laurence U.
Education, Psychology.
- Emma C. Freeman, St. Paul.
B. A. '94, Minnesota.
German.
- Ruby H. Fletcher, Minneapolis.
B. A. '08, Minnesota.
Botany, Geology, Biology.
- Mary Gibson, Minneapolis.
B. A. '05, Minnesota.
Latin, Philosophy.
- Raymond H. Gray, Elk River.
B. A. '05, Minnesota.
Education, Psychology.
- Amos Grothe, Elk Point, S. D.
B. A. '05, St. Olaf.
English, Latin, Education.
The Interrelation of Modern Fiction
and Drama.
- F. B. Harrington, Langdon.
B. A. '07, Oberlin.
Education, Psychology.
- Newton H. Hegel, Cambridge.
B. A. '03, Minnesota.
Education, Psychology.
- Albert Hegstrom, Kennedy.
B. A. '03, Gustavus Adolphus.
Education, Psychology.

- Alfred O. Holte, Gary.
B. A. '08, Luther.
Comparative Philology, Scandinavian,
Education.
- Iver F. Johnsrud, St. Cloud.
B. A. '03, Minnesota.
Education, Psychology.
- A. Ray Kent, Lanesboro.
B. A. '03, Cornell College.
Education, Psychology.
- Inez A. Kelsey, Anoka.
B. A. '05, Minnesota.
Education, Economics, Latin.
- Emil F. Lee, Hanska.
B. S. '08, St. Olaf.
English, Education, Scandinavian.
- Anna E. Maguire, St. Paul.
B. A. '03, Nebraska.
English, History, Philosophy.
- O. J. Oie, Minneapolis.
B. A. '07, Macalester.
Philosophy, History, Scandinavian.
- Phebe L. Pearsall, Minneapolis.
B. A. '04, Beloit.
Bacteriology, Neurology, Botany.
- A. C. Pederson, Benson.
B. A. '04, Luther.
Eugene Routier, Madagascar.
B. A. '08, St. Olaf's.
Political Science, Economics, History.
- Thos. W. Ruger, Devils Lake, N. D.
B. A. '05, Minnesota.
Sociology, History, English.
- Knut A. Rygh, Mound City, S. D.
B. A. '06, St. Olaf.
Education, Psychology.
- Dorothea Stewart, Minneapolis.
B. A. '08, Minnesota.
Geology.
- M. Hauman Thorsen, River Falls, Wis.
B. A. '07, Luther.
Education, Psychology, Logic.
- Margaret H. Trimble, Minneapolis.
B. A. '08, Minnesota.
English.
- Orson M. Washburn, Waterville.
B. A. '97, Minnesota.
Education, Psychology.

FOR MASTER OF SCIENCE--4

- Edward X. Anderson, Minneapolis.
B. S. '08, Minnesota.
Major, Physical Chemistry.
Minor, Mineralogy.
Thesis, The Nucleation of Pure and
Mixed Vapors in Dust-free Air.
- Charles R. Cressy, Minneapolis.
B. S. '08, Minnesota.
Major, Chemistry.
Minor, Mineralogy.
- Thesis, The Analysis of Coal.
- A. R. Kohler, St. Anthony Park.
B. S. Agr. '06 Iowa State.
Plant Breeding, Plant Pathology, Ec-
onomics.
- Isaac F. Metcalf, St. Anthony Park.
B. S. Agr. '08 Guelph Arg. College.
Plant Breeding, Agricultural Economics,
Dry-Farming.

STUDENTS TAKING GRADUATE WORK

NOT ENROLLED AS CANDIDATES FOR DEGREES--35

- Walter J. Beggs, St. Paul.
B. A. '99, M. A. '00, Harvard.
Latin, French.
- Anne Benton, Minneapolis.
B. A. '08, Wellesley.
Chemistry, English.
- Marjorie Bullard, St. Paul.
B. A. '06, Minnesota.
History.
- Polly C. Bullard, St. Paul.
B. A. '06, Minnesota.
- History, English.
- Henry F. Burt, Minneapolis.
B. A. '99, Washburn.
Economics.
- Anna J. Campbell, Hopkins.
B. A. '07, Minnesota.
English.
- Esther Celin, Cokato.
B. A. '06, Gustavus Adolphus.
German.

- Mrs. F. E. Clements, Minneapolis.
B. A. '98, Ph. D. '04, Nebraska.
Botany.
- Mabel Cooper, St. Paul.
B. A. '08, Wellesley.
German.
- Ada E. Davis, Minneapolis.
B. A. '08, Wellesley.
English, Economics.
- Dorothy Derickson, Minneapolis.
B. A. '08, Wells.
Rhetoric, English.
- Kate T. Finkle, Minneapolis.
B. A. '05, Minnesota.
English, Political Science.
- Henry D. Funk, St. Paul.
M. A. '03, Minnesota.
History.
- F. W. Gates, Minneapolis.
Ph. B. '99, Wisconsin.
M. A. '07, Minnesota.
Astronomy.
- Augustus Hallstone, Mabel.
B. A. '02, Luther.
Economics, Political Science, History.
- Carolyn Joyce, Minneapolis.
B. A. '08, Wells.
English.
- Margaret M. E. Kelley, St. Paul.
B. A. '08, Minnesota.
Geology, Sociology.
- Abbie B. Langmaid, Granite Falls.
B. A. '98, Minnesota.
English, Economics.
- Margolie Lewis, St. Paul.
B. A. '03, Minnesota.
Astronomy, Physics.
- George N. Link, Minneapolis.
B. S. '98, Wisconsin.
Mathematics, French.
- V. R. Manning, Minneapolis.
B. A. '08, Minnesota.
Sociology.
- Cora E. Marlowe, St. Paul.
B. A. '00, Minnesota.
English.
- Karl A. Machetanz, St. Anthony Park.
LL. B. '08, Minnesota.
Political Science, English.
- Mrs. Frances J. Nichols, Minneapolis.
B. A. '98, M. A. '99, Columbian U.
English.
- F. W. Plummer, St. Paul.
B. A. '08, Wabash.
Biology.
- Eva Jerome Sardeson, Owatonna.
B. A. '99, Minnesota.
Education, English.
- John P. Schumacher, St. Paul.
B. A. '08, Hamline.
English, Anglo Saxon.
- William H. Shepherd, Minneapolis.
Ph. B. '00, M. A. '07, Wisconsin.
History, Political Science.
- Samuel O. Severson, Minneapolis.
B. A. '03, M. A. '04, Minnesota.
English.
- Mary C. Smith, Minneapolis.
B. A. '06, Smith.
English, Psychology.
- Freda L. Stamm, St. Paul.
B. A. '07, Minnesota.
German, English.
- David L. Tilderquist, Duluth.
M. D. '03, Minnesota.
Anatomy.
- Annalee Weiskopf, Minneapolis.
B. A. '08, Wellesley.
English.
- Beata Werdenhoff, Minneapolis.
B. A. '08, Wellesley.
Scandinavian.
- Jacob Wulfsberg, St. Paul.
B. A. '03, Luther.
History, Psychology.

Summary of Students

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS.

	Men	Women	Total	
Senior Class.....	61	136	197	
Junior Class.....	71	193	264	
Sophomore Class.....	111	197	308	
Freshman Class.....	160	262	422	
Unclassed Students.....	89	114	203	
	492	902	1394	1394

SIX-YEAR MEDICAL COURSE.

	Men	Women	Total	
Sophomore Class.....	39	3	42	
Freshman Class.....	51	7	58	
	90	10	100	100

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS.

Senior Class—

	Men	Women	Total
Civil Engineering section.....	17	..	17
Mechanical Engineering section.....	21	..	21
Electrical Engineering section.....	29	..	29
Municipal Engineering section.....	1	..	1
Science and Technology.....	4	..	4
	72	..	72

Junior Class—

	Men	Women	Total
Civil Engineering section.....	27	..	27
Mechanical Engineering section.....	24	..	24
Electrical Engineering section.....	28	..	28
Municipal Engineering section.....	1	..	1
Science and Technology.....	1	..	1
	81	..	81

Sophomore Class—

	Men	Women	Total
Civil Engineering section.....	43	..	43
Mechanical Engineering section.....	19	..	19
Electrical Engineering section.....	51	..	51
Municipal Engineering section.....	1	..	1
Science and Technology.....	4	..	4
	118	..	118

Freshman Class—

	Men	Women	Total
Civil Engineering section.....	55	..	55
Mechanical Engineering section.....	34	..	34
Electrical Engineering section.....	66	..	66
	<hr/>	<hr/>	<hr/>
	155	..	155

	Men	Women	Total
Unclassed Students.....	41	..	41

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THE DEPARTMENT OF AGRICULTURE.

The College of Agriculture—

	Men	Women	Total
Senior Class.....	23	4	27
Junior Class.....	9	3	12
Sophomore Class.....	35	10	45
Freshman Class.....	77	27	104
	<hr/>	<hr/>	<hr/>
	144	44	188

The School of Agriculture—

	Men	Women	Total
Intermediate Year.....	5	2	7
Class A.....	74	34	108
Class B.....	123	48	171
Class C.....	260	108	368
	<hr/>	<hr/>	<hr/>
	462	192	654

Additional Courses—

	Men	Women	Total
Teachers' Summer School.....	31	59	90
Summer Forestry School.....	14	4	18
Farmers' Short Course.....	165	4	169
Dairy School.....	107	..	107
Crookston School of Agriculture.....	79	22	101
	<hr/>	<hr/>	<hr/>
	396	89	485
			<hr/>
			1327

THE COLLEGE OF LAW.

	Men	Women	Total
Graduate Students for Doctor of Civil Law.....	5	..	5
Graduate Students for Master of Laws.....	28	1	29
Senior Class.....	55	..	55
Middle Class.....	89	..	89
Junior Class.....	201	2	203
Third Year (night class).....	34	..	34
Second Year (night class).....	34	..	34
First Year (night class).....	64	3	67
Special Students.....	98	..	98
	<hr/>	<hr/>	<hr/>
	608	6	614
			<hr/>
			614

THE COLLEGE OF MEDICINE AND SURGERY.

	Men	Women	Total
Graduate Students.....	3	..	3
Senior Class.....	53	2	55
Junior Class.....	38	2	40
Sophomore Class.....	28	2	30
Freshman Class.....	48	1	49
Special Students.....	2	1	3
	<hr/>	<hr/>	<hr/>
	172	8	180

Hamline Medical Department—

	Men	Women	Total
Senior Class.....	19	2	21
Junior Class.....	16	1	17
Sophomore Class.....	35	..	35
	<hr/>	<hr/>	<hr/>
	70	3	73
			<hr/>
			253

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

	Men	Women	Total
Senior Class.....	1	..	1
Junior Class.....	2	..	2
	<hr/>	<hr/>	<hr/>
	3	..	3
			<hr/>
			3

THE COLLEGE OF DENTISTRY.

Senior Class.....	47	1	48
Junior Class.....	49	..	49
Freshman Class.....	77	..	77
Special Students.....	19	..	19
	<hr/>	<hr/>	<hr/>
	192	1	193
			<hr/>
			193

THE COLLEGE OF PHARMACY.

	Men	Women	Total
Senior Class.....	42	8	50
Junior Class.....	45	6	51
	<hr/>	<hr/>	<hr/>
	87	14	101
			<hr/>
			101

THE SCHOOL OF MINES.

	Men	Women	Total
Senior Class.....	12	..	12
Junior Class.....	28	..	28
Sophomore Class.....	49	..	49
Freshman Class.....	61	..	61
	<hr/>	<hr/>	<hr/>
	150	..	150
			<hr/>
			150

THE UNIVERSITY OF MINNESOTA

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY.

	Men	Women	Total	
Senior Class.....	7	3	10	
Junior Class.....	16	1	17	
Sophomore Class.....	7	..	7	
Freshman Class.....	26	1	27	
Unclassed Students.....	18	1	19	
	<hr/> 74	<hr/> 6	<hr/> 80	<hr/> 80

THE COLLEGE OF EDUCATION.

	Men	Women	Total	
Senior Class.....	4	11	15	
Junior Class.....	2	11	13	
Unclassed Students.....	4	9	13	
	<hr/> 10	<hr/> 31	<hr/> 41	<hr/> 41

THE GRADUATE SCHOOL.

	Men	Women	Total	
Graduate Students.....	78	49	127	127

THE UNIVERSITY SUMMER SCHOOL.

	Men	Women	Total	
College Section (Less Duplicates).....	119	172	291	291

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SUMMARY OF TOTALS.

	Men	Women	Total	
The College of Science, Literature and the Arts.....	492	902	1394	
Six-year Medical Course (first two years).....	90	10	100	
The College of Engineering and the Mechanic Arts.....	467	..	467	
The Department of Agriculture.....	1024	303	1327	
The College of Law.....	608	6	614	
The College of Medicine & Surgery (including Hamline).....	242	11	253	
The College of Homeopathic Medicine and Surgery.....	3	..	3	
The College of Dentistry.....	192	1	193	
The College of Pharmacy.....	87	14	101	
The School of Mines.....	150	..	150	
The School of Chemistry.....	74	6	80	
The College of Education.....	10	31	41	
The Graduate School.....	78	49	127	
The Summer School (college section).....	119	172	291	
	<hr/> 3636	<hr/> 1505	<hr/> 5141	<hr/> 5141
Less duplicates.....	73	2	75	75
	<hr/> 3563	<hr/> 1503	<hr/> 5066	<hr/> 5066
	Men	Women	Total	
Students of Collegiate Grade.....	2673	1244	3917	
Students of Non-collegiate Grade.....	890	259	1149	
	<hr/> 3563	<hr/> 1503	<hr/> 5066	<hr/> 5066

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APRIL, 1909

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OF THE

University Summer School

June 21 to July 31, 1909

State Superintendent, C. G. SCHULZ
Department of Public Instruction
St. Paul, Minnesota

GEORGE F. JAMES, *Conductor*
A. W. RANKIN, *Assistant*
University of Minnesota

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- E. B. PIERCE, Registrar of the University of Minnesota.**

The University Summer School.

This school is organized by the authority and under the direct supervision of the department of public instruction. It is maintained partly for the teachers in the high schools and the graded schools of the state, and partly for the teachers in the semi-graded and the rural schools of Hennepin, Ramsey and other adjoining counties.

LOCATION

The school is located in Minneapolis, which is a delightful place for summer residence. It has the use of the buildings, libraries, laboratories and museums of the University of Minnesota, and in addition, students may use, under certain restrictions, other large public and semi-public libraries, both in St. Paul and in Minneapolis.

ORGANIZATION

The school is organized in two sections, the elementary section and the college section.

The elementary section offers free of charge to all Minnesota teachers instruction in the common school studies and in all subjects required for the state teachers' certificates. Students pursuing successfully full courses, in not more than two of these subjects will receive corresponding credits toward the second grade or the first grade certificate. The instructors in the elementary section have been chosen from the men and women best acquainted with school conditions in various parts of the state and best fitted to assist teachers who desire a fuller training for elementary school work.

The college section is organized especially for the benefit of experienced teachers, who are seeking a state professional certificate, and for high school teachers who desire a better preparation to teach the various high school studies. For this purpose courses have been carefully arranged in nearly all of the required and optional subjects of the professional certificate. High school teachers will find an opportunity to pursue advanced courses in the subjects of the secondary curriculum. Students who complete successfully not more than two full courses in the college section will be credited with the corresponding subjects toward their professional certificate. The instructors in this section are largely drawn from the faculties of the University of Minnesota.

The work of both the elementary section and the college section is planned primarily for the teachers mentioned. At the same time it has been found possible to offer on the successful completion of various studies in the elementary section credit toward university

entrance requirements. In addition, the courses in the college section are so arranged, that qualified students may receive on the successful completion of not more than two full courses corresponding university credit. The courses with university credit offered in the present session amount to two-thirds of the total number of hours required for the bachelor's degree. By taking advantage of these opportunities teachers who have not finished their university work may be enabled to meet a considerable part of the requirements for graduation. It is hoped that year by year these opportunities may be made increasingly available to the ambitious and successful teachers of the state. To effect this it is necessary to make the work of the college section as nearly self supporting as possible, and therefore, certain fees are fixed for the work of this section. Instructors will endeavor to meet the needs of advanced students by giving individual attention and guidance in the investigation of special topics, for which appropriate courses are not established.

GENERAL OFFICES

The office of the conductor and the assistant conductor is with the college of education, Room 125, Folwell Hall. The office of the registrar is on the first floor of the library building.

ADMISSION AND REGISTRATION

Registration will begin at nine o'clock on Monday morning, June 21. After Wednesday, June 23, no students will be received, except by special permission. Those who desire to enroll will make application to a committee in the reading room of the library building. When registrations are approved by a member of this committee, students will report to the registrar. Those who desire credit toward the professional state teachers' certificate will apply to the registrar toward the close of the first week for special blanks, which must be filled out promptly and filed with the instructors of the courses in which credit is desired.

CREDIT

In the elementary section credits may be secured toward first and second grade certificates, or university entrance requirements, and by high school graduates only on the normal school course, in the following subjects: agriculture, algebra (elementary), arithmetic, civil government, composition, drawing, geography, geometry (plane), grammar, United States history, music, physical geography, physics (natural philosophy), physiology, and reading. All of these credits will have the value of state high school board certificates. Students should note under the various courses, which kind of credit may be secured and high school graduates who desire credit in the

normal school course should themselves make arrangements with the president of the school attended.

In the college section credits toward the state professional certificate or toward college graduation may be secured by qualified students in the following subjects: algebra, astronomy, botany, chemistry, drawing (freehand, mechanical and engineering), economics, education (including courses on general pedagogy, history of education, school organization and secondary education), English and American literature, French, geology, geometry (solid and descriptive), German, history, Latin, literary criticism, physics, political science, psychology, rhetoric, trigonometry, shopwork and zoology. Students should note under the various courses, which kind of credit may be secured.

EXAMINATIONS

At the close of the university summer school examinations for the state teachers' certificates will be conducted under the direction of the department of public instruction, and examinations for the professional certificates will be held by the state examining board.

CERTIFICATES

A state teachers' second grade certificate is issued to applicants not less than eighteen years of age, with not less than five months' teaching experience in the public schools, who have passed written state examinations in the following studies: arithmetic, civil government, composition, English grammar, geography, history of the United States, penmanship, physiology and hygiene, and reading and spelling with a credit of not less than 65 per cent. A first grade state teachers' certificate is issued to applicants, not less than eighteen years of age, with successful teaching experience of not less than eight months in public schools, who have successfully passed an examination in the above mentioned subjects, with a credit of not less than 75 per cent, and who have, in addition, passed written state examinations in algebra, plane geometry, natural philosophy (physics), and physical geography, with a credit of not less than 70 per cent, and civil government with a credit of not less than 75 per cent. In place of physical geography or plane geometry (or both) credits will be accepted in any one (or any two) of the following studies: general history, botany, rhetoric, zoology, chemistry, or agriculture.

The state professional certificate of the first grade is issued to applicants who have secured a state teachers' first grade certificate, who have taught successfully not less than nine months in a public school in the state, and who have passed successfully examinations in the following studies: psychology, general pedagogy, history of education, school organization and law; in at least two of the following: higher algebra, solid geometry and trigonometry; in at least two of

the following: American literature, English literature, rhetoric; in at least three of the following: ancient history, modern history, English history, American history; in at least three of the following: astronomy, botany, chemistry, geology and physiography, physics, political science, zoology. The state professional certificate of the second grade requires the four subjects first named above and at least six of the other subjects named.

FIELD DAYS AND EXCURSIONS

The vicinity of the Twin Cities abounds in objects of geologic and physiographic interest, in rock formations, old river gorges and glacial moraines; while the cities themselves with their parks, lakes, buildings, libraries and art galleries afford students every opportunity for the profitable use of their leisure hours and for field excursions on the free Saturdays.

UNIVERSITY GYMNASIUM

A special feature of the summer school is the free use of the entire equipment of the university gymnasium, including the running track and the swimming pool. Competent instructors offer courses in correctional training, physical culture, indoor and out-of-door games, including basketball, baseball, and direction of track athletics. Both men and women teachers are thus enabled to get the most scientific preparation for the physical training of their pupils.

LECTURE COURSE

A series of public lectures, concerts, and dramatic recitals, will be given during the session at four o'clock on Monday, Wednesday and Friday. On Tuesday and Thursday evenings from time to time literary, historical and scientific lectures will be offered, illustrated with stereoptican views.

Elementary Section.

AGRICULTURE

Mr. Mayne

A course in the elements of agriculture, conducted by means of text, recitations, farm observations and laboratory work. Full course: two periods each day, with field work. Credit on the first grade certificate, as an alternative for plane geometry or physical geography.

ALGEBRA

Mr. Critchett, Mr. Shumway and Mr. Stanley

I. An elementary course in the principles, processes and problems of algebra, corresponding to the first work in algebra in the public high schools. Text: Wells, Algebra for Secondary Schools. Full course: two periods each day.

No credit will be given for this course, but earnest students may gain much help in preparing for the regular teachers' examinations.

II. An advanced course, open only to those already familiar with the subject. Text: Wells, Algebra for Secondary Schools. Full course: two periods each day.

Credit on the first grade certificate.

ARITHMETIC

Mr. Farmer and Mr. Pryor

I. A course in arithmetic, covering the fundamental operations, common and decimal fractions, percentage, square and cube root, and arithmetical analysis. The intention is to show the best way each topic may be presented to pupils in the grades. Open only to students holding a second grade teachers' certificate or its equivalent. Text: Exercises in Arithmetic. (Northwestern School Supply Co.) Full course: two periods each day.

Credit will be given for arithmetic on the first grade certificate.

II. An advanced course in arithmetic, covering the entire subject. Principles, methods, devices, and short cuts are emphasized. All operations are illustrated concretely and the intention is to show the best way to present each topic to pupils in the grades. Open only to high school graduates or to those who have completed three years of high school work. Text: Exercises in Arithmetic. (Northwestern School Supply Co.) Full course: two periods each day.

Credit on the first grade certificate.

III. A review course in arithmetic, covering the principal operations; intended to prepare students for the state teachers' examination. Half course: one period each day. No credit.

CIVIL GOVERNMENT

Mr. Young and Mr. Selvig

I. Government of the United States. A general course dealing with the fundamental principles and forms of organization of the federal government. Text: Forman's Advanced Civics. Half course: one period each day.

II. Government of Minnesota. A study of the state government, revenue, education, institutions, and elections. Texts: Young's Minnesota and chapters from Forman's Advanced Civics. Half course: one period each day.

Credits: The two half courses may be taken together as a full course. Students who complete this full course satisfactorily will receive a certificate exempting them from examination in civil government for the state certificate. This summer school certificate will be received also by the university for entrance in place of examination in high school civics.

COMPOSITION.

Mr. Harris

A course in English composition, which carries credit on the first grade certificate, is offered under the title, methods IIb.

DOMESTIC SCIENCE AND DOMESTIC ART

Mrs. Blair and Miss Shepperd

Domestic Art.

I. Teachers' course. This course will consist of exercises on models and plans for graded work in the public schools, including basting, the seam, the hem, the gusset, the placket, patching, darning, button-holes, and other hand sewing. Full course: two periods each day.

II. This will consist of garment (including the shirt waist) drafting and making. Full course: two periods each day. Mrs. Blair.

Domestic Science.

I. An introductory course in domestic science, dealing with the chemistry of the table, the science of cooking, and the care of the kitchen and dining room. Full course: two periods each day.

II. An advanced course, primarily intended for those who are engaged in the teaching or supervision of this kind of work. Full course: two periods each day. Miss Shepperd.

A special fee of ten dollars will be paid by all students registering either for the work in cooking or for the work in sewing, and twenty dollars by those who register for both sewing and cooking.

DRAWING

Miss Clopath

I. This beginning half course is designed to give elementary training in drawing. It includes drawing from objects, from plants

and from figure poses, in pencil, in charcoal, in colored chalk, and in water color. Half course: one period each day.

No credit.

II. Composition and Design. This course will include exercises in composition, illustrating the various principles of decorative work. adaptation of plant form, color harmony, stencils, historic ornament and illuminated lettering. Instruction will be given in both courses in the methods found most successful in teaching drawing in the different grades. Students may register in both courses until the limit of accommodations is reached. Half course: one period each day.

Credit will be given to capable students with some previous knowledge of drawing who do with remarkable excellence the work of both courses, in the form of an indorsement for drawing on the first grade certificate.

For advanced work see under drawing in college section.

GEOGRAPHY

Mr. Lehnerts

General Geography. Advanced work with the two-fold purpose of mastering the facts and principles inherent in the subject matter and of discovering the best methods of organization for classroom work in grades. A thorough review covering: (a) The fundamental facts and principles of mathematical and physical geography and their relation to the distribution of life and the industries of man. (b) The western hemisphere with special emphasis on the geography of the United States. (c) The countries of the eastern hemisphere, and their commercial relations with the United States. Methods in geography teaching in the primary, intermediate and advanced grammar grades. Guiding principles. The course of study. Text-books and their use. Supplementary reading. Practical laboratory work for the grades. Excursions. Collection and preparation of illustrative materials. Map drawing, chalk modeling, and relief work. Organization of geographical subject matter for class-room instruction, and method of recitation. Type studies prepared from the double standpoint of pupil and teacher. Full course: two periods each day.

Credit on the first grade certificate.

(Experienced teachers who desire a credit in physical geography for the first grade certificate, may consult with the conductor of the school in regard to their registration.)

PLANE GEOMETRY

Mr. Kirchner and Mr. Stanley

I. An advanced course, open only to those already familiar with the subject. Text: Wells, Essentials of Geometry. Full course: two periods each day.

Credit on the first grade certificate.

II. A course for high school graduates only, who are familiar with the subject. Text: Wells, Essentials of Geometry. Full course: two periods each day.

Credit on the first grade certificate.

GRAMMAR

Mr. Critchett, Miss Booth and Miss Mott

I. A brief course in grammar, treating typical sentences of the plainer sort with consideration of the parts of speech, and special attention to the correction of common grammatical errors. Complex sentences will be analyzed and a study made of verbs and verbals. This course is offered as a review to students preparing for examination for the second grade certificate. Half course: one period each day.

No credit.

II. A full course in grammar, with the aim of fuller comprehension and a knowledge of better methods of teaching. Open only to students who have a second grade teachers' certificate or its equivalent. Text: Webster's English Grammar and Morse's Exercises in English Grammar. Full course: two hours each day.

Credit on the first grade certificate.

III. An advanced course in grammar, including the study of simple and complex sentences, a general survey of inflections, a study of the predicate, its complements and modifiers, particularly adverbial clauses. Open only to high school graduates or to those who have completed three years of high school work. Text: Webster's English Grammar. Full course: two periods each day.

Credit on the first grade certificate.

UNITED STATES HISTORY

Mr. Stomberg and Mr. Burger

I. The Colonial Period and the Revolution. Half course: one period each day.

II. From the Revolution to the Civil War—the growth of nationality. Half course: one period each day.

For each course students must be provided with Hart's Essentials in American History and Hart's Source Book of American History.

Credits. The two half courses may be taken together as a full course. Students who complete this full course satisfactorily will receive a certificate which will exempt them from examination in history for the first grade certificate.

METHODS

Mr. Harris, Mr. Hatch and Miss Staples

I. Primary Methods.

a. General methods as applied to subjects of direct experience. This course gives the methods of those subjects which are learned by direct contact with the situation (home geography, nature study,

and arithmetic), the means of expression (language, dramatization, drawing, construction, writing, singing), and fundamental considerations in regard to physical and moral health (personal and social habits, games, free play and rest, daily programs and recitations). Half course: one period each day.

b. General methods applied to subjects of indirect experience. This course handles in detail the methods in reading and literature, with a discussion of the proper materials and direction of seat work. Half course: one period each day.

II. Grammar Grade Methods.

a. Principles and practice of the grammar grades. In this course an attempt will be made to disclose the aims, characteristics, studies, and methods of the grammar grades. The aim of the course is to combine theory and practice in such a way as to make it as helpful as possible to the teacher in these grades. Such topics as the following will indicate the general nature of the course:—aims of the educational process in the grammar grades; nature and characteristics of the grammar grade child; principles of mental development in the grammar grades, with special reference to principles of impression, organization, and expression; the course of study in the grammar grades—social aspects of the curriculum; aims, materials, and methods in certain subjects of the course of study—arithmetic, reading, spelling, geography; the recitation in the grammar grades—practical exercises in the conduct of the recitation; special topics. Half course: one period each day.

b. Composition. In this course the purposes are: first, to set forth the aims and values of composition work in the grammar grades; second, to furnish the teacher with suggestions as to material and method that will prove helpful in her school work. Among the topics covered are the following:—aims and values of composition work—social value emphasized; oral and written English as the expression of the child's interests; furnishing a motive for composition; material for composition; correlation of composition with other subjects of the curriculum; methods of handling the material—the problem of organization; how to deal with the mechanics of composition; types of composition—reproduction exercises, dictation exercises, narration, letter writing, etc.; best methods of correcting written work. Half course: one period each day.

Credit for composition on first grade certificate.

III. Rural School Methods and School Economy.

a. General methods in recitation. An examination of the state course of study in its adaptation to the rural schools. Half course: one period each day.

b. School law and economy, with discussions of programs, materials, and books. Half course: one period each day.

c. Methods in reading, with discussions of reading material for

the several grades, and methods of presentation. Half course: one period each day.

Note: Additional suggestions as to methods of teaching are given in connection with the various courses in arithmetic, drawing, geography, grammar, history, and music.

METHODS OF THE KINDERGARTEN

Miss Boyd

A course in the theory and practice of kindergarten training will be given for the benefit not only of kindergarten teachers but also of primary teachers in graded schools and of teachers in rural schools. The text-book work and lectures will supplement practical facilities of observation. A group of children of kindergarten age will be taught each morning for two hours and subsequent discussions will be based upon these model lessons. Full course: two to four hours each day. A special fee of three dollars will be charged for this course.

MUSIC

Miss Trask

I. This course consists of a study of the foundation principles and best methods used in presenting elementary music from the kindergarten through the fourth year. The following subjects are considered:

a. The child-voice—its preservation and development in speaking and singing.

b. Children's songs—selection of suitable material and correlation with thought of month.

c. Song interpretation—how to idealize the themes of songs, and how to present them artistically to the child.

d. Ear training—development of tone perception, and development of rhythmic sense.

e. Monotones—causes, classes, suggestions and drills for correcting them.

f. Sight-reading—the logical steps in teaching songs and exercises by note.

g. Relation of music to other school work.

h. Suggestions for handling music without special teacher.

II. This course is designed for teachers having some knowledge of music and bears more directly on the work in the grammar grades. Discussion of subject as follows:

a. Voice exercises to retain vocal purity and cultivate clear enunciation; expressive rendering of songs.

b. Advanced work in rhythm, such as the introduction of the triplet, syncopation and the unequally divided pulse.

c. Advanced work in tonality, such as chromatic tones, minor scales, etc.

d. Two-and-three-part singing; classification of voices; the treatment of changing voices; the cause and remedy of flattening.

e. Logical presentation of the lesson.

III. Teachers' course. This course is planned for those who desire to specialize in public school music and includes professional methods for all grades, practice in advanced sight-singing, ear-training, and theory of school music.

A special fee of ten dollars is charged for this course.

NATURE STUDY

Miss Lillie

I. This course will include talks on nature study, its meaning, purposes, educational value, methods and relation to other studies, with illustrative lessons on plants and animals. Half course: one period daily.

II. A course introductory to a special study of trees, arranged with reference to the needs of the public school teacher. Half course: one period daily.

Field trips or observation lessons, requiring an afternoon, such as visits to the school of agriculture, will be arranged at convenient times.

PHYSICAL TRAINING

Miss Butner and Mr. Foster

The summer school offers extraordinary advantages in the line of physical training, with facilities for every line of class or competitive work, including the swimming pool, twenty-five by sixty feet in size and from five to nine feet deep, the quarter mile oval outdoor track, the fourteen lap indoor cork track, the baseball field, the forty by ninety basketball court, and three open and four inclosed handball courts, together with a fully furnished modern gymnasium and complete locker and bathing facilities for both men and women.

I. Physical training for women. This course will consist of systematic work with Indian clubs, dumb bells, wands, and bar-bells, together with arm and foot calisthenics, and games. The rhythmical work will include folk-dances where the movements are large and vigorous, and the freedom and simplicity of the early dances will be emphasized. These exercises will be taught with special reference to posture and organic effect. The course will be especially valuable to teachers, but it is open for registration by all summer school students.

II. Physical training for men. This course will consist: first, of lectures covering generally the field of physical education, with special emphasis on exercise—body-building, recreative, and corrective,—diet, bathing, clothing, sleep, anthropometry, and first aid to the injured; second, of practical work along the following lines: (a) free hand, dumbbell, and Indian club drills, suitable for calisthenic work in school, home, or gymnasium; (b) running and light apparatus drills; (c) competitive games, including running, basketball, handball, and baseball; (d) a course in swimming including various styles of swimming and fancy and long distance diving; (e) class management—

ELEMENTARY-SECTION-PROGRAM

Instructor	Building	Room No.	I		II		III		IV		V		VI		VII VIII	
			8:15 to 9:05	9:15 to 10:05	10:50 to 11:40	11:50 to 12:40	2 to 2:50	3 to 3:50	4 to 6:00	4 to 6:00						
Mayne	Pillsbury										Agriculture					
Critchett	Folwell	102					Algebra I									
Shumway	Folwell	104					Algebra II									
Farmer	Mech. Arts	16		Arithmetic II			Arithmetic I				Arith. III					
Pryor	Mech. Arts	19		Arithmetic I			Arithmetic II									
Selvig	Folwell	226	Civics I	Civics I			Civics I	Civics I								
Young	Folwell	201	Civics II	Civics II			Civics II	Civics II								
Blair	Law	5		Domestic Art I*			Domestic Art II*									
Shepperd	Med. Sc.			Domestic Science II*			Domestic Science I*									
Clopath	Armory		Drawing I	Drawing II			Drawing I									
Lehnerts	Pillsbury			Geography								Geography				
Stanley	Folwell	104										Plane Geometry				
Critchett	Folwell	102		Grammar II												
Booth	Folwell	109					Grammar III				Grammar I	Grammar I				
Burger	Library	17	History I	History I			History II	History II			History I	History II				
Stomberg	Folwell	206					History I	History II								
Boyd	Folwell			Kindergarten Class*			Kindergarten Methods*									
Staples	Folwell	213	Methods I a	Methods I b			Methods I a	Methods I b								
Harris	Folwell	110	Methods II a	Methods II b			Methods II a	Methods II b								
Hatch	Law	4		Methods III a			Methods III b	Methods III c			Methods III a					
Trask	Folwell	9	Music I	Music II			Music I				Music III*					
Lillie	Med. Sc.		Nat. Study I	Nat. Study II							Nat. Study I					
Butner	Armory										Physical Culture					
Foster	Armory										Physical					
Kovarik	Physics	16	Physics†	Physics			Physics	Physics							Culture	
Johnson	Pillsbury			Physiology												
Holt	Folwell	301					Reading I				Reading II					
Sanford	Folwell	311						Reading III								

CHAPEL

NOON INTERMISSION

GENERAL LECTURES

†Physics lecture the first hour goes with one recitation, the second, third or fourth. *Special fee.

COLLEGE-SECTION-PROGRAM

Instructor	Building	Room No.	I		II		III		IV		V	VI	VII VIII
			8:15 to 9:05	9:15 to 10:05	10:50 to 11:40	11:50 to 12:40	2 to 2:50	3 to 3:50	4 to 6:00				
Dalaker	Folwell	105	Algebra I		Algebra II								
Lee	Folwell	124	Astronomy										
Huff	Pillsbury				Botany I or II*		Field Work Required						
Frankforter	Chemistry		Chemistry*		Chemistry*		Chemistry*						
Clopath	Armory				Drawing III								
Phelan	Library	18	Economics I		Economics II								
Rapeer	Folwell	227			Education I		Education III						
Rankin	Folwell	101	Education II										
James	Folwell	124			Education IV								
Andrist	Folwell	202	French I		French II								
Hall	Pillsbury				Geology I		Geology II		Field Work Required				
Schlenker	Folwell	212	German II		German I								
White	Library	7	History I	History II	History III								
Pike	Folwell	107	Latin I		Latin II	Latin III							
Sanford	Folwell	311	Literary Crit		Literary Crit								
Firkins	Library	8	Literature I		Literature I	Literature II							
Flather	Mech. Eng.		Manual Training†		Manual Training†		Manual Training†						
Zeleny	Physics		Physics*		Physics*		Physics*						
Schaper	Library	16	Politics III	Politics II	Politics I								
Miner	Folwell	322							Psychology I				
Miner	Folwell	322					Psychology II						
Sanford	Folwell	311	Rhetoric										
Shumway	Folwell	104	Trigonometry										
Kirchner	Mech. Arts	24	Descriptive Geometry		Solid Geometry		Engineering Drawing						
Holt	Folwell	301	Voice I	Voice II									
Johnson	Pillsbury				Zoology*								

CHAPEL

NOON INTERMISSION

GENERAL LECTURES

*Laboratory fee. †Special Fee.

instruction in directing classes in calisthenics and upon the apparatus;
(f) instruction in track and field events and methods of conducting competitive meets.

PHYSICS

Mr. Kovarik

A course in the mechanics of solids and fluids, cold and heat, will be given in lectures and recitations. Full course: two periods each day, viz: one lecture and one recitation period.

No one is expected to register for this course without a knowledge of elementary algebra (through quadratic equations); each student who registers must have studied plane geometry or must register for this subject along with the course in physics; not to be taken for high school credit.

Credit on the first grade certificate.

PHYSIOLOGY AND HYGIENE

Mr. Johnson

Elementary. A lecture and recitation course, designed especially for those who intend to teach the subject in graded schools or high schools. Text: "The Human Mechanism," Hough and Sedgwick. Full course: two periods each day. Credit on the first grade certificate.

READING AND ELOCUTION

Miss Sanford and Mr. Holt

I. An elementary course. Some time will be spent in reading before the class. Special attention will be given to correct methods of breathing, elementary sounds of the language, enunciation and pronunciation, and vocal defects such as "nasal" or "throaty" voice. This course is particularly valuable to people of foreign parentage who have not yet fully mastered the spoken English. It is also essential for all who wish to teach language to beginners. Half course: one period each day.

II. A general course in reading and vocal expression. This course is intended for the average student who has no special vocal defects, but wants to develop his own power as a speaker, and learn methods. The work consists mainly in daily practice before the class in reading short passages from standard literature to develop variety and power. There will be daily drill in correct breathing, good standing position, and clear enunciation. A simple, clear and forceful style of delivery is the aim of this course. Half hour, one period each day.

III. Reading Shakespeare. This course is designed mainly for those who teach reading in graded and ungraded schools. It will, however, give help to those who teach English in high schools, enabling them to make the study of Shakespeare and other masters more interesting through correct rendering of the text.

College Section.

ALGEBRA

Mr. Dalaker

I. Higher Algebra.—First part.

A knowledge of some elementary algebra is required. The course will include the fundamental rules, factoring, divisors, multiples, fractions, theory of exponents, involution, evolution, surds, imaginaries, equations (simple and quadratic), with many problems. The course will be given with special reference to the best methods of teaching the subject. Full course: two periods each day.

This course will be credited either for university entrance or for course one in mathematics, the first semester of the freshman year.

II. Higher algebra.—Second part.

This course includes variations, quadratic equations, special 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. Full course: two periods each day.

This course will carry credit for the second semester of the freshman year.

To gain credit for higher algebra toward a professional state teachers' certificate both of the above courses must be taken.

ASTRONOMY

Mr. Lee

A course in general astronomy, by text study and laboratory observations. Text: Young's Elements of Astronomy. Full course: two periods each day.

Credit on professional certificate or university credit for the first semester of course one in astronomy.

BOTANY

Mr. Huff

I. Elementary course. The course is designed for beginners in botany. It will include a study of types from the different branches of the vegetable kingdom, selected to show the gradual evolution from lower to higher forms. Special attention will be paid to the flowering plant series with instruction in the collection and classification of such plants. Field work will be emphasized and the plants will be studied in their native habit. Full course: two periods each day, in addition to lectures and field work.

Credit on first grade certificate or for first semester of course one in botany.

II. Advanced and teachers' course. This course is designed to meet the needs of high school teachers and students who have had elementary botany. It will deal primarily with the flowering plants. These will be studied from the point of view of their evolution and relationship, and their distribution and grouping in nature, in connection with migration, adaptation, etc.

The laboratory work will consist of four two hour sessions a week, and will be supplemented by lectures illustrated with lantern slides. Students entering this course must have had some preparatory work in botany. Full course: two periods each day.

Credit on professional certificate or for first semester of course five, taxonomy.

CHEMISTRY

Mr. Frankforter, Mr. Frary and Assistants

Ia. This course is equivalent to the first semester of the freshman inorganic chemistry. The work covered includes all of the non-metallic elements, with an introduction to physical chemistry. The course consists of lectures, recitations and laboratory work. The lectures are largely experimental, and are especially arranged with regard to work which can not be done in the laboratory, but which is of importance to the teacher. The recitations include, besides a quiz in general theoretical chemistry, discussions of the ionic theory, chemical equations and stoichiometrical calculations. The laboratory work will follow the lectures and will give the student an opportunity of verifying the common chemical laws by experiment. Special attention will be given to laboratory work and laboratory methods.

Ib. This course is an equivalent to the second semester of freshman inorganic chemistry and is a continuation of Ia. The nature of the work is, however, somewhat changed. Less attention will be paid to theory and more to the technical, industrial and metallurgical side. In addition to a study of the common metals, special attention will be given to their compounds and their uses.

IIa. Qualitative analysis. This course is equivalent to the first semester of sophomore chemistry, and is offered to those who have a thorough knowledge of general inorganic chemistry. The work will include an introduction to the subject of qualitative analysis with a discussion of the chemical laws involved and the qualitative separation of the metals. The aim of the course will be to give the teacher a thorough training in the qualitative separation of the metals, in order that he may more fully grasp the subject of practical chemistry.

IIb. Qualitative analysis. The course is equivalent to the second semester of sophomore chemistry, and is a continuation of IIa. The course includes a study of the qualitative separation of the non-metallic or acid-forming elements with their characteristic qualitative tests. This course must have as a prerequisite IIa.

III. Quantitative analysis. This course is especially arranged for teachers who are desirous of studying analytical chemistry proper. The course requires as a prerequisite a thorough knowledge of qualitative analysis. The work covered will be an introduction to gravimetric analysis with special reference to the chemical balance. The substances used in these analyses will be chosen with special reference to their practical and industrial uses, so that in addition to a wide experience and training in exact chemical work, valuable knowledge may also be acquired.

Note—Each of the above is a full course, requiring three periods each day.

Credit: For university as indicated, and also for the professional certificate, if the entire time of the student be given to chemistry during one session.

DRAWING

Miss Clopath

Course III. This advanced half course will include work in representative, decorative and industrial art work, and will meet the need of the special teachers in drawing. There will be out-door sketching and designs will be applied to simple forms of handicraft (modeling, weaving, tooled leather, perforated metal). Lectures will be given on the principles of art teaching under the aspects found most successful in public school work.

University credit for course one in drawing will be given for complete summer school course (four hours daily).

DRAWING, MECHANICAL AND ENGINEERING

Mr. Rowley

This course is designed especially for manual training teachers and engineering students.

University credit by arrangement with instructor.

ECONOMICS

Mr. Phelan

I. Elements of economics. A general survey of economic science, including a general study and discussion of the character and important problems of present day economic life. This course is designed both as an introductory one for those who desire to take up a more or less extended study of economics and as a course for those who desire such general knowledge of economic problems as is necessary to an intelligently active citizenship. Lectures, assigned readings, and discussions. Text: Seager's Introduction to Economics. Full course: two periods each day.

University credit for course one in economics and credit for economics as one-half the requirement in political science for the professional certificate.

II. Economic history of England. This course is prefaced by a few lectures on English industrial and social history prior to the eleventh century. The course proper begins with a discussion of the economics of the Manorial system in that century. The development in England from the corporate life of the middle ages with its local control of economic activity and conditions to the new associative control and national regulation of modern times is traced. Particular attention is given to the English Industrial Revolution and the economic philosophy of Adam Smith and his followers, and an attempt is made to draw lessons of guidance for the present and the future. Lectures, assigned readings, and discussions. Text: Cheyney's Industrial History of England. Half course: one period each day.

Accepted for three hours university credit when supplemented by extra work prescribed and directed by the instructor.

EDUCATION

Mr. James, Mr. Rankin and Mr. Rapeer

I. Theory of teaching. This is a course in the theory and practice of teaching. It includes a discussion of the nature, aims, and elements of education, with problems in applied psychology. An attempt is made to give the student a broader view-point for the judgment of educational aims, values and methods. Full course: two periods each day.

Credit on "general pedagogy" for professional certificate and also university credit for course seven in education.

II. History of education. An introductory course in the history of education. The early part of the course will consist of a discussion of ancient theories and ideals and their bearing on modern education; then the Renaissance and the Reformation will be studied in their relation to educational progress. From this point the development of educational methods and ideals will be traced down to the present time. The course aims to arouse a deeper interest in education and to give the students close knowledge of such educational leaders as Rousseau, Pestalozzi, Froebel and Spencer. Full course: two periods each day.

Credit on professional certificate and also university credit.

III. School administration. 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 architecture and hygiene. Full course: two periods each day.

Credit will be given for "school organization and law" on the state professional certificate, and also university credit for course eight in education.

IV. Secondary education. This course is a study of secondary education, the place and function of the high school, its curriculum, current problems. Half course: one period each day.

University credit of three hours for one semester will be given to qualified students, who complete both the work in class and special readings and paper work, assigned by the instructor.

FRENCH

Mr. Andrist

I. A beginning course. Special attention will be given to pronunciation and conversation, based on Fraser & Squair's Elementary Grammar. Easy stories will be read during the last half of the course. Full course: two periods each day.

Credit for the first semester of the freshman year will be given only for very good work.

II. For students who have already a fair knowledge of grammar and can read at sight. French will be used almost exclusively in this course and some well-known modern novel read. Full course: two periods each day.

Credit will be given for this work at the discretion of the instructor.

GEOLOGY AND GEOGRAPHY

Mr. Hall and Mr. Lehnerts

I. Physical geography. Modern views on the common problems of physical geography will be presented. Subjects considered: phenomena of weather and climate; rock weathering, rivers and river valleys with their successive stages and their relation to agriculture and commerce; plains and plateaux—origin and structural relations and their varied economic features. Also mountains and volcanoes,—mountain-building, crustal displacements, ore deposits; glaciers—the glacial period and glacial results in Minnesota. Text: Gilbert and Brigham's Physical Geography. Full course: one lecture period each day and field work.

University credit will be given for course two in geology.

Professional certificate credit for geology and physiography requires the completion of course one and course two.

II. The elements of geology. This subject will be treated under the following subdivisions:

a. Geodynamics—air, water and vulcanism as sources of energy, with a discussion of the phenomena traced to them; the destructive and reconstructive effects of these forces will be considered.

b. The principal minerals will be described, (1) rock-forming, (2) economic interests in their relation to industries.

c. The architecture of the earth, the aggregation of minerals into rocks by the various processes of rock building; the aggregation of minerals into rocks and the principles of metamorphism.

d. Historical geology—the facts and phenomena of living beings and the results of their existence on the earth.

Text: Scott's Elements of Geology. Full course: one lecture period each day with additional hours for field work and recitation.

Credit: qualified students may secure on this course university credit for course one in geology.

Credit for geology and physiography on the professional certificate may be gained by students who complete successfully both the above courses.

III. Field work. The great advantage of the field in these nature studies makes this an essential part of every course offered. Afternoon excursions will be made to near-by places of geographic and geologic interest, and to manufacturing and commercial establishments and establishments of industrial interest. All-day excursions will be offered to more distant localities for the study of glacial lakes, lava flows, ancient river beds, and other surface features. Nature study will replace book study and pedagogical interests will be kept in mind.

Teachers having cameras will have abundant opportunities to gather illustrative material.

GEOMETRY, SOLID AND DESCRIPTIVE

Mr. Kirchner

I. Solid geometry, covering the subject as presented in the high schools and in the freshman college year, including the required problems and constructions. Text: Wells, Essentials of Geometry. Full course: two periods each day.

Credit: this course is counted either for university entrance, or for the professional certificate.

II. Descriptive geometry, open only to properly qualified students. Recitations, lectures and practice. Full course: two periods each day. Three university credits on successful completion of the course.

GERMAN

Mr. Schlenker

I. An elementary course in grammar and composition, with readings and conversation based on text. Some previous knowledge of German is required of all students who expect any credit. Full course: two periods each day.

University credit will be given students doing exceptionally good work in this course and may be arranged with the instructor.

II. An advanced course in German, more particularly for teachers in which difficult points in grammar and syntax are treated, with illustrative exercises, and a consideration of methods of modern language instruction. One hour will be devoted to conversation on topics or readings. This course is primarily for teachers or those who expect to teach German. Full course: two periods each day.

A university credit will be given to successful students for the second semester of course two in German.

HISTORY

Mr. White

I. The Foundations of England, 449-1399. During this period the English constitution was evolved, and, while the general narrative will not be neglected, the emphasis will be upon institutions. It will be the purpose to gain some understanding of the genesis of the central law courts, the jury system, Parliament, and the principle of limited monarchy. Text: Andrews' History of England; source book: Cheyney's Readings in English History. In this and the two following courses a reasonable amount of collateral reading will be required. Half course: one period each day.

II. England in the Renaissance and Reformation Period, 1399-1688. This course begins with the accession of the House of Lancaster, when the broad outlines of the present forms of government in England, both central and local, had taken shape. In the period covered, especially in the Tudor and Stuart reigns, this newly-formed constitution was developed and tested, and the results of the Renaissance and the Protestant Revolution became prominent in politics and society. The course closes with the great revolution which brought William and Mary to the throne and resulted in the Bill of Rights. Half course: one period each day.

III. The Renaissance and Reformation, 1300-1555. The Renaissance and Reformation will be studied in general European movements, with emphasis upon individual men and upon ideas rather than upon politics and institutions. The course does not touch upon English history. Students will buy Seebohm's Era of the Protestant Revolution, Whitcomb's Source Book of the Renaissance, and the "Reformation Number" of the Pennsylvania Translations and Reprints. Half course: one period each day.

The successful completion of courses one and two entitles the student to three university credits (equivalent to the first semester of course two in history) or to credit for English history toward a professional certificate. The successful completion of courses one and three entitles the student to three university credits (equivalent to course three in history) or to credit for modern history toward a professional certificate.

LATIN

Mr. Pike

I. A course in beginning Latin, either for those who have never pursued the subject or for those who desire to review the elements of the language. Half course: one period each day.

II. A course in elementary Latin composition. Some previous study of the language is a prerequisite for this course. Methods of teaching the subject will be discussed with those who intend to teach. Half course: one period each day.

III. Caesar. One book of Caesar will be read. For those who intend to teach, the subject of indirect discourse will be explained

at length, and colloquial drill given, based upon the text. Half course: one period each day.

Note: Special arrangements may be made with the instructor by those who wish other courses than those outlined above or by those who wish other university credits or to pursue graduate work.

LITERARY CRITICISM

Miss Sanford

The work will consist of the study of masters of English prose and poetry, with special reference to those qualities of style by which their effects are produced. The aim will be the formation of a correct literary taste, a wider knowledge of classic English, and a keener relish for good literature. The works of standard English authors will be constantly needed for reference. The university library will be at the service of the class. Half course: one period each day.

Credit: Professional certificate and university credit as indicated under rhetoric.

LITERATURE

Mr. Firkins

I. English poetry, 1700-1825. This course will include Dryden, Pope, Collins, Gray, Thomson, Cowper, Burns, Wordsworth, Coleridge, Southey, Scott, Byron, Shelley, Keats, Landor, and others. Full course: two periods each day.

University credit or credit on professional certificate will be given to qualified students.

II. American poetry and fiction. The great American poets, including Longfellow, Whittier, Lowell, Holmes, Poe, and Whitman will be discussed, and the development of American fiction during the last century with particular reference to Irving, Cooper, Hawthorne, Poe, Howells, James, Miss Wilkins, Miss Jewett, and Mrs. Wharton will be traced. Half course: one hour each day.

Professional certificate and university credits may be obtained by students who complete both the work in class and the courses in outside reading arranged by the instructor.

Note:—Textbooks will be used in neither course, but students owning texts of the writers named will find them a substantial help. Readings will be assigned in books furnished by the library of the university.

PHYSICS

Mr. Zeleny

A course in electricity and magnetism and light will be given through recitations, experimental lectures, and laboratory work. A knowledge of algebra and plane trigonometry is required of those taking this course.

A double university credit, six hours for the second semester of the sophomore year, will be given to students who complete the

course satisfactorily, giving their whole time during the summer school to this subject alone. Credit for physics on the state professional certificate may be secured by completion of this course.

Note:—A continuation of this course, treating of the mechanics of solids and fluids, heat and sound may be expected in the Summer School of 1910, and for that, credit on the state professional certificate will be given, and to students who give their entire time to this work a double university credit for physics in the first semester of the sophomore year.

POLITICAL SCIENCE

Mr. Schaper

I. Elements of American Government. A course dealing with the origin, present organization and administration of the national government and the government of Minnesota. The latest improvements in the civil service, the new naturalization law, Pure Food Law, and other recent legislation will be explained. Text: Hart, Actual Government. The work includes lectures and assigned reading. Full course: two periods each day.

Credit for one-half of political science on professional certificate (the other half being gained by completing course one in economics) or university credit for course one in political science.

II. Municipal Government. This course deals with the problems of the modern city, such as the framing of city charters, the latest attempts at charter making, the administrative organization of some leading cities, the merit system, political parties, police and fire protection, sanitation, and the management of public utilities. Text: Goodnow, Municipal Problems. The work includes lectures, discussions, and reports. Half course: one period each day.

Credit: duly qualified students desiring the university credit for course seven in political science may arrange to do additional work in connection with the course under the direction of the instructor.

III. Teachers' Course in Government. This course deals with the methods of teaching government: the examination of text-books, the selection of a library, the collection of documents and blanks, the planning of visits to governmental bodies, etc. An account will be given of "The Report of the Committee of Five of the American Political Science Association on Instruction in American Government in Secondary Schools" just published, and other recent reports and suggestions to teachers. The work will consist of lectures and reading. Two recitations per week; hours to be arranged.

Credit: properly qualified students may receive the university credit for course thirteen in political science by taking the work.

PSYCHOLOGY

Mr. Miner

I. An elementary course in psychology. The purpose of the work is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psy-

chology. The instruction is as untechnical as possible, and emphasis is placed upon the conception of mental life as a growth. Full course: two periods each day.

Credit will be given on this course for psychology as required for the state professional certificate and duly qualified students will receive also credit for the university course in psychology. (Course one in philosophy.)

II. A course in educational psychology. The study of mental development in its relations to heredity and training. Lectures and reports on the facts and theories of childhood and adolescence, with special reference to their bearing on education. This course is open only to those who have studied general psychology. Half course: one period each day.

Students who pursue this course successfully and do the additional reading and report work required by the instructor may receive a university credit for educational psychology. (Course two in philosophy, or course three in education).

RHETORIC

Miss Sanford

A half course, one period each day. Students who combine with this the course in literary criticism will receive professional certificate or university credit for rhetoric.

TRIGONOMETRY

Mr. Shumway

A full course, two periods each day, carrying professional certificate and university credit. Text: Bauer and Brooke's Trigonometry.

VOICE CULTURE

Mr. Holt

I. A general course in vocal expression for the average student who wants to improve his effectiveness as a speaker or teacher. Some time will be given to drill in correct breathing, elementary sounds, and a good standing position, but for the most part the work consists of daily practice in reading short selections from standard literature, prose, and poetry before the class, to improve the articulation, strengthen the voice, and give variety and power to the student's expression. The course aims at simplicity, naturalness, and earnestness in expression. Great emphasis is laid on correct and sympathetic interpretation. Half course: one period each day.

II. Advanced course, for those who have had course one or its equivalent. This course is intended especially for high school teachers of English and rhetoric, and for other teachers of vocal expression. The work consists in reading some of the classics used in high schools, including at least one Shakespearean play, the presentation of complete platform readings before the class, methods for coaching recitations and orations for high school and college contests, and

methods for the selection and presentation of plays for high schools and colleges. Three university credits for courses one and two. Half course: one period each day.

ZOOLOGY

Mr. Johnson

General Zoology. A course of lectures and laboratory work, planned with special reference to the teaching of zoology in the schools. Text: Colton's Zoology, Descriptive and Practical. Full course: two periods each day.

Credit for zoology on the state professional certificate will be given to successful students, and university credit for the first semester of course one in general zoology.

LIBRARY TRAINING SCHOOL

Miss Baldwin, Director

This school is under the direction of the Minnesota Library Commission, and is therefore not included in the regular courses of the Summer School. The course is planned to meet the needs of the smaller public libraries which cannot afford trained librarians, and includes instruction and practice work in classification, cataloging and the technical details of library work, with lectures on the general organization and administration of a library.

The course is open to all holding library positions, or under definite appointment to such positions, and to teachers in charge of school libraries. Individual attention will be given to the special problems of work in school libraries.

For further information regarding the outline of work, program, fees, etc., address Miss Clara F. Baldwin, Secretary, Public Library Commission, St. Paul.

Department of Manual Training for Teachers and Engineering Students.

Mr. Flather, Mr. Shipley, and Mr. Richards

This department was established five years ago for the benefit of manual training teachers and for those students in engineering who desire to take a portion of their shopwork during the summer session, and thus obtain more time for the regular class-room work of their respective courses.

Each student may elect such work as he desires to take and for which he is found to be fitted. In general, it would be well to devote at least four hours each day to work in the shops. The rest of the time may be profitably employed in mechanical and free-hand drawing and such lectures as may be desired.

Students in high schools will be admitted to the shopwork courses, and by working eight hours a day, for six days per week, they can obtain in two summer periods, the full complement of shop work usually given in a manual training high school course.

Furthermore, students in the preparatory schools can thus clear off a large portion of the required shop work in the College of Engineering, so that when they take up their engineering courses they will be credited with as much of this work as they have taken in advance.

For the work in Sloyd and manual training in wood work, a carefully graded series of models has been chosen and will be taken up systematically. In the selection of these exercises the utilitarian idea has been prominent, and the construction of the models illustrates primarily fundamental principles and processes rather than the mere exercise. While facility of execution is gained by the use of the tools, the main object is to prepare the teacher for carrying out similar lines of work in his or her own school. A course is also offered in iron work in order to meet the requirements of those who wish to fit themselves to teach this subject.

The following schedule of exercises will be maintained both for manual training teachers and for those who elect to do their shop work during the summer, as well as high school students who are preparing for the engineering courses. For those who choose to pursue further any of the special lines of work indicated in the schedule, the course will be extended beyond the scope of the work given to the class in so far as the qualifications of the student and the equipment will permit.

COURSE I, MANUAL TRAINING IN WOODWORK

A systematic course in the use of the saw, plane, gouge, paring chisel and kindred carpentry tools. Training in the use of carving tools in Sloyd, geometrical and chip carving. Systematic training at the lathe in the use of the gouge, chisel, and various other turning tools.

COURSE II, MANUAL TRAINING IN IRON WORK.

This embraces practice in wrought and cast iron with the hammer, chisel, and file at the vise; also training in the use of file and scraper on wearing surfaces. Practice on the engine lathe, in connection with which are taught the elementary features of boring, turning and screw cutting. It will also include the methods of determining the diameter of blanks for spur and bevel gears on the lathe, and in cutting teeth with the milling machine.

COURSE III, ENGINEERING COURSE IN CARPENTRY AND PATTERN-WORK.

Training in the use of carpentry tools. Planing, Sawing, Gouging, Paring, and Joining. Training at the lathe in the use of lathe tools. Beading, Filleting and Faceplate Work. Construction of patterns for molding and casting.

University credit will be arranged with the department.

COURSE IV, ENGINEERING COURSE IN MACHINE WORK AND TOOL CONSTRUCTION.

The course covers the work required of mechanical and electrical engineering students in machine shop practice. The lectures accompanying this course are taken with the regular classes the following year, without extra fee.

University credit will be arranged with the department.

The fee for any of the above courses is \$25.00 for the full course of eight hours per day for six weeks. A short course of four hours per day is given under each of the above courses, for which a fee of \$15.00 is charged.

Persons desiring to take work in this department of the summer school during the coming session are asked to make application to the registrar on or before June 1st, 1909.

General Announcements.

1. Enrollment begins Monday, June 21st, at 9:00 a. m., and closes Wednesday, June 23rd, at 5:00 p. m.

2. Candidates for the state professional certificates and for university credits are required to make application on Friday, June 25th, on a special blank in addition to the general registration.

3. Recitations begin on Tuesday of the first week and continue through Saturday. During the following weeks recitations begin on Monday and continue through Friday.

4. Examinations will be given at the close of the session upon entrance subjects to the university and certificates will be issued on standing of 75 per cent and over. These examinations are open only to the students registered in the respective subjects and the certificates will have the rank and value of those issued by the high school board and will be so accepted by the department of public instruction. Examination will be given on July 30th and 31st in the following subjects: agriculture, elementary algebra, arithmetic, civil government, composition, geography, geometry, grammar, United States history, physical geography, physics, and physiology.

5. Candidates for the state professional certificate will be under the inspection of a committee of the state examining board, and will receive credit upon a satisfactory report of this committee and the instructor. Applicants must in most cases have previous knowledge of the subjects pursued and may not register in more than two subjects.

6. University credits may be secured in various departments by students who register for not more than two full courses, for each of which three hours' credit will be given for one semester. Credit may

be secured in algebra, astronomy, botany, chemistry, drawing, economics, education, English and American literature, French, geology, geometry, German, history, Latin, literary criticism, physics, political science, psychology, rhetoric, trigonometry, zoology, and complete credit for shop work for engineering students.

7. An examination for the state professional certificate will be held at the University by the state examining board on August 2nd, 3rd and 4th.

8. An examination for the state teachers' certificates will be held at the University on August 2nd, 3rd and 4th.

The complete program of examinations will be reported during the session of the school.

9. Fees.

(1) Instruction in elementary courses is free to teachers of the State of Minnesota; to others the fee is four dollars.

(2) Instruction in the college courses is open to teachers of the State of Minnesota for four dollars and to others for nine dollars. All students who desire university credits will pay nine dollars. In addition, three dollars will be charged for each of the laboratory courses in botany, chemistry, and zoology, and six dollars for the double course in physics.

(3) Every member of the school will pay a registration fee of one dollar.

(4) Courses in domestic science and domestic art and the advanced course in music carry a fee of ten dollars for each subject. The manual training course is fifteen dollars for a half day and twenty-five dollars for a full day; kindergarten methods three dollars.

- [a) An actual resident of Minnesota who is a teacher, whether teaching in the state or not, will be received as a Minnesota teacher.
- b) A non-resident who has engaged to teach in this State will be received as a Minnesota teacher.
- c) Those who have completed school courses and express a bona fide purpose to teach this coming year, and all students in normal schools, will be accepted as teachers.]

10. Good board and pleasant rooms are always to be had at reasonable rates near the University. A list of such places, stating location and prices, will be ready about the middle of May and will be sent to any address on application to the registrar. Several good restaurants are to be found in the immediate vicinity of the University.

Books and other necessary supplies are to be had at the University Book Store and the Northwestern School Supply Company, both located near the campus.

Correspondence with reference to the school, and requests for circulars, may be addressed to Mr. E. B. Pierce, Registrar, University of Minnesota, Minneapolis, Minn.