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Bulletin of the
UNIVERSITY OF MINNESOTA



*Graduate Programs in Medicine,
Dentistry, and Pharmacy, 1955-1958*

How to Use This Bulletin

The section on "Requirements for Advanced Degrees in Medicine" in this bulletin is your official source of information about the policies of the Graduate School and about procedures in earning graduate degrees in the medical fields. Do not fail to read it.

The section entitled "Fields of Instruction" contains statements of the policies and requirements of the various departments and listings of the course offerings in those departments.

Symbols and Explanations

A course sequence separated by hyphens (121f-122w-123s) must be taken *in the order listed* unless it is specifically stated that a student may enter any quarter. When course numbers are separated by commas (121f,122w,123s) the student may enter any quarter. Suffixed letters separated by commas (121f,w,s,su) indicate the repetition of the course in corresponding quarters. The suffixed f,w,s,su indicate fall, winter, spring, and summer quarters.

When no departmental prefix precedes the number of a course listed as a prerequisite, this prerequisite course is in the same department as the course being described.

A prerequisite reading "5 cred." means 5 credits earned in courses offered by the same department as that offering the course being described.

The following symbols are used throughout the course descriptions and will not carry any page footnotes:

* An asterisk indicates courses through which it is possible to prepare required Plan B papers.

† A dagger indicates that all quarters of a course preceding the dagger must be completed before credit is granted for any quarter.

‡ A double dagger following a sequence course number indicates that students may enter any quarter.

§ This symbol appearing in the prerequisites means "consent of the instructor."

¶ A section mark indicates that credit is not given if the equivalent course listed after the section mark has been taken for credit.

¶ A paragraph symbol preceding a course number in prerequisites for a given course means that the prerequisite course is to be taken simultaneously.

Courses numbered between 100 and 200 are open to both graduate and undergraduate students except in dentistry and a few departments of the Medical School. Those numbered 200 or above are for graduate students only.

Students should consult the *Class Schedule* each quarter for the hour and place of a given course.

Generally, the work is described in two separate groups—that given at the Medical School, and that given at the Mayo Foundation. The special prefix M is added to courses offered at the Mayo Foundation.

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Graduate Programs in Medicine, Dentistry, and Pharmacy

GENERAL INFORMATION

The graduate work in medicine here outlined is not intended for those seeking brief practitioners' review or demonstration courses. Opportunities of this kind are described in the folder *Center for Continuation Study*.

Purpose—The object of graduate work in medicine at the University of Minnesota is to promote the development of investigators and teachers and of fully qualified specialists, with training in the scientific method of investigation, for medical practice in the various branches of medicine.

Standards—Graduate work in medicine depends upon maintenance of real standards of admission; qualified advisers of graduate students; adequate laboratory, clinical, and library equipment; rigid tests in courses and examinations in residence; and evidence of the power of productive research on the part of the graduate student as demonstrated in a thesis.

In clinical branches the degree of master of science primarily indicates scientific proficiency. To be recommended for this degree the candidate must have given evidence that he is competent to begin practice of a clinical specialty in a scientific manner. The doctorate of philosophy in clinical subjects is awarded only to those who give evidence of proficiency at least equal to that required for the Master's degree, and in addition show marked ability to advance medical science through original investigation.

Laboratory Equipment—Laboratory equipment for graduate work in medicine is located in the several buildings on the campuses at Minneapolis and St. Paul and at Rochester. The University museums of anatomy, pathology, and surgery contain a large number of specimens available for teaching purposes.

In Rochester, laboratory facilities for research are available at St. Marys Hospital, Methodist Hospitals, the Medical Sciences Building, Hills Farm Institute, and the Mayo Clinic buildings. The Mayo Foundation Museum of Hygiene and Medicine represents an accumulation of important exhibits depicting latest surgical techniques as well as more recent methods of diagnosis and treatment and scientific investigation.

Clinical Equipment—The University owns and controls Elliot Memorial Hospital, the Memorial Cancer Institute, the Todd Memorial Hospital, the William Henry Eustis Hospital for Crippled Children, the Variety Club Heart Hospital, the Mayo Memorial, and the Students' Health Service.

The Minneapolis General Hospital, the Veterans Hospital in Minneapolis, the Ancker Hospital in St. Paul, the Gillette State Hospital for Children in St. Paul, the Shriners Hospital for Crippled Children in Minneapolis, as well as certain private hospitals in Minneapolis and St. Paul, are also available for graduate work.

In Rochester, Methodist, Curie, St. Marys, and Worrall hospitals and the Rochester State Hospital for the Insane are available. All patients are examined clinically in the Mayo Clinic buildings.

Services are so arranged that a fellow may, in addition to his clinical responsibilities, carry forward consistently some research problem. The Mayo Memorial and other laboratories provide adequate facilities for experimental medicine, pathology, physiology, and surgical research. Seminars and conferences such as the group seminars, clinical-pathological conferences, Research Club, and others afford opportunities for fellows to present interesting clinical and research material, correlating knowledge of the various phases of the subject. While the presentations may be clinical, the relationship of the fundamental fields to the clinical problem is always emphasized.

A working museum of more than 1,000,000 pathological specimens, catalogued for study and research, is in Jackson Hall.

Fellows or other graduate students in medicine may divide their time, part of their work being taken at the Mayo Foundation at Rochester and part at the Medical School in Minneapolis and St. Paul.

Libraries—Besides the University Library and the departmental libraries, there are at the disposal of the student the general medical and biological libraries in the University Library and the collections of the Hennepin County and Ramsey County Medical Societies. The medical library of the Mayo Foundation at Rochester occupies one floor of the clinic building with a general reading room and private rooms for special studies. Current issues and complete files of the most important medical periodicals are available in both Minneapolis and Rochester.

Methods of Study—Graduate work in medicine is maintained on a University basis. The graduate student is encouraged to study independently rather than to receive formal instruction by undergraduate methods. The student's work is graded quarterly by his immediate chief. Work which receives a grade below B is not acceptable for graduate credit in the major field, nor if below C, in the minor. Students with unsatisfactory records will not be permitted to continue.

Admission—All graduate students are admitted by the dean of the Graduate School. Entrance upon work for the advanced degrees of master of science (M.S.) or doctor of philosophy (Ph.D.) in the clinical departments of medicine is limited to those who have (a) satisfactory character and professional qualifications; (b) the Bachelor's degree in arts or science or its equivalent; (c) the degree of doctor of medicine from an acceptable institution (i.e., one approved by the American Medical Association); and (d) one year's experience as an intern in an approved hospital or as an assistant in a laboratory of an acceptable medical school. In the fundamental laboratory sciences (anatomy, bacteriology, biochemistry, biophysics, pathology, pharmacology, and physiology) properly prepared students may be admitted without (c) and (d) as candidates for the Master's degree (M.A. or M.S.) or the Doctor's degree (Ph.D.). In the field of cancer biology students having a broad background in the basic sciences may be admitted without (c) and (d) as candidates for the Master's degree and Doctor's degree (Ph.D.).

In the selection of graduate medical students and of fellows for medical graduate work, preference will be given, other things being equal, to candidates who have more extensive training in the fundamental medical sciences (anatomy, pathology, physiology, etc.) through which they approach the specialty they wish to take as a major subject. While

the minimum requirement for appointment is the completion of an internship, and many are appointed with this minimum requirement, an appreciable number of appointees have had more hospital experience than this, and a good many have also been in private practice of medicine. Personal interviews with applicants are desirable.

Registration and Number of Students—All students entering upon graduate work in medicine will register with the dean of the Graduate School. Fellows who begin their residence in Rochester may fulfill the preliminary requirements by registering there with the director of the Mayo Foundation. The number of graduate students who will be registered for work is determined by the clinical opportunities and laboratory facilities available.

Tuition—Students enrolled for graduate work in clinical medicine, dentistry, and pharmacy pay tuition and fees as required for these respective colleges. Students enrolled for graduate work in the fundamental laboratory branches of medicine pay fees at the Graduate School rate. All fellows, scholars, and members of the teaching staff enrolled in the Graduate School pay fees at the graduate resident rate.

For specific information concerning fees and expenses during the academic year, consult the current *Bulletin of General Information*. For Summer Session fees, see the *Bulletin of the Summer Session*.

Fellowships and Assistantships—Medical fellowships in the clinical departments of the Medical School are now established as follows: in anesthesiology, 9; in internal medicine, 18; in dermatology, 3; in psychiatry, 6; in neurology, 4; in obstetrics, 12; in ophthalmology, 6; in otolaryngology, 5; in pediatrics, 9; in radiology, 11; in physical medicine, 4; in surgery, 17; in neurosurgery, 3; in orthopedic surgery, 4; in proctology, 1; and in urologic surgery, 3. In addition, there are several clinical fellowships in the Minneapolis General Hospital and at Ancker Hospital (St. Paul). At the Minneapolis General Hospital they include 7 in medicine, 3 in ophthalmology and otolaryngology, 4 in pediatrics, 8 in surgery, 1 in pathology, 1 in urology, 2 in radiology, 3 in obstetrics and gynecology, 2 in psychiatry, and 1 in dermatology. At Ancker Hospital they include 6 in medicine, 3 in ophthalmology and otolaryngology, 3 in radiology, 1 in pediatrics, 1 in dermatology, 1 in pathology, and 8 in surgery. They carry a stipend of \$2,190 for each of the three successive years. These medical fellows are required to devote their entire time (excepting an annual vacation of four weeks) to graduate work, including a small amount of teaching.

The University graduate training program in the clinical specialties of medicine includes 128 residencies at the Minneapolis Veterans Hospital. These residencies, which carry stipends of \$2,400, \$2,700, and \$3,000 for the first, second, and third years, respectively, are distributed as follows: 5 in pathology, 38 in medicine, 3 in dermatology, 3 in ophthalmology, 3 in otolaryngology, 25 in surgery (including urology), 2 in neurosurgery, 9 in orthopedic surgery, 11 in anesthesiology, 4 in neurology, 8 in psychiatry, 11 in radiology, and 1 in physical medicine.

Teaching assistantships, carrying stipends of \$1,404 for nine months or \$1,892 for twelve, have been established in the preclinical departments of the Medical School as follows: in anatomy (including embryology and histology), 10; in bacteriology, 12; in pharmacology, 4; in physiology, 6; in physiological chemistry, 6; in physiological hygiene, 2; and in public health, 8. These fellowships and assistantships carry a stipend of \$1,404 per year on a half-time nine-month basis. There are 6 fellowships in

pathology which carry a stipend of \$2,190 for each of three years. They require a small amount of teaching, the remainder of the time being devoted to graduate work leading to advanced degrees.

In addition, there are on the Minneapolis Campus 5 fellowships without stipend, carrying free tuition with opportunity for graduate study in any of the clinical departments.

The attention of prospective medical graduate students is also called to the Shevlin Fellowship in Medicine yielding \$1,000 and the privilege of applying concurrently for a tuition scholarship. This fellowship, offered in the Medical School in 1958-59, permits work in any department of medicine, preference being given to the preclinical sciences. Applications should be in the hands of the dean of the Graduate School before February 15, 1958.

The Mayo Foundation carries the following laboratory science and clinical fellowships: in anesthesiology, 15; in bacteriology, 3; in biophysics, 2; in biochemistry, 2; in dermatology and syphilology, 14; in internal medicine, 150; in neurologic surgery, 18; in neurology and psychiatry, 15; in nutrition, 2; in obstetrics and gynecology, 15; in ophthalmology, 15; in orthopedic surgery, 20; in otolaryngology and rhinology, 12; in parasitology, 2; in pathology, 18; in pediatrics, 15; in physical medicine and rehabilitation, 9; in physiology, 3; in plastic surgery, 8; in proctology, 6; in radiology, 24; in surgery, 150; in urology, 15; and in dentistry, 9. The fellowships carry stipends of \$1,800 each year on a twelve months basis with an annual vacation of two weeks.

On the Minneapolis Campus a number of teaching assistantships and fellowships with stipend are also available to qualified students in dentistry and pharmaceutical chemistry and pharmacognosy.

Nominations for fellowships at the Mayo Foundation are made each quarter, beginning with October 1, for residence to begin six months later or as vacancies occur. Each applicant is notified of his nomination immediately after it is made, and his acceptance or rejection thereof is requested. In the Medical School, appointments are made as vacancies occur.

Applicants for fellowships are expected to read and speak English fluently and to pass a physical examination including X ray of chest after nomination and before being finally accepted.

All appointments are made for one year and are renewable annually for a total period of three years or longer upon the basis of satisfactory progress in the work pursued. Requests for application blanks for fellowships and assistantships should be addressed to the Dean of the Graduate School, University of Minnesota, Minneapolis 14, or for fellowships on the Mayo Foundation to the Director of the Mayo Foundation, Rochester, Minnesota.

Special Assignments—Special students, such as fellows from other universities or foundations, officers of the medical corps of the United States Army, Navy, Air Force, or Public Health Service, and others, may be accepted at Rochester in laboratory and clinical branches for shorter periods. The number is necessarily limited to avoid interference with the work of the resident fellows. Correspondence concerning this should be addressed to the Director of the Mayo Foundation, Rochester, Minnesota.

Fellows who have satisfactorily completed two years of residence at the Mayo Foundation may be awarded first assistantships in the Mayo Clinic at an increased stipend.

Several of the departments in the Medical School (including Anatomy, Bacteriology, Biostatistics, Pathology, Pharmacology, Physiological

Chemistry, Physiology, and Public Health) have other paid assistantships which may furnish means of self-support while the holder is pursuing graduate work. For further information, address the Dean of Medical Sciences, University of Minnesota, Minneapolis 14.

Clinical and Class Work for Visiting or Resident Practitioners—To avoid misunderstanding it should be stated that the graduate work for a limited number, described above, in no way alters the arrangements offered at the Medical School for practitioners who wish to attend such undergraduate medical classes as may be of profit to them without interfering with the regular work of the staff and students of the Medical School. Class visitors are charged the same fees as students regularly registered for credit. Inquiries concerning these opportunities should be addressed to the Dean of Medical Sciences, University of Minnesota, Minneapolis 14.

Nor do the fellowships in the Mayo Foundation change or modify the opportunities for observation extended visiting physicians and surgeons by the Mayo Clinic in Rochester. Inquiries concerning these should be addressed to the Director of the Mayo Foundation, Rochester, Minnesota.

Veterans' Information—Prior to registration in the Graduate School, the graduate medical student eligible for training benefits under P.L. 346 (World War II aid) should arrange an appointment with a counselor in the Veterans Activities Unit, 302 Johnston Hall, to discuss procedures related to graduate training in medicine under the provisions of P.L. 346.

P.L. 550 (Korean) veterans who plan to use training benefits for work in graduate medicine should arrange an appointment with the counselor for Korean veterans at 114 Administration Building.

REQUIREMENTS FOR ADVANCED DEGREES IN MEDICINE

Licensure—Graduate students working in any field of clinical medicine must be licensed to practice in Minnesota within six months after beginning their work in either the Medical School or the Mayo Foundation.

Master's Degree

Residence—Upon entrance to the Graduate School, the student, with the approval of the dean, will select his adviser in the field of his major work. With the approval of his adviser and the dean, he will outline a study program for the year and if possible for the period of residence.

For the *Master's degree (M.S.) in clinical subjects*, two or three years are required. For the Master's degree without special designation in the laboratory sciences a minimum of one year (three quarters) of residence is required. For the *Master's degree with field named (M.S. in Path. or Rad.)* in pathology or radiology, three years are required. The longer term of three years is required in all cases where the Master's degree is granted in clinical subjects *with field named*. This implies clinical proficiency in the special field. For the ordinary Master's degree *without special designation*, the length of residence in clinical fields may be reduced to two years. This rule should be noted also when the M.S. is taken in connection with the preliminary examination for the Ph.D. in clinical subjects.

Language Requirements—For the *Master's degree in the preclinical sciences*, a reading knowledge of only one foreign language is required,

which must be certified before the candidate may be admitted to the written and oral examinations required for the degree. The certificate must be signed by a representative of the appropriate foreign language department.

For the *Master's degree (M.S.) in the clinical branches*, the language certificate is optional.

Language examinations occur on the second Thursday of each quarter. A repetition of the language examination because of failure is considered a special examination for which a fee of \$5 is charged.

Admission to Candidacy—For the *Master's degree in the laboratory sciences*, students who have completed 9 to 15 graduate credits, at least 3 of which must be in the major, should apply for admission to candidacy on a blank secured from the Graduate School office.

For the *Master's degree in the clinical branches*, students should apply for candidacy after one calendar year of graduate work.

Major—For the student in a *clinical branch*, the major is that field in which the student desires to specialize. In choosing a preclinical field for major work, the candidate must present the minimum undergraduate preparation prescribed in the departmental statements.

Minor—With the approval of his adviser and the dean of the Graduate School, each student upon entrance selects a minor, which must be logically related to his major subject. For *majors in clinical branches*, unless variations are permitted by special petition, the minor shall be a fundamental laboratory branch which will serve as a basis for the proposed clinical specialization. This fundamental work should be concentrated in the first part of the course so far as possible.

Familiarity with those phases of the basic medical sciences essential to proficiency in the major specialty is required.

Thesis—Each candidate for a Master's degree must submit a thesis (except in certain fields where Plan B [without thesis] may be authorized with the approval of the major adviser and the Medical Graduate Group Committee. Plan B is not employed in the clinical medical fields.). The thesis shall present evidence of ability and accomplishment in the planning and the prosecution of scientific research by the candidate. In any of the several fields of medicine the Master's thesis should demonstrate significant accomplishment on the part of the candidate in applying the scientific method. It is especially to be noted that in the clinical fields the tabulation of data confirming earlier established observations is not acceptable. Statistical studies of clinical material may, however, be appropriate if through such studies new discoveries are made. The distinction between the Master's and the doctoral dissertation shall be in the importance and extent of the studies in question. Both shall represent contributions to knowledge made by the candidate. In the medical fields the candidate shall, except in unusual cases where the problem would not permit, himself make the majority of the original observations upon which the thesis is based.

After approval of candidacy, and before the final quarter, the title of the thesis for the Master's degree should be filed with the dean of the Graduate School. A blank for reporting the thesis title may be obtained in the Graduate School office. The subject must be approved by the adviser and by the Medical Graduate Group Committee. The topic should be within the field of the major. The thesis must be written in acceptable English. It must give evidence of independent investigation and thought

by the candidate in perceiving the problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the special field and correct citation of authorities are expected.

No material which has been published prior to its approval by the thesis committee may be used to meet the thesis requirement. Candidates contemplating publication of any material that they expect to present for a thesis should therefore arrange through the Graduate School office to obtain such approval.

The Master's thesis must be typewritten in quadruplicate, one copy on red-ruled twenty-pound linen stock of 75 per cent rag content, the others on bond paper. Samples of the paper required should be examined in the dean's office. The original and first copy must contain all illustrative material. Ample margins should be left for binding purposes. The body of the thesis should be double spaced, but footnotes may be single spaced. A copy of the thesis, certified by the adviser as complete, must be registered in the dean's office at least eight weeks before graduation. (Students should consult the Graduate School office for dates when their theses must be registered.) The thesis will be examined by a committee of not less than three appointed by the dean of the Graduate School on recommendation of the Medical Graduate Group Committee. The examining committee will include two representatives of the major field and one representative of the minor field. Unanimous approval by the thesis committee is necessary for the acceptance of the thesis, and a record of this approval must be filed in the Graduate School office on the appropriate form before the candidate may be admitted to the final written and oral examinations. The Graduate School in any case should be informed, on the appropriate blank, of the action of the thesis committee.

If the thesis is accepted, the candidate must deposit with the Office of Admissions and Records, at least five weeks before the commencement in which he wishes to take his degree, the sum of \$2.50 for binding two copies of the thesis, which will be catalogued and deposited in the University Library.

Examinations—In addition to the usual course examinations in all subjects where such are given, the candidate for the Master's degree must pass final written and oral examinations.

The final *written examination* will be held prior to the oral examination. It will cover the major field and may include any work fundamental thereto. (There will be no special examination in the minor.) The final written examination will be arranged by the adviser as chairman of the thesis committee, the questions to be prepared with the co-operation of the faculty of the major department. The chairman will report the results of the examination to the Graduate School office on the appropriate form. A majority vote of the committee is required for approval of the written examination.

The final *oral examination* is held when all other requirements for the degree have been met, including the final written examination and the acceptance of the thesis. All final examinations for the Master's degree in medicine will include questions on the history of medicine with special reference to the candidate's major field and will cover the major field and any work fundamental thereto. The oral examination shall not exceed two hours. At the close of the examination, the committee will vote upon the candidate's performance, and a majority vote is required for approval. The chairman of the committee will then report the result of the vote to the Graduate School office on the appropriate form.

Date for Completion of Requirements for Degrees—Because flexibility is necessary in scheduling final oral examinations in the medical fields, it is not feasible to publish definite times when these are held and when other requirements must be met. Each student should arrange such dates with the Graduate School office. If the student's name is to be included in the commencement program, *all the requirements for his degree must be completed at least five weeks before the commencement in which he expects to take the degree.*

Reports—Special blanks are provided for signed reports concerning the thesis and the final written and oral examinations.

Recommendation by the Faculty—The dean of the Graduate School will report to the Executive Committee of the graduate faculty the names of those who have completed the requirements for the Master's degree, and those duly approved will be recommended by the faculty to the Board of Regents of the University. At the Mayo Foundation each candidate must have a *certificate of proficiency* signed by all members of the faculty with whom he has served, stating that in their opinion he is competent to begin the practice of his major field in a scientific manner.

Attendance at Commencement—Unless especially excused by the dean of the Graduate School, candidates upon whom degrees are to be conferred are required to be present at commencement.

Summary of Requirements for the Master's Degree

<i>Requirements</i>	<i>Under the Direction of</i>	<i>Date</i>
Program, major and minor	Adviser and dean of the Graduate School or director of Mayo Foundation	On entrance
Approval of candidacy	Committee, normally from the major department, division, or college, and dean	After completion of 9 to 15 credits for basic science majors After 1 calendar year for majors in clinical fields
Approval of thesis subject and degree program	Adviser and group committee	After approval of candidacy but before final quarter
Language requirement	Adviser and language department	Before admission to written and oral examinations
Licensure	State Board	Six months after beginning graduate work
Registering of thesis	Graduate School office	Consult Graduate School office for date
Approval of thesis	Thesis committee	Before admission to final oral examination
Final written examination in major	Major adviser and committee	Consult Graduate School office for date
Final oral examination on all work	Committee	
Filing of thesis	Graduate School office	
Graduation fee and fee for binding thesis	Office of Admissions and Records	Not later than five weeks before commencement in which student takes his degree

Doctor of Philosophy Degree

Residence—For the Doctor's degree (Ph.D.) at least three full years of successful graduate study are required, including certain special requirements noted in the following.

Language Requirements—For the Ph.D. degree, the following regulations are effective. Reading knowledge of one foreign language is always required. Language examinations occur on the second Thursday of each quarter.

General Regulations

1. The Ph.D. candidate shall, with the approval of his major adviser, file in the Graduate School office by the end of the second quarter of his Ph.D. program his plans for meeting the requirements of the foreign languages and/or one language and the research technique or the collateral field of knowledge. Graduate School Form 79 for this purpose is available in the Graduate School office. The second quarter of the Ph.D. program is the second quarter in residence after completion of the M.A. or M.S. degree, or its credit equivalent in those cases where the individual proceeds directly toward Ph.D. candidacy.

2. The foreign language and the special research technique requirements (as defined in 10 and 11) must be completed before the student is admitted to the preliminary examinations for the Ph.D., and the work to be presented in meeting this requirement shall be entered on the student's program. The special research technique requirements may be met by special proficiency examinations where such examinations are feasible and practical.

3. Repetition of any examination taken under 2 above is considered a special examination for which a fee of \$5 is charged.

4. Where a collateral field of knowledge (as defined in 12) is offered in place of one foreign language, this collateral field must be completed before the student is admitted to the final oral examination for the Ph.D., and the work to be presented in meeting this requirement shall be entered on the student's doctoral program. Completion may be in terms of earned course credits, or of validated transfer of credits from another institution, or of special proficiency examinations where feasible and practical.

5. In meeting either the foreign language requirements or the requirements of a special research technique, credits earned or proficiency demonstrated in other approved institutions are transferable to the Minnesota record if these have been completed within a three-year period immediately prior to entering this Graduate School. To meet the requirements of a collateral field of knowledge, credits earned in other approved institutions are transferable to the Minnesota record in accordance with existing regulations governing transfer of credits for the Ph.D. degree.

6. Course credits presented to fulfill the requirements of a special research technique or a collateral field of knowledge shall be recorded on the student's permanent grade record and must represent a quality of work no lower than C. Any group committee may require a standard of performance higher than this minimum standard after appropriate consultation with the departments within its area.

7. The group committee may include the collateral field of knowledge in the final oral examination of the candidate by the appointment of a representative of this field to the oral examination committee.

8. In no case may the special research technique subject or the collateral field of knowledge be one that has regularly or traditionally been included in the major or minor fields of study of similar candidates in the past. The special research technique subject should represent the

acquisition of any special skill that will effectively contribute to the research proficiency of the candidate. The collateral field of knowledge is expected to broaden the candidate's scholarly and scientific background by permitting exploration of knowledge in fields related to the major and minor. The collateral field of knowledge may include in this sense any work now available or to be developed in the preparation for college teaching, including supervised instruction at the college level.

9. The burden of proof of the significance or relevance of options other than the foreign language rests upon the candidate and his major adviser. The group committee under whose jurisdiction the major field falls shall review the recommendations of the major adviser and in turn recommend action to the dean of the Graduate School. In given instances the adviser and the group committee may feel, notwithstanding the existence of the option, that it is educationally wise for the graduate student to establish proficiency in the two selected foreign languages.

10. The foreign languages in which proficiency may be demonstrated are: German, French, Spanish, Italian, Portuguese, the Scandinavian languages, the Oriental languages, Russian, Greek, or Latin. Upon the advice of the Medical Group Committee, the dean of the Graduate School shall determine which of the above languages are appropriate for such use by each candidate for a degree.

11. A special research technique is defined as not less than 9 credits in approved Senior College or graduate courses, completed with a grade not lower than C.

12. A collateral field of knowledge is defined as not less than 15 credits of work in courses numbered above 99 (for dentistry, above 199) completed with a grade not lower than C.

Major Field Requirements

1. Departments or major fields requiring two foreign languages, one of which must be German:

Pharmacognosy

2. Departments or major fields requiring two foreign languages without further specification:

Neurology

3. Departments or major fields permitting fulfillment of the requirements by (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge:

Anatomy	Ophthalmology and	Physiological Chemistry
Bacteriology	Otolaryngology	Physiological Hygiene
Biochemistry	Pathology	Physiology
Biophysics	Pediatrics	Psychiatry
Cancer Biology	Pharmacology	Public Health
Internal Medicine	Physical Medicine and	Radiology
Obstetrics and Gynecology	Rehabilitation	Surgery

4. Department or major field permitting fulfillment of the requirements by (a) two foreign languages or (b) one foreign language and the option of a special research technique:

Pharmaceutical Chemistry

5. Department or major field permitting fulfillment of the requirements by (a) two foreign languages or (b) one foreign language and

the option of either a special research technique or a collateral field of knowledge:

Biostatistics

Transfer of Language Certification—See *Bulletin of the Graduate School*, page 17.

Ph.D. Study Program—The study program for the entire three years *should* be submitted at the beginning of the first year and *must* be submitted before beginning the second year. Doctoral program blanks may be obtained in the Graduate School office. This program requires approval by the student's adviser, by his minor department, by the Medical Graduate Group Committee, and by the dean of the Graduate School. The candidate is required to do enough independent investigation to show his grasp of the principles and methods of scientific research and to form the basis of an acceptable thesis. The preparation of a thesis is an exercise to develop investigative habits which the candidate may learn to apply to clinical as well as to purely investigational problems.

Major—The major is that field in which the student desires to specialize. Together with the thesis, the major work should occupy *at least two thirds* of the total work for the degree.

Minor—The minor must be logically related to the major subject, and must be completed by the end of the second year. The minor is preferably a laboratory subject in some other department, and should amount to not less than one sixth of the total work for the degree. *At least one sixth* of the work offered for the degree in a clinical subject should consist of graduate courses in those fundamental laboratory branches which will serve as a basis for the proposed clinical specialization. This fundamental work should be concentrated in the first part of the course so far as possible. The final examination in the minor is included in the preliminary examination.

Familiarity with those phases of the basic medical sciences essential to proficiency in the major specialty is required.

Admission to Candidacy—For the Doctor's degree, the student is required to pass a preliminary examination before admission to candidacy.

Written Examination—A written examination in the major subject shall be given by the graduate faculty in the major department prior either to the preliminary or to the final examination or to both, as the department may decide. This examination shall cover all the work done in the major, and *may include any work fundamental thereto*. The passing or failing of this written examination shall be reported by the major adviser to the Graduate School office on a form which the student will obtain in that office. In case of failure, the candidate will normally be allowed only one opportunity to retake the failed examination; this re-examination will be permitted not earlier than the following academic quarter.

Preliminary Oral Examination—At least one full academic quarter before the Doctor's degree is conferred, an oral preliminary examination (not to exceed three hours) is given by a committee appointed by the dean of the Graduate School. Language certificates and completion of special technique requirements, completion of the minor work, and the recommendation of the major department are required before admission to this examination, which is in addition to the usual course examinations. It shall cover the graduate work previously taken by the student

and may include any work fundamental thereto except the thesis subject and the thesis.

The outcome of the preliminary oral examination will be recorded in one of three possible ways: examination passed, examination failed, examination passed with reservations. The voting proportions necessary for one of these decisions are as follows: In the case of a five-member examining committee, a favorable verdict for passing a candidate will consist of either a unanimous vote or a vote of four-to-one; if the committee consists of six members, a unanimous vote or a vote of five-to-one or four-to-two will pass the candidate; and if the committee consists of seven members, a unanimous vote or a vote of six-to-one or five-to-two will pass the candidate. Unless the candidate obtains favorable committee votes in these proportions, the outcome is failure, except that, on the basis of the same proportions in the voting, the verdict may be passed with reservations.

In the case of an examination reported as passed with reservations, these reservations may involve: additional preparation and study followed by re-examination; the preparation of a special paper or written examination in a stated field; or other special conditions deemed appropriate by the examining committee.

The chairman and the examining committee will report the results of the preliminary oral examination to the Graduate School office, stating clearly, in the case of passing with reservations, what additional requirements must be met by the candidate prior to re-examination or prior to the reporting of satisfactory performance, and when such re-examination shall take place.

Students failing the preliminary oral examination may, upon recommendation of the examining committee, be excluded from further candidacy for the degree, and in any case no re-examination shall be held until at least one full academic quarter has passed. Preliminary examinations must be scheduled in the Graduate School office two weeks in advance.

Thesis—The thesis shall present an original contribution to knowledge in the field of major specialization. The thesis must give evidence of originality and power of independent investigation and must exhibit mastery of the literature of the subject and familiarity with the sources. The matter must be presented with a fair degree of literary skill.

No material that has been published prior to its approval by the thesis committee may be used to meet the thesis requirement. Candidates contemplating publication of any material that they expect to present for a thesis should therefore arrange through the Graduate School office to obtain such approval.

The thesis must be typewritten in quadruplicate to facilitate reading by the thesis committee. A copy, certified by the adviser as complete, must be registered in the dean's office and four copies distributed to the thesis committee at least two weeks before the final oral examination. (Students should consult the Graduate School office for dates when their theses must be registered.) Unanimous approval of the thesis by the committee is necessary, and the chairman of the committee will report the results of the review of the thesis to the Graduate School office on the appropriate form, available in that office. Two copies of the thesis are to be bound and deposited in the Graduate School office.

When he submits his *thesis report form* and *final oral examination report*, the candidate will sign in triplicate a *Memorandum of Agreement* with University Microfilms, Ann Arbor, Michigan, under which the ribbon copy of the thesis will be microfilmed before being permanently

filed in the University of Minnesota Library. He will then pay his microfilm fee of \$35. If he wishes his thesis to be copyrighted he will pay an additional \$5 plus 1¼ cents per page for two positive microfilm copies of his thesis, which will be deposited in the Library of Congress.

Each candidate for the Doctor's degree shall submit with the bound copies of his thesis an abstract of 600 words or less, approved by his adviser, embodying the principal findings of the research. Such abstracts will be published in *Dissertation Abstracts*, which announces the availability of the thesis for distribution.

Publication of Theses—Publication by microfilm does not preclude publication by other methods later, and it is hoped that attempts at publication in the regular way will not be relaxed.

Final Oral Examination—After preliminary written and oral examinations, after acceptance of the thesis, and after successful completion of final written examinations, when required, the final oral examination shall be given. This examination shall be conducted by a committee consisting of the adviser, the other members of the thesis review committee, and at least two additional members of the graduate faculty, appointed by the dean, upon recommendation of the Graduate Group Committee in Medical Sciences. This examination (not to exceed three hours) covers the thesis and the field of the candidate's special study and may include the collateral field when that option is taken.

Upon completion of the examination, a formal vote of the committee shall be taken. To be recommended for the award of the doctoral degree, the candidate must receive either a unanimous vote or a vote showing not more than one dissenting member of the total final examining committee. The chairman of the examining committee will then report the result of the vote to the Graduate School office.

All Ph.D. candidates are required to register in the quarter in which their final oral examination is taken.

Date for Completion of Requirements for Degrees—Because flexibility is necessary in scheduling final oral examinations in the medical fields, it is not feasible to publish definite times when these are held and when other requirements must be met. Each student should arrange such dates with the Graduate School office. If the student's name is to be included in the commencement program, however, *all the requirements for his degree must be completed at least five weeks before the commencement in which he expects to take the degree.*

Reports—Special blanks are provided for signed reports on the written examination in the major, the preliminary oral examination, the review of the thesis, and the final oral examination. All of these must be filed with the Graduate School office: the thesis review report at the time the final oral examination is scheduled, and the final oral report form at least five weeks before graduation.

Recommendation by the Faculty—The dean of the Graduate School will report to the Executive Committee of the graduate faculty the names of those who have completed the requirements for the Doctor's degree, and those duly approved will be recommended by the faculty to the Board of Regents of the University. At the Mayo Foundation each candidate must have a *certificate of proficiency* signed by all members of the faculty with whom he has served, stating that in their opinion he is competent to begin the practice of his major field in a scientific manner without supervision.

Attendance at Commencement—Unless excused by the dean of the Graduate School, all candidates are required to be present at commencement when the degrees are conferred.

Summary of Requirements for the Doctor's Degree

<i>Requirements</i>	<i>Under the Direction of</i>	<i>Date</i>	
First Year			
Selection of major	Adviser and dean of the Graduate School		
Selection of minor			
Second Year			
Doctoral program	Adviser, Medical Graduate Committee, and dean of Graduate School	Before beginning work of second year	
Thesis title	Adviser, Medical Graduate Committee, and dean of Graduate School	Before admission to preliminary examination	
Completion of minor			Course instructors
Languages			Adviser and language departments
Recommendation			Major department
Written examination	Graduate faculty of the major department	Prior to preliminary oral or to final oral examination or to both	
Preliminary examination, oral	Committee	At least one academic quarter before degree is to be conferred	
Third Year			
Registering of completed thesis certified by adviser	Graduate School office	Consult Graduate School office for date	
Approval of thesis	Thesis committee	Before admission to final oral examination	
Final oral examination ...	Committee. Date of examination fixed by Graduate School	Consult Graduate School office for date	
Two bound copies, abstract of thesis, and payment of \$35 for microfilming of thesis	Graduate School office	Not later than five weeks before commencement in which student takes his degree	
Release card	Graduate School office		
Graduation fee	Office of Admissions and Records		

FIELDS OF INSTRUCTION

See page 2 for explanations of course listings and for the List of Symbols used in connection with course requirements.

For Graduate Training in the Basic Medical Sciences and Clinical Specialties

It is deemed desirable that the graduate student in medicine be given the greatest possible freedom of choice in his plan of study. Rarely, if ever, have any two graduate students in medical fields in the University of Minnesota selected exactly the same type of work throughout their periods of residence.

The various divisions of study are grouped under the following departments:

Anatomy (including hematology, histology, and embryology)
Bacteriology and Immunology
Biophysics
Biostatistics
Cancer Biology
Dentistry
Medicine (including Divisions of Internal Medicine, Nutrition, Dermatology and Syphilology, and Clinical Laboratory Medicine)
Neurology and Psychiatry
Obstetrics and Gynecology
Ophthalmology
Otolaryngology, Otology, Rhinology, and Laryngology (including Plastic Surgery)

Pathology
Pediatrics
Pharmaceutical Chemistry
Pharmacognosy
Pharmacology
Physical Medicine and Rehabilitation
Physiological Chemistry (Biochemistry)
Physiological Hygiene
Physiology (including Surgical Research)
Public Health
Radiology
Surgery (including Divisions of General Surgery, Anesthesiology, Neurosurgery, Orthopedic Surgery, Proctology, and Urology)

ANATOMY

OFFERED AT THE MEDICAL SCHOOL

Professor

Arnold Lazarow, M.D., Ph.D., *head*
Lemen J. Wells, Ph.D.

Associate Professor

Berry Campbell, Ph.D.
J. Francis Hartmann, Ph.D.
R. Dorothy Sundberg, Ph.D., M.D.
W. Lane Williams, Ph.D.

Prerequisites—Prerequisite work for all majors or minors in the Department of Anatomy includes general zoology, 9 credits.

Major and Minor Work for the Ph.D.—Each major in anatomy must have had or take the elementary courses in anatomy—embryology, gross anatomy, histology, and neurology. For majors in anatomy (hematology), 165 and 166 are required. Majors in clinical subjects who desire a minor in anatomy must have had as prerequisites the courses in anatomy usually required of medical students (including 100-101, 103, 104, 107, and 111).

Language Requirement—For the Master's degree, a reading knowledge of one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A. (Consult department head.)

Doctor's Degree—The department provides excellent facilities for work in anatomy leading to the Ph.D. degree.

- 100f-101w.† Gross Human Anatomy.** Dissection of the human body. (8 cred. per qtr.; enrollment limited) Staff
- 102s. Anatomy of the Head and Neck.** (6 cred.; prereq. 59) Staff
- 103f-104s.† Human Histology.** Microscopic study of the various tissues and organs. (4 cred. per qtr.) Staff
- 105f. Microscopic Anatomy.** (9 cred.; prereq. 102) Staff
- 107w. Human Embryology.** Development of the human body. (5 cred.; prereq. #) Staff
- 111s. Human Neurology.** Central nervous system and sense organs of man. (6 cred.; prereq. 103, 104, and 107, or Zool. 150) Staff
- 131. Biological Electron Microscopy.** (Cred. and hrs. ar.; prereq. #) Hartmann
- 132. Experimental Study of the Fetus.** (Cred. and hrs. ar.; prereq. #) Wells
- 149f,w,s. Experimental Neurology.** Morphology of the central nervous system as determined by experimental methods. (Cred. and hrs. ar.; prereq. #) Campbell
- 153f,154w,155s,156su.‡ Advanced Anatomy.** Cytochemistry, embryology, gross anatomy, hematology, histology, or neurology or experimental morphology. (Cred. and hrs. ar.; prereq. #) Lazarow, Wells, Campbell, Hartmann, Sundberg, Williams
- 161. Experimental Cytochemistry.** (Cred. and hrs. ar.; prereq. 103-104, Ph.Ch. 100-101, #) Lazarow
- 165f-166w. Hematology.** Blood and blood-forming organs; emphasis on blood and bone marrow from the standpoint of diagnosis and prognosis. (4 cred. per qtr., prereq. 103, or Zool. 54 or #) Sundberg
- 167s. Seminar in Hematology.** (1 cred.; prereq. 166) Sundberg
- 201f,202w,203s,204su. Research in Anatomy.** Cytochemistry, embryology, gross anatomy, histology, hematology, and neurology. Special facilities are offered to graduate students in the clinical departments for work upon problems in applied anatomy. (Cred. and hrs. ar.; prereq. #) Lazarow, Wells, Campbell, Hartmann, Sundberg, Williams
- 205f,206w,207s. Anatomical Seminar.** Reviews of the current literature and discussion of research work being carried on in the department. (1 cred. per qtr.; prereq. #) Lazarow, staff

OFFERED AT THE MAYO FOUNDATION **

Professor

W. Henry Hollinshead, Ph.D.
Kendall B. Corbin, M.D.
George M. Higgins, Ph.D.

In co-operation with other departments at the Mayo Foundation, there is opportunity for study and research leading to a minor in anatomy.

M251f,s. Anatomy for General Surgeons. Fundamental anatomical facts and relations, especially of the neck and trunk, are reviewed and details of special surgical interest, not generally acquired in undergraduate anatomy, are studied in lectures, discussions, and by dissection. Hollinshead

M252f,s. Anatomy of the Head and Neck. Detailed laboratory study of the gross anatomy of the head and neck, designed especially for fellows major-

** Enrollment in all of these courses is limited.

ing in otolaryngology, is supplemented by lectures and discussions. Hollinshead

M253f.s. Anatomy of the Orbit. Lectures and laboratory work in the detailed anatomy of the orbit and optic pathways. Hollinshead

M254s. Neuroanatomy. Review of fundamental structures and connections of the central and peripheral nervous systems. Corbin, Hollinshead

M255f.s. Orthopedic Anatomy. Lectures and laboratory work on the limbs and back. Hollinshead

BACTERIOLOGY AND IMMUNOLOGY

OFFERED AT THE MEDICAL SCHOOL AND THE INSTITUTE OF AGRICULTURE

Professor

Jerome T. Syverton, M.D., *head*
Harold Macy, Ph.D.
Dennis W. Watson, Ph.D.

Associate Professor

Herman C. Lichstein, D.Sc.
Joseph C. Olson, Jr., Ph.D.
Edwin L. Schmidt, Ph.D.
Newell R. Ziegler, M.D., Ph.D.

Assistant Professor

Wendell Hall, M.D., Ph.D.
James J. Jezeski, Ph.D.
Karl R. Johansson, Ph.D.
William F. Scherer, M.D.
Robert I. Wise, M.D., Ph.D.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A.

Doctor's Degree—Work toward the Ph.D. degree is offered in this department.

100s. Bacteriology for Dental Students.** Morphology; methods of staining; culture media; methods of identification; principles of sterilization and disinfection; antibiotics; bacteria and disease; fundamentals of immunology; the oral flora; bacteriology of oral infections, dental caries, alveolar abscess, and periodontal infection; the relationship of oral infections to other focal and general infections. (6 cred.) Staff

102s. Medical Bacteriology.** The pathogenic bacteria, especially in their relationship to disease; principles of infection and immunity; microbiological techniques for laboratory diagnosis and antibiotic determinations. (4 cred.; for students other than medical students; prereq. 116) Watson, staff

103s. Soil Microbiology. Methods for enumeration and study of microflora and microfauna. Biochemical activities of soil population. (4 cred.; prereq. 53, 8 cred. in organic chemistry and #) Schmidt

105f-106w. Principles of Infectious Disease.** The instruction, which includes medical bacteriology, immunology, mycology, and virology, familiarizes medical students with the factors that produce an infectious process. Emphasis on principles and techniques that make possible diagnosis, treatment, and prevention of specific infectious disease. (6 cred. for 105, 5 cred. for 106; prereq. Anat. 103, Ph.Ch. 100 or 101, or Ag.Bi. 120) Syverton, staff

112f. General Mycology. (Formerly Bact. 113) A survey of the fungi with emphasis on life cycles, morphology, physiology, ecology, and economic significance. (3 cred.; prereq. 53, 15 cred. in chemistry) Roth

113s. Advanced Mycology. Fungi of particular interest to microbiologists. Ecology, nutrition, metabolism, genetics, and economic importance of the im-

** Microscope required. Students may obtain use of microscope by purchasing \$3 microscope cards from the bursar.

- perfect fungi, actinomycetes, and yeasts. (3 cred.; prereq. 112 or #; offered 1955-56 and alternate years) Roth
- 114s. Medical Mycology.** Pathogenic fungi and mycotic infections in man and animals; emphasis on diagnostic procedures. (3 cred.; prereq. 102 or 105; offered 1956-57 and alternate years) Roth
- 116w. Immunology.** Mechanism of the interactions between host and parasite. Techniques and theories of serologic procedures; laws of hemolysis, quantitative relationship between antigen and antibody; opsonins, serums, vaccines, toxin, antitoxin, complement fixation, neutralization, precipitative and agglutinative reactions, blood grouping, atopy, anaphylaxis. (4 cred.; prereq. 53) Watson
- 121f. Physiology of Bacteria.** Chemical and physical structure; staining; growth; influence of environment on growth; nutrition; enzymes; metabolism. (3 cred.; required of all bacteriology majors; prereq. 53, 8 cred. in organic chemistry or biochemistry) Lichstein
- 122w. Physiology of Bacteria Laboratory.** Techniques employed in study of bacterial physiology and metabolism. (3 cred.; required of all graduate students in bacteriology; open to others by consent; prereq. 121) Lichstein
- 123s. Bacterial Metabolism.** Advanced treatment of metabolism: enzymes; biological energy; fermentation; respiration; nitrogen metabolism. (3 cred.; required of all graduate students in bacteriology; open to others by consent; prereq. 122, introductory biochemistry; offered 1955-56 and alternate years) Lichstein
- 124f. Viruses and Rickettsia.** Character, nature, and transmission of viruses and rickettsia; important viral and rickettsial diseases; identification and laboratory diagnosis. (4 cred.; prereq. 102 or 105, 116) Syverton
- 125w. Animal Cell Cultures in Virology.** Principles and techniques essential for the cultivation of animal cells; the use of cellular cultures in virology. (3 cred.; prereq. 124, #) Scherer, staff
- 152f.w.s. Special Problems.** (Cred. ar.; prereq. #) Staff
- 153f.w.s. General Bacteriology.** Lectures, demonstrations, and laboratory exercises used to instruct in the morphology, physiology, taxonomy, and ecology of bacteria. Emphasis on practical application of these fundamental principles in other phases of science and industry. (3 cred.; prereq. 10 cred. in chemistry, 4 cred. in biological sciences or #) Staff
- 201f.w.s. Research in Bacteriology and Immunology.** Graduate students with the requisite preliminary training may elect research, either as majors or minors in bacteriology or immunology. (Cred. and hrs. ar.) Staff
- 202f.w.s. Diagnostic Microbiology.** Fundamental principles and practical application of laboratory procedures for isolation and identification of microorganisms from patients. Work is carried out in the diagnostic microbiology laboratories of the hospital. (Cred. ar.; prereq. grad. student in bacteriology, #) Syverton, Wise
- 203f.w.s. Seminar.** (1 cred.) Staff
- 204w-205s. Advanced Bacteriology.** Techniques in bacteriology; microscopy and photomicrography; variation; quantitative methods; cultivation and identification of anaerobes; bacterial reactions catalyzed by enzymes. (Cred. ar.; prereq. 121-122, which may be ¶, #)
- Dy.Hu.150w. Dairy Bacteriology.** Microbiology in relation to milk production and the processing of milk and dairy products. (3 cred.; prereq. Bact. 53; lect., lab.) Olson
- Dy.Hu.151s. Advanced Dairy Bacteriology.** Investigations of specific problems in the microbiology of milk and dairy products. (3 cred.; prereq. Dy.Hu. 150 or equiv., Dy.Hu. 111 or 112) Jezeski
- Dy.Hu.212f.*213w.*214s.*215su.216su. Research in Dairy Bacteriology.** Opportunities and facilities for investigation and advanced study of problems involving the bacteriology and mycology of milk and dairy products. (Cred. ar.;

open in the Summer Session only to those who have preliminary graduate work) Macy, Olson, Jezeski

Pl.Pa.117f. Virus Diseases of Plants. The nature of plant viruses and types of diseases they cause; emphasis on methods for studying virus diseases. (3 cred.; prereq. Pl.Pa. 1 or 10; offered 1955-56 and alternate years) King

OFFERED AT THE MAYO FOUNDATION

Professor

Fordyce R. Heilman, M.D., Ph.D. in
Bact.

Instructor

Gerald M. Needham, Ph.D.
John A. Ulrich, Ph.D.

Associate Professor

Luther Thompson, Ph.D.
Lyle A. Weed, Ph.D., M.D.

Prerequisites—Opportunities for graduate study of bacteriology and immunology in connection with routine clinical examinations and in special research are open to graduates in medicine or holders of Master's degrees who have had work in both bacteriology and pathology equivalent to that given in the medical course at the University.

Language Requirement—For the Master's degree, reading knowledge of one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. Clinical Bacteriology. Making and examining of cultures. Preparation and administration of autogenous vaccines. Serodiagnostic tests; special laboratory methods in clinical bacteriology; bacteriology of surgical material. Research in bacteriology. Heilman, Weed, Thompson, Needham, Ulrich

M252f.w.s.su. Experimental Bacteriology. Research in the bacteriology of normal and diseased tissues, the blood, secretions and exudates. Experimental inoculation of animals and immunological studies. So far as possible work limited to study of pathogenesis and to development of specific methods of prevention and treatment of various diseases presumably of infective origin. Heilman, Weed

M253f.w.s.su. Medical Mycology. Experience in the examination and diagnosis of specimens from cases with superficial and systemic mycotic disease. Ulrich

Students majoring in bacteriology and immunology may also take work in physiology and biochemistry. For details, see these departments.

BIOPHYSICS

OFFERED AT THE MEDICAL SCHOOL AND AT THE COLLEGE OF SCIENCE,
LITERATURE, AND THE ARTS

Advisers:

Professor

Otto H. Schmitt (Biophysics)
Edward J. Baldes (Biophysics and
Medical Physics, Mayo Clinic)
Karl W. Stenstrom (Medical
Physics and Radiology)

Staff:

Professor

Edward J. Baldes, Ph.D.
Kenneth N. Ogle, Ph.D.
Otto H. Schmitt, Ph.D.
Karl W. Stenstrom, Ph.D.
Marvin M. D. Williams, Ph.D.

Associate Professor

Julia F. Herrick, Ph.D.

Assistant Professor

James F. Marvin, Ph.D.

Staff for the program in biophysics is drawn also from the Departments of Physics, Zoology, and Botany and from the Medical School and the Mayo Clinic.

Prerequisites—Basic preparation in biology, physics, chemistry, and mathematics with an undergraduate major in one of these subjects or in biophysics is required. Each program for graduate work in biophysics must be approved by the appropriate adviser.

Language Requirement—For the Master's degree, reading knowledge of either French or German. For the Ph.D. degree, reading knowledge of German and any one of the following: French, Russian, Italian. In special cases another language may be substituted by petition.

Master's Degree—Offered in general under Plan A. By petition Plan B may be followed.

Doctor's Degree—This department offers work leading to the Ph.D. degree.

105. A review of elementary physics for medical students. (Part of Rad. 121) By arrangement with instructor. (1 cred.) Stenstrom

138f.w.s. **Seminar in General Physiology and Biophysics.** (Cred. ar.) Staff

170f.w.s.su. **Problems in Biophysics.** Roentgen ray machines, radium, and radioactive isotopes are available for experimental purposes. Measurements are performed, effects of the radiation on animals are studied, and isotopes are used as tracer elements. (Cred. and hrs. ar.) Stenstrom, Marvin

204f.w.s.su.* **Research in Biophysics and Physiology of Radiation.** (Cred. ar.) Stenstrom

221f.w.s*-222f.w.s*-223f.w.s.* **Research in Biophysics.** (Cred. ar.) Schmitt

Rad.236. **Radioactive Isotopes Seminar.** (1 cred.; prereq. #) Marvin

Zool.155f.*156w.*157s.* **Biophysics.** Theoretical and experimental aspects of biology that can be studied by quantitative physical means. 155: Tissue ultrastructure (biostatics) as revealed by hypermicroscopy, birefringence, X ray, electron and radioactive means, and by colloidal and micellar phenomena. 156: Dynamics of biophysical systems: excitatory state, contraction, secretion, synthesis. 157: Integrative biophysical systems: stability of systems, transmission of information, sensory mechanisms. (3 cred. per qtr.; prereq. 28 cred. distributed between physics and biology, #, physical chemistry and general physiology recommended; schedule ar.; any section may be taken separately) Schmitt

Zool.296f*-297w*-298s.* **Seminar in Biophysics.** (Cred. ar.) Schmitt

Credit in biophysics is regularly granted for the following courses drawn from other departments. For descriptions of courses listed only by title, see detailed listings under the respective departmental headings.

Bot.118w. **Extranuclear Cytology.** (3 cred.) Dahl

Bot.119f. **Nuclear Cytology.** (3 cred.) Dahl

Ph.Ch.100f.su-101w.su. **Physiological Chemistry.** (7 cred., 6 cred.) Armstrong and staff

P.Ch.101f-102w-103s. **Physical Chemistry.** (3 cred. per qtr.) Crawford, Lipscomb, Wertz

Phys.100f-102w-104s. **Mechanics and Electromagnetism.** (3 cred. per qtr.) Nier

Phys.101f-103w-105s. **Theoretical Physics.** (5 cred. per qtr.) Nier

Phys.107f*-109w*-111s.* **Modern Physics.** (3 cred. per qtr.)

- Phys.120f.* **Atomic Physics.** (3 cred.) Blair
 Phys.121w.* **Experimental Nuclear Physics I.** (3 cred.) Blair
 Phys.122s. **Experimental Nuclear Physics II.** (3 cred.) Blair
 Phys.126f-127w-128s. **Solid State Physics.** (3 cred. per qtr.) Slifken
 Phys.144f. **Electrical Measurements.** (4 cred.) Blair
 Phys.146w.* **Electronics.** (3 cred.) Blair
 Phys.148s. **Applications of Electronic Circuits.** (3 cred.)
 Phys.181f*-183w*-185s.* **Atomistics and Elementary Quantum Mechanics.** (3 cred. per qtr.) Williams
 Phys.191f*-192w*-193s.* **Introduction to Mathematical Physics.** (3 cred. per qtr.)
 Physl.106s-107su.† **Human Physiology.** (15 cred.) Visscher, Gellhorn, others
 Zool.100f,101w,102s. **Zoological Techniques.** The content of this course is subject to the direction of the major adviser. (Cred. ar., not to exceed 3 cred. per qtr.)
 Zool.109w. **Sense Organs.** (3 cred.) Minnich
 Zool.112f*-113w.* **Advanced General Physiology.** (3 cred. per qtr.) Steinbach
 Zool.128f-129w. **Insect Physiology.** (4 cred. per qtr.) Richards
 Zool.140s. **Biological Microscopy.** (4 cred.) Richards
 Zool.160w-161s. **Cytology.** (3 cred. per qtr.)
 Zool.182s. **Experimental Embryology.** (5 cred.) Spratt
 Zool.291f-292w-293s. **General Seminar.**

OFFERED AT THE MAYO FOUNDATION

Professor

Edward J. Baldes, Ph.D.
 Marvin M. D. Williams, Ph.D.
 Kenneth N. Ogle, Ph.D.

Associate Professor

Julia F. Herrick, Ph.D.

Graduate courses in biophysics at the Mayo Foundation are limited to research concerned chiefly with hemodynamics, osmotic pressure, bioelectric phenomena, electroencephalography, spectroscopy and spectrophotometry, microscopy, energy exchanges between the body and its environment, biological effects of radiation, special problems in aeromedicine, and certain phases of physiological and ophthalmological optics, with related problems in vision and spatial localization.

Prerequisites—A limited number of qualified fellows majoring in biophysics may undertake research projects that will be the basis for the doctoral thesis. In general, the Master's degree or its equivalent is a prerequisite for admission to these advanced research courses.

Facilities for experimental work are available to fellows majoring in the various fields of medicine.

Language Requirement—For the Master's degree, reading knowledge of one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. Special Research in Biophysics. Baldes, Williams, Ogle, Herrick

BIostatISTICS

OFFERED AT THE SCHOOL OF PUBLIC HEALTH

Professor

Alan E. Treloar, Ph.D.
Joseph Berkson, M.D., D.Sc.

Assistant Professor

Jacob E. Bearman, Ph.D.

Lecturer

Lillian R. Elveback, M.A.

Prerequisites—Satisfactory evidence of high aptitude for quantitative reasoning, supplemented by scientific training of a broad character. Preparation in college mathematics through integral calculus is desirable but not essential if there is a compensating breadth in scientific background.

Major—Courses in mathematics, theoretical and applied statistics, philosophy, and the sciences may be required at the discretion of the adviser as part of the major program.

Minor—Courses in statistics or closely related fields may be accepted as part of a minor program. Approval must be secured from the minor adviser.

Language Requirement—For the M.S. degree, none. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a special research technique or a collateral field of knowledge.

Master's Degree—Offered under both Plan A and Plan B. [See the *Bulletin of the School of Public Health* for the master of public health degree.]

Doctor's Degree—Work for the Ph.D. degree is offered both in this department and under the statistics curriculum (see page 31 of the *Bulletin of the Graduate School*) in accordance with the general requirements of the Graduate School.

Pub.H.110f.s. Biometric Principles. Univariate distributions, normal correlations, simple tests of significance. (3 cred.; prereq. ¶111) Treloar, Elveback

Pub.H.111f.s. Biostatistics Laboratory. Practical training in techniques discussed in 110, which must be concurrent. (2 cred.)

Pub.H.120w.* Biostatistics II. The nature of estimation and hypothesis testing as techniques in experimental science; small sample tests (t , χ^2 , F , analysis of variance) and their power. (3 cred.; prereq. 110 with grade not lower than C, ¶121) Elveback

Pub.H.121w. Biostatistics Laboratory II. Practical exercises in theory discussed in 120, which must be concurrent. (2 cred.) Elveback

Pub.H.130s.* Biostatistics III. (Continuation of 120) Includes correlation and regression with two or more variables; further discussion of χ^2 and analysis of variance. (3 cred.; prereq. 120 with grade not lower than C, ¶131) Elveback

Pub.H.131s. Biostatistics Laboratory III. Practical exercises associated with 130, which must be concurrent. (2 cred.) Elveback

Pub.H.140w. Vital Statistics I. Official sources; population changes; rates; trends; significant differences. (3 cred.; prereq. ¶) Treloar

Pub.H.150s.* Vital Statistics II. Sources of error in vitality records; adjustment procedures; morbidity and survival rates; the life table and its application in medical problems. (3 cred.; prereq. 140 or equiv. with grade not lower than C; offered when demand warrants) Treloar

Pub.H.200f,w.s.* Research. Opportunities will be offered by the School and by various co-ordinated organizations for qualified students to pursue research work. (Cred. ar.)

Pub.H.201f,w.s.* Topics in Biometry. Studies in special topics for advanced students. (Cred. ar.; prereq. 120, 130, and #) Treloar and staff

Pub.H.211f,w.s. Seminar in Biometry. (Cred. ar.) Treloar

OFFERED AT THE MAYO FOUNDATION

Professor

Joseph Berkson, M.A., M.D., D.Sc.

Instructor

Robert P. Gage, M.S. in Math. and Stat.

Graduate work in biometry and medical statistics at the Mayo Foundation is offered in the Division of Biometry and Medical Statistics at the Mayo Clinic. This may include studies in clinical as well as laboratory fields.

Language Requirement—For the M.S. degree, none. For the Ph.D. degree, (a) two foreign languages or (b) one foreign language and the option of either a special research technique or a collateral field of knowledge.

M251f,w.s.su. Research Problems in Biometry. Berkson, Gage

CANCER BIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

John J. Bittner, Ph.D., *head*

Maurice B. Visscher, M.D., Ph.D.

Prerequisites—Graduate study in the field of cancer biology, leading to the Ph.D. degree, with a major in cancer biology, is offered to qualified students who have a broad background in laboratory sciences, but is recommended only for those who have the M.D. degree.

Minor—It is suggested that students majoring in cancer biology present a minor in any one of the following fields: pathology, genetics, virology, bacteriology, physiology, biochemistry, cytology, histology. Students using cancer biology as a minor are limited to graduate courses in these fields dealing strictly with cancer.

Language Requirement—For the Master's degree, reading knowledge of one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—The master of science degree in cancer biology requires at least two academic years in residence and satisfaction of substantially the same basic course requirements in the fundamental fields as are listed for the Ph.D.

Doctor's Degree—Candidates for the Ph.D. degree with a major in cancer biology may offer toward the major graduate work in any one of the following fields: cytology and organology, bacteriology, pathology, physiology, and genetics. Attendance at the seminar in cancer biology is required of all students in cancer biology. The thesis must deal with the field of the major.

140f,w.s. Seminar in Cancer Biology. (1 cred.) Bittner

141f,w.s. Problems in Cancer Biology. (Cred. and hrs. ar.) Bittner

207f,w.s. Research in Cancer Biology. (Cred. and hrs. ar.) Bittner

DENTISTRY

OFFERED AT THE SCHOOL OF DENTISTRY

Professor

William H. Crawford, D.D.S., *dean*
 Henry B. Clark, Jr., M.D., D.D.S.
 Ambert B. Hall, D.D.S.
 Thomas D. Speidel, D.D.S., M.S.
 Harold C. Wittich, D.D.S.
 Douglas H. Yock, D.D.S., M.S.
 Helmut A. Zander, D.D.S., M.S.

Associate Professor

Mellor R. Holland, D.D.S., M.S.
 James R. Jensen, D.D.S., M.S.D.
 David F. Mitchell, D.D.S., Ph.D.

Clinical Associate Professor

Sherwood R. Steadman, D.D.S., M.S.

Assistant Professor

Wendell L. Bartholdi, Ph.D., D.D.S.

Graduate work in dentistry is offered to meet needs in two areas—the training of well-qualified teachers and investigators in the various branches of dentistry, and the preparation of fully trained specialists for the various fields of dentistry. The course of study leads to the degree of M.S. in dentistry, a combination of the normal work for the M.S. degree plus achievement of proficiency in some phase of clinical dentistry. Hence, a minimum of two academic years in residence is required, though most students probably will need three years.

Graduate study related to dentistry and leading to the M.S. and Ph.D. degrees may also be pursued through majors in such allied sciences as anatomy, bacteriology, biochemistry, pathology, pharmacology, and physiology.

Graduate courses in dentistry are offered in the fields of oral pathology, oral surgery, orthodontics, restorative dentistry, oral medicine, and periodontics.

Prerequisites—A degree from an accredited school of dentistry with an average of B or better or a standing in the top fourth of the applicant's graduating class.

Major or Minor Work—The aim of the program of study is mastery of the major subject, in which a minimum of 18 credits must be earned with a grade of B or better. The minimum acceptable grade in the minor field is C.

Language Requirement—Although reading knowledge of German is highly desirable, candidates for the Master's degree in dentistry are exempted from the foreign language requirement.

Master of Science Degree—Offered only under Plan A.

A detailed mimeographed statement of graduate work in dentistry may be secured by writing to the Dean of the School of Dentistry, 136 Owre Hall, University of Minnesota, Minneapolis 14.

Oral Medicine

230f.w.s.su. Advanced Oral Diagnosis. Survey of the basic principles of oral examinations, differential clinical diagnostic techniques, and treatment planning. Topics dealing with oral manifestations of systemic disease and systemic manifestations of oral disease are assigned for collateral reading. (Cred. and hrs. ar.) Bartholdi

231f.w.s.su. Advanced Clinical Oral Diagnosis. Practical work in the clinic taking and recording case histories, making oral examinations, and setting up a detailed treatment plan. (Cred. and hrs. ar.) Bartholdi

- 261f.w.s.su. Advanced Dental Radiographic Technique.** (Formerly 260) Systematic consideration of the basic factors governing X-radiation, emphasizing recent advances in biophysics with special reference to the technique and material used. Demonstration and practice. (Cred. and hrs. ar.) Petersen

Oral Pathology

- 260f. Oral Pathology and Histology.** (Formerly 160) Lectures and laboratory covering the histology of the teeth and related oral tissues including embryologic considerations. Special pathology of the oral region as well as the relation of local pathologic findings to systemic conditions and to general pathology are emphasized. Graduate students participate as laboratory assistants and meet some further requirements. (4 cred.) Mitchell
- 262f.w.s.su. Research in Oral Pathology.** (Cred. and hrs. ar.) Mitchell
- 263f.w.s. Dental Research Seminar.** (1 cred.) Mitchell
- 264f.w.s. Clinical Oral Pathology Conference.** (1 cred.) Mitchell, Clark (see courses in Oral Surgery.)

Oral Surgery

- 250f.w.s.su. Advanced Oral Surgery.** Includes assigned clinics in University Hospitals such as Tumor, Plastic, and Hospital Dental Clinic in addition to the regular periods in the Dental School. (Cred. and hrs. ar.) Clark and staff
- 251f.w.s.su. Oral Surgery Seminar.** (1 cred.) Clark
- 252f.w.s.su. Research in Oral Surgery.** (Cred. and hrs. ar.) Clark and staff
- 253f.w.s.su. Problems in Oral Surgery.** (Cred. and hrs. ar.) Clark and staff

Orthodontics

- 200f.w.s.su. Advanced Orthodontic Techniques.** (Cred. and hrs. ar.) Speidel, Steadman
- 201f.w.s.su. Treatment Procedures in Orthodontics.** (Cred. and hrs. ar.) Speidel, Steadman
- 202f.w.s.su. Case Analysis.** (Cred. and hrs. ar.) Speidel, Steadman
- 203f.w.s.su. Treatment Planning.** (Cred. and hrs. ar.) Speidel, Steadman
- 204f.w.s.su. Advanced Clinical Orthodontics.** (Cred. and hrs. ar.) Speidel, Steadman
- 205f.w.s.su. Osteology and Myology of the Head.** (Cred. and hrs. ar.) Steadman
- 206f.w.s.su. Growth of the Head.** (Cred. and hrs. ar.) Speidel, Steadman
- 207f.w.s.su. Comparative Odontology.** (Cred. and hrs. ar.) Steadman
- 208f.w.s.su. Seminar in Orthodontics.** (Cred. and hrs. ar.) Speidel, Steadman
- 209f.w.s.su. Problems and Research in Orthodontics.** (Cred. and hrs. ar.) Speidel, Steadman

Periodontics

- 280f.w.s.su. Advanced Periodontics Clinic.** Practical work in the clinic in examination, diagnosis, treatment planning, and various phases of treatment of patients with periodontal disease. Includes the practice of curettage, gingival resection, splinting of teeth, and balancing the occlusion. (Cred. and hrs. ar.) Zander and staff
- 281f.w.s.su. Advanced Periodontics Lectures.** Consideration of the tissues involved in periodontal disease. Etiology and treatment of periodontal disease. (3 cred.) Zander and staff

- 282f.w.s.su. Research in Periodontics.** Opportunity to take part in the many phases of periodontal research that are under way in the laboratory set up for periodontal research. (Cred. and hrs. ar.) Zander
- 283f.w.s.su. Seminar in Periodontics.** Etiology of periodontal disease, histopathology of periodontal symptoms, treatment of periodontal disease, research in periodontics. (1 cred.) Zander and staff
- 284f.w.s.su. Supporting Structures of the Teeth.** The histology, pathology, and physiology of the gingival tissues, the cementum, the periodontal membrane, and the alveolar bone will be covered in lectures. Associated problems will be studied on a set of microscopic slides. (3 cred.) Zander and staff

Restorative Dentistry

- 220f.w.s.su. Advanced Dental Anatomy.** Under supervision, the student assists in teaching and participates in the activities of the Division of Dental Anatomy. He also is assigned special problems in the division. (Cred. and hrs. ar.) Hall
- 240f.w.s.su. Advanced Technical Restorative Dentistry.** Teaching experience is integrated with technical solution of problems involving application of the theories of indeterminate stresses to the more complex problems of tooth morphology. (Cred. and hrs. ar.) Jensen, Wittich, Yock, staff
- 243f.w.s.su. Advanced Clinical Restorative Dentistry.** Detailed application of clinical techniques provides comprehensive training in restorative dentistry through studies on clinical material, collateral reading, and conferences. Research methods and evaluation of data emphasized. (Cred. and hrs. ar.) Jensen, Wittich, Yock, staff
- 247f.w.s.su. Research Problems in Restorative Dentistry.** Arranged with individual students upon application after a critical review of the current and historical literature pertaining to the problem. (Cred. and hrs. ar.) Jensen, Wittich, Yock, staff

OFFERED AT THE MAYO FOUNDATION

Professor

Louie T. Austin, D.D.S., head
Edward C. Stafne, D.D.S.

Assistant Professor

Stanley A. Lovstedt, D.D.S., M.S.

Instructor

R. Quentin Royer, D.D.S., M.S.

The Mayo Foundation offers fellowships in dentistry to a limited number of graduates of approved dental schools who have bachelor of science degrees or the equivalent. Preference is given to candidates who have completed one year of approved internship.

The courses offered are in the fields of oral surgery, oral pathology, and oral medicine, and the minimum residence requirement is three years.

Completion of the requirements leads to the degree of M.S. in dentistry, with minors available in the allied laboratory sciences of anatomy, pathology, and physiology.

Weekly seminars, lectures, and clinicopathological conferences are held regularly.

Dentistry

- M251f.w.s.su. Dental Roentgenology.** Staff
- M252f.w.s.su. Oral Diagnosis.** Staff
- M253f.w.s.su. Oral Surgery.** Austin, Stafne, Lovstedt, Royer
- M254f.w.s.su. Oral Pathology.** Staff

Anat.M252f.s. Anatomy of the Head and Neck. (See Department of Anatomy)

Anes.M253f.w.s.su. Anesthesiology. (See Department of Anesthesiology)

Plas.Surg.M253f.w.s.su. Plastic Surgery. (See Department of Plastic Surgery)

Path.M255f-w.w-s-s-su-su-f. Surgical and Fresh Tissue Pathology. (See Department of Pathology)

For graduate students in the field of oral surgery, the surgical service at the Methodist-Worrall Hospital is supplemented by a period of training at the Rochester State Hospital.

MEDICAL SOCIAL WORK

For staff and courses of study offered, see Social Work in the *Bulletin of the Graduate School* for 1954-56.

MEDICINE

(Including Divisions of Internal Medicine, Nutrition, Dermatology and Syphilology, and Clinical Laboratory Medicine)

Graduate work in the Department of Medicine offers opportunities for physicians having outstanding undergraduate scholastic records, or giving other evidence of promise, to prepare themselves for careers of teaching and research in, or the practice of, internal medicine or any of its subdivisions as a specialty. Primarily it guides its fellows in research in these fields and gives them a start in university teaching. Prospective fellows who have had no special orientation beyond that of the ordinary undergraduate courses will profit greatly from some special work. While any of the preclinical subjects might be of value, bacteriology, biochemistry, pathology, pharmacology, and physiology at the present are of the greatest importance. Work in any of these subjects may be continued further during the major studies in medicine to meet the requirements for a minor subject.

Internal Medicine

OFFERED AT THE MEDICAL SCHOOL

Professor

Cecil J. Watson, M.D., Ph.D., *head*
 Gerald T. Evans, M.D., Ph.D.
 Ivan D. Frantz, M.D.
 Thomas Lowry, M.D.
 J. Arthur Myers, M.D., Ph.D.
 Wesley W. Spink, M.D.

Howard L. Horns, M.D.
 Robert B. Howard, M.D., Ph.D.
 Samuel Nesbitt, M.D., Ph.D.
 Samuel Schwartz, M.D.
 Louis Tobian, Jr., M.D.
 O. Leslie Zieve, M.D.

Associate Professor

Edmund B. Flink, M.D., Ph.D.
 Paul S. Hagen, M.D.
 Wendell H. Hall, M.D., Ph.D.
 Frederick W. Hoffbauer, M.D., M.S.

Clinical Associate Professor

Arthur C. Kerkhof, M.D., Ph.D.

Assistant Professor

Byrl J. Kennedy, M.D., M.Sc.

A wide range of clinical material for graduate work in internal medicine is available in the wards and out-patient departments of the University of Minnesota Hospitals, the Minneapolis General Hospital, the Ancker Hospital in St. Paul, and the Veterans Hospital in Minneapolis. There are opportunities for research in the laboratories of the Department of Medicine at the University and at the Veterans Hospital and in

the general laboratories for basal metabolism, biochemistry, electrocardiography, and hematology in all of the hospitals.

Anatomy, bacteriology, biochemistry, immunology, pathology, pharmacology, and physiology all have their laboratories and teaching centers on the campus, and the pursuit of a minor subject may be carried on simultaneously and in intimate relation with more definitely clinical studies. The large autopsy material of the Department of Pathology provides experience in this field as well as control of clinical diagnosis.

The more intensive clinical studies of the graduate student in medicine are carried on in one or more of the hospitals mentioned, and the out-patient departments are used as necessary for training the fellow for later practice.

In general, fellowships are planned for four-year periods, of which from one to one and one-half years are devoted to basic science and research and two and one-half to three years to clinical medicine and research. During the greater part of the latter period the individual will act as assistant resident physician or as resident physician in one of the hospitals. In this position he assumes greater responsibility for patients than during the internship. The fellow in medicine must devote some time to teaching.

Besides clinical work, a fellowship also includes research toward preparation of an acceptable thesis. This work may be purely clinical for the M.S. degree, but a combined clinical and laboratory study is preferable and is essential for a Ph.D. thesis.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

The courses listed below are described in the broadest outline to convey the character of the work. No hard and fast program is contemplated, the individual capabilities and purposes of the fellow being given particular attention.

- 201f.w.s.su. **Clinical Medicine.** Study of general diagnosis and methods of investigation and of the recording of clinical data. Emphasis on methods of treatment. (Cred. ar.) Watson, Spink, Lowry, Stead, Flink, Hoffbauer, Hagen, Hall, Horns, Smith, Tobian, and staff
- 202f.w.s.su. **Diseases of the Cardiovascular Apparatus.** Special study of diseases of the heart and blood vessels. (Cred. ar.) Frantz, Tobian, Smith, and staff
- 203f.w.s.su. **Research in Medicine.** Study of a clinical or fundamental problem related to internal medicine. (Cred. ar.) Watson, Spink, Flink, and staff
- 205f.w.s.su. **Diseases of the Chest.** Opportunities to study problems relating to tuberculosis from both the clinical and laboratory standpoint. (Cred. ar.) Myers, Stead
- 206f.w.s.su. **Clinical Conference.** Presentation of problem cases from the Medical Service. Discussion of diagnosis and treatment and consideration of pertinent literature. (1 cred.) Watson, Spink, Flink, and staff
- 207f.w.s.su. **Clinical Pathological Conference.** Presentation of clinical features, necropsy findings, and discussion. Medical and surgical cases. (1 cred.) Dawson, Watson, and staff
- 208f.w.s.su. **Clinical Radiological Conference.** Presentation and discussion of X-ray films from the Medical Service, with clinical correlation. (1 cred.) Rigler, Watson, and staff
- 210f.w.s.su. **Infectious Disease Seminar.** (1 cred.) Spink, Hall, and staff
- 211f.w.s.su. **Electrocardiographic Conference.** (1 cred.)
- 212w.s. **Pigment Metabolism.** (1 cred.) Schwartz, Watson, and staff

OFFERED AT THE MAYO FOUNDATION

Professor

Edgar V. Allen, M.D., M.A., M.S. in Med.
 J. Arnold Bargaen, M.D., M.S. in Med.
 Nelson W. Barker, M.D., M.S. in Med.
 Arlie R. Barnes, M.D., M.A., M.S. in Med.
 Howard B. Burchell, M.D., Ph.D. in Med.
 Hugh R. Butt, M.D., M.S. in Med.
 Mandred W. Comfort, M.D., M.S. in Neur.
 Thomas J. Dry, M.A., Ch.B., M.B., M.S. in Med.
 Samuel F. Haines, M.D., M.S. in Med.
 Frank J. Heck, M.D., M.S. in Path.
 Philip S. Hench, M.D., M.S. in Med.
 Edgar A. Hines, M.D., M.A., M.S. in Med.
 F. Raymond Keating, M.D., M.S. in Med.
 Herman J. Moersch, M.D., M.S. in Med.
 Raymond D. Pruitt, M.D., M.S. in Med.
 Edward H. Rynearson, M.D., M.S. in Med.
 Charles H. Slocumb, M.D., M.S. in Med.
 Randall G. Sprague, M.D., Ph.D., in Med.
 Charles H. Watkins, M.D., Ph.D. in Med.

Associate Professor

John M. Berkman, M.D., M.S. in Med.
 Alex E. Brown, M.D., M.S. in Med.
 Philip W. Brown, M.D., M.S. in Med.
 William H. Dearing, M.A., M.D., Ph.D. in Med.
 Earl E. Gambill, M.D., M.S. in Med.
 Malcolm M. Hargraves, M.D. in Med.
 Bayard T. Horton, M.D., M.S. in Med.
 Walter F. Kvale, M.D., M.S. in Med.
 Carl G. Morlock, M.D., M.S. in Med.
 Howard M. Odel, M.D., M.S. in Med.
 Arthur M. Olsen, M.D., M.S. in Med.
 Robert L. Parker, M.D., M.S. in Med.
 Howard F. Polley, M.D., M.S. in Med.
 Louis E. Prickman, M.D., M.S. in Med.
 Herbert W. Schmidt, M.D., M.S. in Med.
 J. Minott Stickney, M.D., M.S. in Med.
 Elmer G. Wakefield, M.D.
 James F. Weir, M.D., M.S. in Med.
 Eric E. Wollaeger, M.D., M.S. in Med.

Assistant Professor

Milton W. Anderson, M.D., M.S. in Med.
 Edwin D. Bayrd, M.D., M.S. in Med.
 James C. Cain, M.D., M.S. in Med.
 Donald C. Campbell, M.D., M.S. in Med.
 David T. Carr, M.D., M.S. in Med.
 Haddon M. Carryer, M.D., Ph.D. in Med.
 Norman A. Christensen, M.D., M.S. in Med.

Talbert Cooper, M.D., M.S. in Med.
 Guy W. Daugherty, M.D., M.S. in Med.
 Austin C. Davis, M.D.
 J. Earle Estes, M.D., M.S. in Med.
 Albert B. Hagedorn, M.D., M.S. in Med.
 Gustav A. Hedberg, M.D.
 Corrin H. Hodgson, M.D., M.S. in Med.
 Llewelyn P. Howell, M.D., M.S. in Med.
 Giles A. Koelsche, M.D., Ph.D. in Med.
 D. Morrison Masson, M.D.
 Donald R. Nichols, M.D., M.S. in Med.
 Gustavus A. Peters, M.D., M.A., M.S. in Med.
 Robert M. Salassa, M.D., M.S. in Med.
 William G. Sauer, M.D., M.S. in Med.
 Charles H. Scheifey, M.D., M.S. in Med.
 R. Montgomery Snick, M.D., M.S. in Med.
 Lucian A. Smith, M.D., M.S. in Med.
 Charles F. Stroebel, M.D., M.S. in Med.
 Jan H. Tillisch, M.D., M.S. in Med.
 Laurentius O. Underdahl, M.D., M.S. in Med.
 L. Emmerson Ward, M.D., M.S. in Med.

Instructor

Howard A. Andersen, M.D., M.S. in Med.
 Milton J. Anderson, M.D.
 William M. Balfour, M.D., M.S. in Med.
 Lloyd G. Bartholomew, M.D., M.S. in Med.
 Charles M. Blackburn, M.D., M.S. in Med.
 Robert O. Brandenburg, M.D., M.S. in Med.
 Ezra V. Bridge, M.D.
 James C. Broadbent, M.D., M.S. in Med.
 Bruce E. Douglass, M.D., M.S. in Med.
 Clifford F. Gastineau, M.D., Ph.D. in Med.
 Joseph E. Geraci, M.D., M.S. in Med.
 Ray W. Gifford, M.D., M.S. in Med.
 John B. Gross, M.D., M.S. in Med.
 David G. Hanlon, M.D., M.S. in Med.
 Lowell L. Henderson, M.D., M.S. in Med.
 Kenneth A. Huizenga, M.D., M.S. in Med.
 William J. Martin, M.D., M.S. in Med.
 William M. McConahey, M.D., M.S. in Med.
 Wallace A. Merritt, M.S. in Med.
 Roland D. Miller, M.D., M.S. in Med.
 Thomas W. Parkin, M.D., M.S. in Med.
 Donald E. Ralston, M.D., M.S. in Med.
 Raymond V. Randall, M.D., M.S. in Med.
 Randolph A. Rovelstad, M.D.
 Donald A. Scholz, M.D., M.S. in Med.
 Harold H. Scudamore, Ph.D., M.D.
 Maurice H. Stauffer, M.D., M.S. in Med.
 Louis D. Vaughn, M.D., M.S. in Med.
 William E. Wellman, M.D., M.S.

Clinical work in internal medicine at the Mayo Foundation consists of diagnostic work in the clinic or in the hospital medical services, includes history taking, physical examinations, recommendation of patients for

special examinations with correlation of the results thereof, and formation of independent judgments concerning diagnoses and indications and recommendations for medical and surgical treatment. This work is under the immediate direction of the consulting physicians of the section in which the fellow is working.

There are nineteen general diagnostic sections in which the fellow may work in the clinic and seventeen medical hospital services. Each diagnostic section contains four or more consulting physicians. Each of the general diagnostic sections in general in the sense that any patient may be referred to any one of them. Many of them, however, are special in that they have intensive interest in the following fields: rheumatic diseases, infectious diseases, medical complications in urologic diseases, intestinal diseases, acute medical diseases, diseases of the chest, diseases of the blood, diseases of metabolism and endocrinology, diseases of the heart, cardiovascular and renal diseases, diseases of the upper gastrointestinal tract, allergy, vascular diseases.

Satisfactory completion of at least two services of six months each in these sections is required for an advanced degree. When he is sufficiently competent in clinical work the fellow may be appointed to a first assistantship at the Mayo Clinic.

The Medical Department has available five hundred beds in the several hospitals.

In graduate work in medicine the didactic lecture plays but a minor role. In the diagnostic clinic and hospitals much of the teaching is done in seminars, ward rounds, and by contact between the member of the faculty and the fellow in the care of patients, or in carrying out laboratory procedures. In both clinical and hospital sections the fellow assists in the actual work of these sections under the supervision of the head of the section and his associates.

In departmental clinical seminars cases of unusual interest are discussed and presented. In the hospital services additional seminars and conferences are conducted on special phases of medicine, on laboratory methods, and on current medical literature. Clinico-pathologic conferences are conducted in cases coming to necropsy. In these seminars the fellow plays an active role in presenting to the group assigned cases or subjects.

In the laboratories fellows are given every opportunity to work out for themselves the problems of their choice or to participate in investigations being carried out by members of the staff.

As soon as he is oriented, each fellow is expected, in addition to his routine work, to begin to carry forward consistently some research. While it may be purely clinical, in most instances it will have relationships requiring detailed study in bacteriology, hematology, pathology, physiological chemistry, or physiology.

Though the minimum time required for the degree of master of science or doctor of philosophy in these fields is three years, considerably more time is often desirable.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f-w.w.s.s-su,su-f. General Medical and Surgical Diagnosis. Research. Seminar. Staff

M252f.w.s.su. Medical Hospital Residence. Research. Seminar. Staff

Diagnosis in Neurology and Psychiatry. (See Section on Neurology and Psychiatry)

Hospital Residence in Neurology. (See Section on Neurology and Psychiatry)

Hospital Residence in Psychiatry. (See Section on Neurology and Psychiatry)

Necropsy Service. (See Department of Pathology)

Clinical Hematology. (See Department of Pathology)

Research Work on Selected Problems in Physiology. (See Department of Physiology)

Biochemistry. (See Department of Physiological Chemistry)

Fellows majoring in internal medicine may also take work in biophysics, dermatology, pediatrics, physical medicine and rehabilitation. For details, see these departments.

Nutrition

OFFERED AT THE MAYO FOUNDATION

Professor

Charles F. Code, M.D., Ph.D. in Physiol.

Associate Professor

Randall G. Sprague, M.D., M.S., Ph.D. in Med.

Opportunities are provided for a few fellows majoring in nutrition. Appointments may be made not only to physicians but to qualified nutritionists and dietitians. Ordinarily nutritionists and dietitians who are fellows in nutrition are not candidates for higher degrees. This work is under the supervision of the Departments of Medicine, Physiology, and Biochemistry.

M251f.w.s.su. Nutrition. Code, Sprague

Dermatology and Syphilology

OFFERED AT THE MEDICAL SCHOOL

Professor

Henry E. Michelson, M.D., *director*

Clinical Assistant Professor

Isadore Fisher, M.D., M.S.

Clinical Professor

Carl W. Laymon, M.D., Ph.D.

Francis W. Lynch, M.D., M.S.

Instruction in dermatology and syphilology leading to the M.S. or Ph.D. degree is offered at the University Hospitals, the Minneapolis General Hospital, the Veterans Hospital in Minneapolis, and the Ancker Hospital in St. Paul, combined with attendance at the clinics at the four hospitals. A limited number of graduate students are appointed as residents in dermatology, rotating in these hospitals. The student devotes full time and may not carry on outside practice. All graduate students majoring in dermatology and syphilology are required to carry on independent research under the direction of Dr. Michelson and the head of the department or division in which they wish to do special research.

Language Requirement—For the Ph.D. degree, this requirement may be fulfilled either by (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

- 225f.w.s.su. Clinical Dermatology and Syphilology.** Wards and out-patient departments of the University Hospitals, Veterans Hospital, Minneapolis General Hospital, and Ancker Hospital. (Cred. ar.) Michelson and staff
- 226f.w.s.su. Dermatology and Allergy.** Conference twice weekly on diagnosis and treatment of skin conditions. (Cred. ar.) Laymon and staff
- 227f.w.s.su. Histopathology of the Skin.** (Cred. ar.) Michelson and staff
- 228f.w.s.su. Research in Dermatology and Syphilology.** (Cred. ar.) Michelson and staff

OFFERED AT THE MAYO FOUNDATION

Professor

Paul A. O'Leary, M.D.
 Louis A. Brunsting, M.D., M.S. in Derm.
 and Syph.
 Hamilton Montgomery, M.D., M.S. in
 Derm. and Syph.

Associate Professor

Robert R. Kierland, M.D., M.S. in
 Derm. and Syph.

The Department of Dermatology and Syphilology of the Mayo Foundation affords opportunity for study of a large volume of patients with a great variety of cutaneous diseases and syphilis. A close working relationship between this department and the sections of internal medicine is maintained.

A dermato-histopathologic laboratory with a comprehensive collection of slides is augmented by about 800 biopsies each year. General laboratories of the Clinic and Foundation are available for routine and investigative work, and a six month's service in the hospital (45 beds) is part of the three-year training offered.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

- M251f.w.s.su. Histopathology of the Skin.** Laboratory and lectures. Montgomery
- M252f.w.s.su. Diagnosis with Special Reference to Dermatology and Syphilology.** Daily seminar. Clinical conference. O'Leary, Brunsting, Montgomery, Kierland
- M253f.w.s.su. Hospital Residence.** Care of hospitalized patients. Seminar. O'Leary, Brunsting, Montgomery, Kierland

Fellows majoring in dermatology and syphilology may also receive instruction in allergy, hematology, mycology, Roentgen and radium therapy, and serology. Biochemistry, biophysics, and physiology may be elected. For details see these departments.

Clinical Laboratory Medicine

OFFERED AT THE MEDICAL SCHOOL

Professor

Gerald T. Evans, M.D.C.M., Ph.D.,
director

Assistant Professor

Ellis S. Benson, M.D.

The clinical laboratories (bacteriology and immunology, blood bank, chemistry and metabolism, electrocardiography, hematology, morphologic pathology, parasitology) are administratively integrated, but each unit is under the professional charge of a specially assigned member of the appropriate fundamental department. Credits obtained in this field may be used in the above listed areas at the discretion of the adviser.

Fellows in training in internal medicine, pediatrics, and clinical pathology are accepted for a rotating experience through the clinical laboratories. The rotation does not usually include morphologic pathology. Besides gaining experience with the principal techniques and their interpretation, fellows are assigned special small problems and reading courses. Recourse to the fundamental sciences and to current literature in investigative medicine is stressed.

Also one-year renewable fellowships are open to suitably prepared persons wishing to spend their time principally on clinical laboratory medicine and clinical laboratory research.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

235f, w.s.s.u. Advanced Clinical Laboratory Medicine. General rotation as above described. (Cred. ar.; prereq. Anat. 165-166 [Hematology]) Evans and staff

236f, w.s.s.u. Research on Clinical Laboratory Problems. (Cred. ar.) Evans and staff

NEUROLOGY AND PSYCHIATRY

OFFERED AT THE MEDICAL SCHOOL

Professor

Donald W. Hastings, M.D., *head*
 Abe B. Baker, M.D., Ph.D., *director of Neurology*
 Starke R. Hathaway, Ph.D., *director of Clinical Psychiatry*
 Reynold A. Jensen, M.D.
 Paul E. Meehl, Ph.D.
 Burtrum C. Schiele, M.D.

Clinical Professor

S. Allan Challman, M.D.
 Eric K. Clarke, M.D.
 Royal C. Gray, M.D., Ph.D.
 Adelaide M. Johnson, M.D.
 Hyman S. Lippman, M.D., Ph.D.

Associate Professor

C. Knight Aldrich, M.D.
 Bernard C. Glueck, Jr., M.D.
 Robert G. Hinckley, M.D.
 William Schofield, Ph.D.

Clinical Associate Professor

Clifford O. Erickson, M.D.
 Harold H. Noran, M.D., Ph.D.
 Werner Simon, M.D.
 Marvin Sukov, M.D.

Assistant Professor

Ian A. Brown, M.D.
 Maynard M. Cohen, M.D., Ph.D.
 Frank Kiesler, M.D.
 Richard Magraw, M.D.
 Fae Y. Tichy, M.D., Ph.D.

Clinical Assistant Professor

Philip Feinberg, M.D.
 Harold B. Hanson, M.D.
 Clarence J. Rowe, M.D.
 Hildred Schuell, Ph.D.
 Virgil R. Zarling, M.D.

Clinical Instructor

Irving C. Bernstein, M.D.
 Robert P. Bush, M.D.

Excellent facilities are available for work toward one of the higher degrees in psychiatry and neurology. The minor may be elected in anatomy, pathology, physiology, or other basic fields. Fellows in psychiatry are advised to satisfy the minor requirements in such fields as anthropology, psychology, sociology, philosophy, or related fields giving a background in broad cultural areas. Under ordinary circumstances the fellowship runs for a period of three years, i.e., fulfills the requirements of training for the American Board of Psychiatry and Neurology. The fellow in psychiatry spends six months of the three years in neurology, and the fellow in neurology spends a similar block of time in psychiatry.

In addition to work in the University Hospitals Psychopathic Unit, on the Neurologic Service, the Child Psychiatry Clinic, and the Out-Patient Service, the student has access to the Veterans Administration

Hospital, the Veterans Administration Mental Hygiene Clinic, and the St. Cloud Veterans Hospital.

The fellow is given a clinical assignment in the in-patient and the out-patient services of the University Hospitals or the Veterans Hospital and is responsible to his service chief for the clinical study and therapy of his patients. He makes daily informal rounds with his superior staff, has weekly clinical conferences with the director of the department, and prepares cases for presentation at formal weekly staff conferences and at the clinic given to undergraduate medical students. He helps conduct the pedagogical work of the clerkship of the medical students. He reports on the literature or on his special studies in staff conferences from time to time.

Neurology

Language Requirement—For the Ph.D. degree, a reading knowledge of two foreign languages is required.

- 208f-w-s-su. Clinical Neurology.** (Cred. and hrs. ar.) Baker and staff
- 209f-w-s-su. Research in Neurology.** (Cred. and hrs. ar.) Baker and staff
- 210f-w. Advanced Neuropathology.** (2 cred., §150 and Path. 115; offered 1956-57 and alternate years) Tichy
- 211f-w. Intracranial Neoplasms.** (2 cred., §Path. 118; offered 1955-56 and alternate years) Tichy
- 212f-w-s-su. Survey of Neuropathology.** (1 cred., §151 and Path. 119) Tichy
- 220f-w-s-su. Advanced Clinical Neurology.** Selected readings and comprehensive review of specialized subjects in the neurological field. (1 cred.) Baker and staff
- 225. Neuro-ophthalmology.** Lectures covering the field of ophthalmology as related to neurology. (2 cred.; offered 1955-56 and alternate years) Baker, Hanson
- 226f-w-s-su. Neurological-Neurosurgical Conference.** Review of X rays, case histories, and neuropathological material on neurological and neurosurgical cases. (1 cred., §Surg. 318, Rad. 163A) Peterson, Peyton, Baker
- 228f-w-s-su. Research in Neuropathology.** (Cred. and hrs. ar.) Baker and staff
- 230f. Electroencephalography.** (1 cred.)
- 231f-w-s. Applied Electroencephalography and Myography.** Practical experience in reading and interpretation of electroencephalographical tracings. (1 cred.)
- 232f-w-s. Applied Neuroroentgenology.** Experience in the actual reading of neuroroentgenological films. (1 cred.) Peterson
- 233f-w-s. Applied Neuropathology.** (1 cred.) Tichy
- 234. History of Neurology.** (1 cred.) Staff
- 235. Neurology in Other Medical Specialties.** (1 cred.) Baker and staff
- 238f-w-s. Neurological Clinical Pathological Conference.** (1 cred. per qtr.) Baker and staff
- 239s. Neuroanatomy.** (1 cred.) Baker and staff
- 240f-w-s. Neuropathology Conference.** (1 cred. per qtr.) Tichy, Cohen
- 241w-s. Neuroradiology.** (1 cred. per qtr., §Rad. 190; offered 1956-57 and alternate years) Peterson
- 247f-w-s. Neurological Speech Disorders.** (1 cred.) Schuell
- 248f-w. Applied Neurophysiology.** (2 cred. per qtr.; offered 1955-56 and alternate years) Morrell

Psychiatry

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

- 208Xf-w-s-su. **Clinical Psychiatry.** (Cred. ar.) Hastings and staff
 208Yf-w-s-su. **Clinical Child Psychiatry.** (Cred. ar.) Jensen
 209f-w-s-su. **Research in Psychiatry.** (Cred. ar.) Hastings and staff
 213f-w-s-su. **Orientation in Psychiatric Social Service.** (Cred. and hrs. ar.)
 214w-s. **Psychiatric and Neurologic Disorders of Childhood.** (1 cred. per qtr.)
 Jensen
 215f-w-s. **Seminar in Diagnostic and Therapeutic Interviewing.** (1 cred.) Hathaway
 218f-w-s. **Psychological Methods in Psychiatry.** (1 cred. per qtr.) Schofield
 219f-w-s. **Personality Structure, Normal and Abnormal.** (1 cred.) Hathaway
 221f-w-s-su. **Psychometric Clerkship.** Psychological testing of in-patient and out-patient cases in the University Hospitals. (2 cred.) Hathaway, Meehl, Schofield
 222f-w-s. **Interviewing Techniques in Psychiatry.** (1 cred.) Hastings
 227f-w-s. **Clinical Seminar for Psychologists.** (1 cred. per qtr.; prereq. #)
 Schiele, Schofield
 236f-w-s. **Normal Personality Development and Psychopathology.** (1 cred.)
 Challman
 237f-w-s. **Psychoanalytic Therapy.** (1 cred.) Lippman
 243f-w-s-su. **Prolonged Psychotherapy.** (1 cred.) Staff
 244f-w-s. **Seminar in Psychosomatic Medicine.** (1 cred., §Med. 213) Aldrich
 245f-w-s-su. **Case Conference for Clinical Psychologists.** (Cred. and hrs. ar.)
 Schiele, Schofield

OFFERED AT THE MAYO FOUNDATION

Neurology

Professor

Henry W. Woltman, M.D., Ph.D. in
 Neur.
 Kendall B. Corbin, M.D.
 Lealdes M. Eaton, M.D., M.S. in Neur.
 Frederick P. Moersch, M.D.
 Harry L. Parker, M.B., Ch.B., B.A.O.,
 M.S. in Neur.

Associate Professor

Joseph R. Brown, M.D., M.S. in Neur.
 and Psy.

Assistant Professor

Clark H. Millikan, M.D.

Instructor

Edward C. Clark, M.D.
 David Daly, M.D., Ph.D. in Neur.
 Donald W. Mulder, M.D., M.S. in Neur.
 Waldemar C. Rasmussen, M.D., M.S. in
 Neur. and Psy.
 E. Douglas Rooke, M.D., C.M., M.S. in
 Neur.
 J. G. Rushton, M.D., M.S. in Med.

Psychiatry

Professor

Howard P. Rome, M.D.
 David A. Boyd, Jr., M.D., M.S. in Neur.
 and Psy.
 Adelaide M. Johnson, D.Sc., Ph.D., M.D.

Associate Professor

Magnus C. Petersen, M.D.

Instructor

Mary E. Giffin, M.D., M.S. in Neur. and
 Psy.
 Jorge A. Lazarte, M.D., M.S. in Neur.
 and Psy.

Neurology—The fellowship in neurology is normally for a period of three years which is roughly divided into approximately one year of out-patient assignments, one year of hospital experience, and one year in the laboratory sciences and other fields related to neurology. In both the out-patient department and the hospitals, fellows work in close collaboration with the faculty, who are available for consultation and guidance at all times. In the basic sciences and related fields fellows obtain experience in neuropathology, neuroanatomy, electroencephalography, electromyography, funduscopy, and physical medicine and rehabilitation. Experience in psychiatry is also provided in the fellowship in neurology. In addition to the practical work, there is an organized series of lectures, conferences, and seminars on clinical material, the neurologic literature, and selected topics in neurology. The sections on neurology and psychiatry are closely associated with one another and with other medical and surgical sections of the Mayo Clinic as well as with the various clinical and research laboratories.

Psychiatry—The practical work in psychiatry consists of diagnostic and therapeutic out-patient assignments in adult and child psychiatry, and hospital assignments on both open and closed wards. Normally, six months or more are devoted to child psychiatry. There is ample opportunity for long-term therapy of ambulatory adults and children of Rochester. Such therapy is dynamically oriented. Since the section on psychiatry is part of a large general medical institution, a multiplicity of psychosomatic conditions can be studied. Besides practical work, there is an organized series of conferences, lectures, and seminars dealing with clinical material, psychiatric literature, and selected topics in psychiatry. There is organized instruction in basic science and related fields such as neuroanatomy, neurophysiology, neuropathology, electroencephalography, and electromyography. Experience in neurology is also included in the fellowship in psychiatry.

Ample facilities for laboratory and clinical research are available. A limited number of selected fellows of the Mayo Foundation may be offered psychoanalytic training. Such selections are made only from those who have been fellows in psychiatry for one to two years. The facilities of the Mayo Clinic and its affiliated hospitals are supplemented with those of the Rochester State Hospital, the city and county well-baby and well-child clinics, and the city's Adult Guidance Clinic.

Language Requirement—For the Ph.D. in neurology, two foreign languages. For the Ph.D. in psychiatry, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f-w,w-s,s-su,su-f. Diagnosis in Neurology and Psychiatry. Research. Seminar. Staff

M252f,w,s,su. Hospital Residence in Neurology. Staff

M253f,w,s,su. Hospital Residence in Psychiatry. Staff

M254f-w-w-s,s-su,su-f. Special Psychiatry at the Rochester State Hospital. Residence. Petersen, Boyd, Rome, Lazarte

M255f,w,s,su. Child Psychiatry. Johnson

Neuroanatomy. (See Department of Anatomy)

Neuropathology. (See Department of Pathology)

Neurophysiology. (See Department of Physiology)

Neuro-ophthalmology. (See Department of Ophthalmology)

OBSTETRICS AND GYNECOLOGY

OFFERED AT THE MEDICAL SCHOOL

ProfessorJohn L. McKelvey, M.D.C.M., *head***Clinical Assistant Professor**

William P. Sadler, M.D.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

- 201f-202w-203s-204su. Advanced Obstetrics and Gynecology, I.** Includes service in the University Hospitals or Minneapolis General Hospital with ample experience in diagnosis, care, and treatment (operative and nonoperative) of patients. Facilities for study of problems and cases of unusual interest. (Cred. ar.; required of first-year fellows) McKelvey and staff
- 205f-206w-207s-208su. Advanced Obstetrics and Gynecology, II.** Similar to 201-204, but more advanced, both in clinical and research aspects of the subjects adapted to the increased training and experience. (Cred. ar.; required of second-year fellows) McKelvey and staff
- 209f-210w-211s-212su. Advanced Obstetrics and Gynecology, III.** Similar to 201-204 and 205-208, but more advanced. (Cred. ar.; required of third-year fellows) McKelvey and staff
- 213f-214w-215s. Staff Conference Seminar.** Presentation and discussion of original work and reports upon the current literature in obstetrics and gynecology. (Cred. ar.; for fellows and graduate students) McKelvey and staff
- 216f-217w-218s-219su. Research.** Clinical and laboratory research upon problems in obstetrics and gynecology. (Cred. ar.; required of third-year fellows, who must complete a satisfactory thesis during the year; elective for second-year fellows or other properly qualified graduate students) McKelvey and staff
- 221f-222w-223s-224su. Clinical Obstetrics and Gynecology.** Diagnosis and treatment, with special study of selected cases. Clinic in the Out-Patient Department of the University Hospitals. (Cred. ar.; required of teaching fellows) McKelvey and staff

OFFERED AT THE MAYO FOUNDATION

Professor

Lawrence M. Randall, M.D., M.S. in Obst. and Gyn.
 Arthur B. Hunt, M.D., M.S. in Obst. and Gyn.

Assistant Professor

Edward A. Banner, M.D., M.S. in Obst. and Gyn.
 Robert B. Wilson, M.D., M.S. in Obst. and Gyn.

Instructor

David G. Decker, M.D., M.S. in Obst. and Gyn.
 John E. Faber, M.D.
 James S. Hunter, M.D., M.S. in Obst. and Gyn.
 M. Elizabeth Mussey, M.D., M.S. in Obst. and Gyn.

Opportunity is available for extensive experience in diagnosis and treatment of gynecologic diseases and obstetrics, supplemented by studies in basic sciences underlying the specialty, and in operative surgery in sections concerned principally with gynecologic conditions. Seminars and conferences are held regularly.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f-w,w-s,s-su,su-f. Diagnosis, principally in relation to obstetrics and gynecologic conditions. Research. Seminar. Randall, Hunt, Wilson, Banner, Faber, Mussey

M252f-w,w-s,s-su,su-f. Clinical Obstetrics and Gynecology. Diagnosis and treatment with special study of selected obstetric and gynecologic cases. Residence. Seminar. Randall, Hunt, Wilson, Banner, Faber, Mussey

M253f.w.s.su. Operative Surgery. Counsellor, Waugh, Ferris, Pratt

Anatomy for General Surgeons. (See Department of Anatomy)

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Students majoring in obstetrics and gynecology may also take work in physiology, radium therapy, urology, and anesthesiology. For details, see these departments.

OPHTHALMOLOGY

OFFERED AT THE MEDICAL SCHOOL

Clinical Professor

Erling W. Hansen, M.D., *head*

Clinical Associate Professor

Hendrie W. Grant, M.D., M.S.

Walter L. Hoffman, M.D., M.S.

Charles Hymes, M.D., M.S.

Clinical Assistant Professor

Edward P. Burch, M.D.

Richard C. Horns, M.D., M.S.

Virgil J. Schwartz, M.D.

Robert R. Tracht, M.D., M.S.

John P. Wendland, M.D., M.S.

Graduate courses in this subject are designed to prepare selected men for advanced work in the various lines, and for practice in this specialty, and to develop research and productive work in this subject. Of elective courses in other departments, the following are highly desirable:

Physics of Light and Acoustics

Advanced Anatomy of the Head and Neck

Topographic Anatomy of the Head and Neck

Developmental Anatomy of the Head

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A.

121. Operative Clinic in Eye. (2 cred.; limited to 6 students; University Hospitals) Hansen, Hoffman, Hymes, Wendland

122. Medical and Neurological Ophthalmology. (2 cred.; limited to 16 students; 2 sections; Todd Memorial Room) Schwartz, Lindberg

200. Refraction. (3 cred. per qtr.) Cooper

201. Advanced Refraction. (1 cred. per qtr.) Tracht

202. Clinical Ophthalmology. (6 cred. per qtr.) Staff

203. Biomicroscopy. (1 cred.) Burch

204. Ocular Muscles. (2 cred. per qtr.) Grant, Horns, Kantar

205. Perimetry. (1 cred.) Kantar

206. Surgery of the Eye. (3 cred. per qtr.) Hansen, Hymes

207. **Pathology of the Eye.** (2 cred.) Monahan
 208. **Ophthalmoscopy.** (2 cred.) Schwartz, Lindberg
 209. **Neuro-ophthalmoscopy.** (1 cred.) Wendland
 210. **Animal Surgery.** (2 cred.) Hansen, Hoffman
 211. **Physiologic Optics.** (1 cred. per qtr.) Jerome
 212. **Seminar in Ophthalmology.** (1 cred.) Hansen and staff
 213. **External Diseases and Diseases of the Anterior Segment.** (2 cred.) Wendland
 214. **Histology of the Eye.** (2 cred.) Kantar
 215. **Radiology of the Eye, Orbit, and of the Head.** (Cred. ar.) Peterson
 216. **Plastic Surgery of the Eye and Adnexa.** (Cred. ar.) Leven
 217. **Allergy of the Eye.** (Cred. ar.) Hansen
 218. **Ophthalmic Therapeutics.** (Cred. ar.) Horns
 219. **History of Ophthalmology.** (Cred. ar.) Hansen
 220. **Physiology of Vision and Biochemistry of the Eye** (2 cred.) Wendland

OFFERED AT THE MAYO FOUNDATION

Professor

C. Wilbur Rucker, M.D., M.S. in Ophth.
 Henry P. Wagener, M.S. in Ophth.

Assistant Professor

Robert W. Hollenhorst, M.D., M.S. in Ophth.

Associate Professor

Hugo L. Bair, M.D.
 John W. Henderson, M.D., M.S. in Ophth.

Instructor

Thomas P. Kearns, M.D., M.S. in Ophth.
 Theodore G. Martens, M.D., M.S. in Ophth.

Fellows majoring in ophthalmology receive practical experience in diagnosis and treatment of diseases of the eye under supervision of full-time staff members. Departmental seminars and conferences are held throughout the year. Studies in related laboratory sciences are available in the departments concerned.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. Refraction and Ophthalmic Myology. Theory of refraction, retinoscopy, diagnosis of refraction errors of the eye, prescribing of lenses, disturbances of motility of the eyes, orthoptics. Martens

M252f.w.s.su. Clinical Ophthalmology. Diagnosis and treatment of diseases of the eye and its adnexa. Bair, Henderson

M253f.w.s.su. Medical and Neurologic Ophthalmology. Ophthalmology and ophthalmoscopy as they pertain to the fields of internal medicine and neurology. Rucker, Wagener, Hollenhorst

M254f.w.s.su. Ophthalmic Surgery. A six-months' hospital service. Bair, Henderson, Hollenhorst, Martens

Anatomy of the Orbit. (See Department of Anatomy)

Pathology of the Eye. (See Department of Pathology)

Optics. Physical and Physiologic. (See Department of Biophysics)

OTOLARYNGOLOGY

OFFERED AT THE MEDICAL SCHOOL

Clinical Professor

Lawrence R. Boies, M.A., M.D., *head*
 Henry B. Clark, Jr., D.D.S., M.D.
 Anderson C. Hilding, M.D., Ph.D.

John J. Hochfilzer, M.D.
 Frank M. Lassman, Ph.D.
 Kenneth A. Phelps, M.D.
 Robert E. Priest, M.D., M.S.

Clinical Associate Professor

Charles E. Connor, M.A., M.D.
 Henry V. Hanson, M.D.
 Jerome A. Hilger, M.D., M.S.

Clinical Assistant Professor

Conrad J. Holmberg, M.D.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

104f.w.s. Clinic and Conferences in Diseases of the Ear, Nose, and Throat.

Diagnosis and treatment of cases. University Dispensary; operating rooms in the University Hospitals; the Minneapolis General Hospital; United States Veterans Hospital; Ancker Hospital. (4 cred.) Boies and staff

230. Clinical Otolaryngology. (3 cred. per qtr.) Staff

231. Clinical Rhinology and Laryngology. (3 cred.) Staff

232. Surgery of the Ear, Nose, and Throat. Operative clinic in the University Hospitals. (3 cred. per qtr.) Staff

233. Operative Surgery of the Temporal Bone. (2 cred.) Staff

234. Operative Surgery of the Nose and Throat. (2 cred.) Staff

235. Roentgenology of the Head. (½ cred.) Staff

236. Functional Ear Tests. (1 cred.) Staff

237. Endoscopy. Lectures and demonstrations. (2 cred.) Staff

238. Pathology of the Ear, Nose, and Throat. (2 cred.) Staff

239. Neurologic Lesions in the Field of Otolaryngology. (½ cred.) Staff

240. Physiotherapy and Surgery of the Malignant Diseases of the Ear, Nose, and Throat. (2 cred.) Staff

241. Seminar in Otolaryngology. (1 cred.) Staff

242. Applied Physiology in Otolaryngology. (½ cred.)

243. Applied Pharmacology in Otolaryngology. (½ cred.)

244. Speech Pathology. (½ cred.) Staff

245. Allergy. (1 cred.) Staff

246. Practical Audiology. (1 cred.) Lassman

247. Plastic Surgery of the Nose. (1 cred.) Staff

Otolaryngology and Rhinology

OFFERED AT THE MAYO FOUNDATION

Professor

Henry L. Williams, M.D., M.S. in Otolaryngology.

Associate Professor

Kinsey M. Simonton, M.D., M.S. in Otolaryngology.

Assistant Professor

Henry A. Brown, M.D., M.S. in Otolaryngology.
 Olav E. Hallberg, M.D., M.S. in Otolaryngology.
 LeRoy D. Hedgecock, Ph.D. (Audiology)
 Clifford F. Lake, M.D., M.S. in Otolaryngology and Rhinology.

Instructor

James B. McBean, M.D.

Practical experience in diagnosis and treatment of diseases of the ear, nose, and throat is available to fellows majoring in otolaryngology and rhinology. Included also are studies in the basic sciences underlying the field and the practical application of those principles to the clinical conditions. Seminars and departmental conferences are held regularly.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f, w.s.su. Clinical Otolaryngology and Rhinology. Theory and practice with differential diagnosis of diseases of the ear, nose, paranasal sinuses, pharynx, and larynx, and their relation to general diagnosis. Williams, Simonton, Hallberg, Brown, Lake, McBean

M252f, w.s.su. Preoperative and Postoperative Care of Patients. Treatment of complications. Williams, Simonton, Hallberg, Brown, Lake, McBean

M253f, w.s.su. Operative Otolaryngology and Rhinology. Hospital residence, second assistantship in operating service. Williams, Simonton, Hallberg, Brown, Lake, McBean

M254f, w.s.su. Operative Otolaryngology and Rhinology. First assistantship in operative service. Williams, Simonton, Hallberg, Brown, Lake, McBean

M255f, w.s.su. Advanced Audiology. Tests of hearing; evaluation of speech disorders for purposes of diagnosis and as a basis for advising use of hearing aids; educational therapy. Hedgecock

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Anatomy of the Head and Neck. (See Department of Anatomy)

Fellows majoring in otolaryngology and rhinology may also take work in bacteriology or biophysics. For details, see these departments.

Plastic Surgery and Laryngology

OFFERED AT THE MAYO FOUNDATION

Professor

Frederick A. Figi, M.D.

Instructor

Kenneth D. Devine, M.D.

Edward L. Foss, M.S., M.D.

Associate Professor

John B. Erich, M.D., D.D.S., M.S. in
Oral Surg.

Fred Z. Havens, M.D.

This surgical specialty is concerned with the reconstruction and plastic repair of acquired and congenital deformities. It includes treatment of traumatic injuries of the maxillofacial region, the management of diseases of the mouth, and the diagnosis and treatment of benign and malignant tumors occurring in the oral cavity, the nose, paranasal sinuses, pharynx, and larynx. Use of pedicle skin flaps as well as free grafts of skin, cartilage, bone, and fascia in the correction of many defects is emphasized. Facilities are available for training in plastic surgery of the entire body.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f, w.s.su. Observation of Plastic Procedures as Related to Orthopedic, Urological, and Gynecological Surgery. Opportunity is afforded fellows to take surgical pathology for credit as a minor subject. Staff

M252f, w.s.s.u. Diagnostic and Operative Service. Plastic surgery of the face and neck (preoperative, operative, and postoperative treatment). Diagnosis and operative treatment of neoplasms of the head and neck. Staff

M253f, w.s.s.u. Hospital Residence. Operative plastic surgery of the face and neck. Immediate and late care of maxillofacial injuries. Operative and other treatment of neoplasms of the head and neck. Staff

M254f, w.s.s.u. Operative Plastic, Maxillofacial, and Laryngological Surgery. First assistantship in operative service. Staff

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Anatomy of the Head and Neck. (See Department of Anatomy)

PATHOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

James R. Dawson, Jr., M.D., *head*
A. B. Baker, M.D., Ph.D.
Robert Hebbel, M.D., Ph.D.
James McCartney, M.D.

Associate Professor

Kano Ikeda, M.D.
Nathaniel H. Lufkin, M.D.
John F. Noble, M.D.

Prerequisites—Graduate students who desire to take their major work in pathology must present credits for the equivalent of the first two years' work of the Medical School of this University. A degree with designation, such as M.S. in Pathology, is awarded only to those who have an M.D. degree.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A.

Master's Degree with Designation in Pathology—Given only after three years of work.

Doctor's Degree—The Ph.D. degree with designation in pathology may be awarded after completion of three or more years in graduate work and presentation of a thesis of high quality.

101. **Pathology.** General Pathology. (8 cred.; prereq. completion of first year in Medical School or equiv.) Dawson, Hebbel, McCartney, and staff
102. **Pathology.** Special Pathology. (8 cred.; prereq. 101) Dawson, Hebbel, McCartney, and staff
104. **Autopsies.** (Cred. ar.; prereq. 102) Staff
105. **Diseases of the Kidney.** (3 cred.; prereq. 102) Hebbel
106. **Diseases of the Heart.** (3 cred.; prereq. 102) McCartney
110. **Seminar in Pathology.** (1 cred. per qtr.; prereq. 102) Staff
111. **Conference on Autopsies.** (1 cred. per qtr.; prereq. 102) Staff
112. **Diagnosis of Tumors.** (2 to 5 cred. per qtr.; prereq. 102) Hebbel, McCartney
113. **Surgical Pathology.** (2 to 5 cred. per qtr.; prereq. 102) Hebbel, McCartney
114. **Diseases of the Liver.** (1 cred.; prereq. 102) McCartney
115. **Advanced Neuropathology.** (Cred. and hrs. ar.; \$N.Psy. 150, 210) Baker
116. **Problems in Neuropathology.** (Cred. and hrs. ar.; \$N.Psy. 143; prereq. 102) Baker

117. **Neuropathology.** (Cred. and hrs. ar.; §N.Psy. 143) Baker
 118. **Intracranial Neoplasms.** (2 cred.; §N.Psy. 211) Baker
 119. **Survey of Neuropathology.** Examination of specimens from current autopsies. (Cred. and hrs. ar.; §N.Psy. 151 and 212) Tichy
 120. **Diseases of the Lungs.** (1 cred.; prereq. 102) Dawson
 121. **Diseases of the Alimentary Tract.** (1 cred.; prereq. 102) Hebbel
 201. **Research.** (Cred. and hrs. ar.; graduate students with necessary preliminary training may elect research, either as majors or minors in pathology) Staff

OFFERED AT THE MAYO FOUNDATION

Professor

James W. Kernohan, M.B., B.Ch.,
D.P.H., M.A., M.D.
 Archie H. Baggenstoss, M.D., M.S. in
Path.
 Malcolm B. Dockerty, M.D., C.M., M.S.
in Path.
 Jesse E. Edwards, M.D.
 William H. Feldman, D.V.M., M.S.
 John R. McDonald, M.D., M.S. in Path.
 Thomas B. Magath, M.D., Ph.D.
 Carl F. Schlotthauer, D.V.M.

Associate Professor

Warren A. Bennett, M.D., M.S. in Path.
 Frank D. Mann, M.D., Ph.D.

Assistant Professor

David C. Dahlin, M.D., M.S. in Path.
 Alfred G. Karlson, D.V.M.
 Don R. Mathieson, M.S., M.D.
 Charles A. Owen, Jr., M.D., Ph.D. in
Med.
 Edith M. Parkhill, M.D., M.S. in Path.
 George P. Sayre, M.D., M.S. in Path.
 Lewis B. Woolner, M.D., M.S. in Path.

Instructor

Gertrude L. Pease, M.D., M.S. in Path.
 John H. Thompson, Jr., Ph.D. in Para-
sitology

Opportunities for advanced work in pathology are offered in four different sections in the Mayo Foundation, as follows:

1. *Clinical Pathology*—Work in this section includes diagnostic work in the laboratories of gastrology, urinalysis, serology, bacteriology, parasitology, and clinical chemistry. Graduate students in these clinical laboratories may learn the technique of accepted diagnostic procedure. Special attention is called to the opportunity for experience and research in serology and for training and research in parasitology. This work may be taken either as a major or as fulfilling the conditions of a minor for those majoring in pathology.

2. *Pathologic Anatomy*—Post-mortem examinations are made in sufficient numbers to permit approximately twelve fellows being assigned to the section.

The service permits the laying of a thorough foundation in the general principles of pathologic anatomy. Each fellow serves as junior assistant three months and senior assistant three months, during which time he takes part in the routine of post-mortem examinations and studies the microscopic sections of these post-mortems and engages in weekly conferences and seminars concerned with general and special subjects in pathologic anatomy. Each fellow is expected to work on a problem and to present his findings to the group. Microscopic and gross demonstrations are held at frequent intervals, and the work throughout is carefully supervised. Collateral reading and study are encouraged, and there is ample opportunity for thesis studies or special lines of research. Available for study is a large collection of operative and post-mortem specimens, both gross and microscopic, cross-indexed as to organ and disease. In addition there are over 45,000 photomicrographs and photographs of gross specimens illustrating various phases of pathologic anatomy.

3. *Surgical Pathology*—The laboratories of surgical pathology receive immediately all tissues removed at operation. They are studied both

grossly and microscopically while the operation is going on, and the choice of surgical procedure is not infrequently influenced by the results of the examination. Case records, including operative findings, are reviewed by the fellows and discussed at daily conferences that correlate clinical symptoms and results of laboratory tests with pathologic findings. All gross specimens and all microscopic slides are preserved indefinitely so that original material may be available for pathologic research. By means of daily experience in the laboratory in the microscopic examination of tissues supplemented by weekly demonstrations, each fellow has an opportunity to study approximately 7,000 surgical specimens over a six-month period. First assistants are provided with an additional six months' training with added responsibilities.

In addition to participation in formal seminars and conferences conducted by the staff each fellow is assigned a subject each quarter for investigation and presentation. Current thesis work is often discussed at these meetings, and outstanding presentations are typed and multi-graphed for future reference.

4. *Experimental Pathology and Comparative Pathology*—Work consists of research in problems of pathology using animals for experiment. Seminars are held regularly.

Language Requirement—For the Master's degree (nonclinical), reading knowledge of one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f,w,s,su. Clinical Pathology. Preparation and examination of cultures, preparation and administration of autogenous vaccines, Wassermann tests, special clinical and laboratory methods including hematology and serology. Opportunities for research are open to qualified students. Magath, Mann, Mathieson, Owen, Pease

M252f,w,s,su. Parasitology. Routine clinical and special research in parasitology, examination of stools, study of internal parasites. Magath

M253f,w,s,su. Clinical Hematology. Heck, Watkins, Pease

M254f-w,w-s,s-su,su-f. Necropsy Service. Junior assistant three months; senior assistant three months; demonstrations in clinico-pathologic conferences; microscopic examination of fixed tissues removed at necropsy. Bacteriology and necropsy material. Research problems. Weekly seminars. Kernohan, Baggenstoss, Edwards, Bennett, Sayre

M255f-w,w-s,s-su,su-f. Surgical and Fresh Tissue Pathology. Diagnosis of surgical specimens (gross and microscopic) with immediate correlation with all clinical data. Experience in examination of cellular content of body secretions, including cervical smears. Research problems. Daily demonstrations and discussions. Dockerty, McDonald, Parkhill, Dahlin, Woolner

M256f,w,s,su. Research Work on Selected Problems in Experimental Pathology. Bollman, Grindlay

M257f,w,s,su. Research Work on Selected Problems in Comparative Pathology. Feldman, Schlotthauer, Karlson

M258f,w,s,su. Cytology of Body Secretions. McDonald, Woolner

M259f,w,s,su. Pathology of the Eye. Open to ophthalmology majors who have adequate preparation in general pathology. Kernohan, Parkhill

M260f,w,s,su. Neuropathology. Open to majors in neurology and psychiatry or neurologic surgery who have adequate preparation in general pathology. Kernohan, Sayre

Students majoring in pathology may also do research in biophysics, physiological chemistry, physiology, and bacteriology. For details, see these departments.

PEDIATRICS

Graduate work in pediatrics is arranged (a) to prepare students to become competent pediatricians, (b) to train them in the techniques of clinical investigation, and (c) to make them competent teachers in the subject.

OFFERED AT THE MEDICAL SCHOOL

Professor

John A. Anderson, M.D., Ph.D., *head*
Robert A. Good, Ph.D., M.D.
Reynold A. Jensen, M.D.
Irvine McQuarrie, Ph.D., M.D.

Clinical Professor

Hyman S. Lippman, M.D., Ph.D.
Erling S. Platou, M.D.
Max Seham, M.D.
Albert V. Stoesser, M.D., Ph.D.

Clinical Associate Professor

Paul F. Dwan, M.D.
Lawrence F. Richdorf, M.D., Ph.D.
Robert L. Wilder, M.D.

Assistant Professor

Paul Adams, M.D.
Ray C. Anderson, Ph.D., M.D.
Lewis W. Wannamaker, M.D.
Mildred R. Ziegler, Ph.D.

The work of the department is conducted in the pediatric research laboratories, the wards, and the Out-Patient Department of the University Hospitals, at the Minneapolis General Hospital, and at Ancker and Children's hospitals in St. Paul. The infant and child welfare organizations and the child guidance clinics of Minneapolis and St. Paul afford additional opportunities for all phases of preventive pediatrics.

The general medical library of the University with almost complete files of journals dealing with pediatrics and allied fields furnishes adequate reference facilities.

Research laboratories of the Department of Pediatrics and the large general laboratories of the Departments of Anatomy, Bacteriology, Biochemistry, Pathology, Pharmacology, Physical Medicine, and Physiology are at the disposal of graduate students, and afford every possible opportunity for research.

Prerequisites—General understanding of bacteriology, immunology, pathology, physiology, and physiological chemistry and reading knowledge of certain foreign languages are essential.

Minor—Students are required to carry a minor in one of the fundamental branches or allied fields.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Courses leading to the Ph.D. may be arranged with members of the graduate faculty.

150f,w,s.** **Physiology and Diseases of the Newborn.** (1 cred.) Good

152f,w,s.** **Fundamental Principles of Nutrition and Metabolism as Applied to Children.** Seminar Course. (1 cred.) J. Anderson, McQuarrie, Ziegler

** Not offered to less than ten students.

- 154f,w.s.** **Endocrinology as Applied to Pediatrics.** Seminar course. (1 cred.) McQuarrie
- 156f,w.s.** **Advanced Study of Noncontagious Diseases.** Both clinical and experimental subject matter included. (1 cred.) McQuarrie, Seham, Good
- 158f,w.s.** **Advanced Study of Contagious Diseases.** Both clinical and experimental subject matter included. (1 cred.) Platou, Good
- 160f,w.s. **Allergic Disorders in Childhood.** (1 cred.) Stoesser, L. Nelson
- 162f,w.s. **Common Behavior Disturbances in Childhood.** Their recognition and management. (1 cred.) Jensen, Engstrom
- 163f,w.s. **Hematology of Infancy, Childhood.** (1 cred.) E. Nelson, Good
- 164f,w.s. **Rare. Unusual Diseases of Infancy, Childhood.** (1 cred.) McQuarrie, Platou
- 165f,w.s.su. **Case Conference in Child Psychiatry.** (Cred. ar.) Jensen
- 166f,w.s. **Seminar.** Problems in pediatrics. (1 cred.) Ziegler and staff
- 167f,w.s. **Seminar.** Current literature. (1 cred.) J. Anderson, McQuarrie, and staff
- 168f,w.s. **Speech Disturbances in Childhood.** Clinic course. (1 cred.) Jensen, Stenswick
- 170f,w.s. **Rheumatic Infection and Heart Diseases in Childhood.** (1 cred.) Good, Dwan, R. Anderson, Adams
- 171f,w.s. **Congenital Heart Disease.** (Cred. ar.) Dwan, R. Anderson, Adams
- 172f,w.s. **Dental Disorders in Relation to General Health.** (Cred. ar.) Cohen
- 174f,w.s. **Heredity in Pediatrics.** (4½ cred.) R. Anderson
- 200f,w.s.su. **Graduate Seminar in Pediatrics.** (1½ cred.) J. Anderson, Ziegler, and staff
- 202f,w.s.su. **Pediatric Clinic.** Out-Patient Department, University Hospitals. Daily, 9:00 to 12:00 noon. (1 to 7 cred.) J. Anderson, McQuarrie, Jensen, Stoesser, Dwan, R. Anderson, Adams
- 204f,w.s.su. **Three months' residence in pediatrics at the University Hospitals.** (1 to 7 cred.) J. Anderson, McQuarrie, Jensen, Good, Platou
- 206f,w.s.su. **Three months' residence in pediatrics at the Minneapolis General Hospital.** (1 to 7 cred.) Platou, Richdorf, Seham
- 208f,w.s.su. **Pediatric Research.** Special problems. Students may collaborate with members of the staff or with other students. (3 to 7 cred.) McQuarrie, Jensen, Good, Ziegler, staff
- 210f,w.s.su. **Special Clinics in Pediatrics.** (1 cred.) Jensen, Dwan, Heilig, Stoesser
- 214w.s. **Psychiatry of Childhood.** (Cred. ar.) Jensen

OFFERED AT THE MAYO FOUNDATION

Professor

Roger L. J. Kennedy, M.D., M.S. in Ped.

Associate Professor

Haddow M. Keith, M.D.

George B. Logan, M.D., M.S. in Ped.

Assistant Professor

James W. DuShane, M.D.

Stephen D. Mills, M.D., M.S. in Ped.

Instructor

Edmund C. Burke, M.D., M.S. in Ped.

Lloyd E. Harris, M.D.

Alvin B. Hayles, M.D., M.S. in Ped.

** Not offered to less than ten students.

The section on pediatrics at the Mayo Foundation trains selected physicians for the practice and teaching of pediatrics. Each pediatric fellow whose standard of performance warrants annual reappointment over a three-year period has the opportunity of working in the several sections. The program provides a well-rounded experience in diagnosis and treatment of disorders of children, in preventive pediatrics, and in laboratory research. All fellows in pediatrics participate in the following weekly seminars and conferences: seminar in growth and development, clinical case conference (ambulatory patients), clinical case conference (hospitalized patients), and review of current literature.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f-w,w-s,s-su,su-f. Diagnosis of Medical and Surgical Diseases of Infants and Children. Seminar. Staff

M252f-w,w-s,s-su,su-f. Hospital Residence. Diagnosis and care of sick infants and children. Staff

M253f-w,w-s,s-su,su-f. Local Outcall Service. Diagnosis and care of sick infants and children of the community under direction of consultants.

M254f,w,s,su. Care of Newborn and Well Infants. St. Marys Hospital newborn nursery and Mayo Clinic well-baby clinic at St. Marys Hospital. Kennedy, Harris

M255f,w,s,su. Care of Well Infants and Children and Health Supervision of Preschool and School-Age Children. City Hall and county well-baby and well-child clinics and schools of city and county. Kennedy, Harris

Child Psychiatry. (See Department of Neurology and Psychiatry)

Metabolism and Endocrinology. (Under supervision of Department of Medicine)

Necropsy Service; Pediatric Pathology (104f-w,w-s,s-su,su-f). Minneapolis Campus. (See Department of Pathology)

Research in Pathology, Biochemistry, or Physiology. (See these departments)

PHARMACEUTICAL CHEMISTRY

OFFERED AT THE COLLEGE OF PHARMACY

Professor

Charles H. Rogers, Sc.D., dean
Ole Gisvold, Ph.D.
Willard J. Hadley, Ph.D.
Charles V. Netz, Ph.D.
Taito O. Soine, Ph.D.

Associate Professor

Frank E. DiGangi, Ph.D.

Assistant Professor

Robert H. Miller, Ph.D.

Prerequisites—Graduate work leading to the M.S. and Ph.D. degrees with a major in pharmaceutical chemistry or pharmacognosy is open to students who have shown exceptional scholarship and ability in undergraduate courses of this or some other college of pharmacy of equal standing. Consideration will be given to applications of students who are not graduates in pharmacy but whose pattern of undergraduate work includes training in such allied or related subjects as would implement them to do graduate work successfully with a major in pharmaceutical chemistry.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a special research technique.

Master's Degree—In general, offered under Plan A. Plan B may be followed by petition.

Doctor's Degree—Graduate work leading to the Ph.D. degree is offered to students prepared for advanced work in pharmaceutical chemistry.

161f-162w-163s. Organic Pharmaceutical Products. Sources, methods of production, properties, reactions, relationships of structures to activity, and uses of natural and synthetic organic compounds used as therapeutic agents. 161: Hydrocarbons, halogenated hydrocarbons, alcohols, aldehydes, ketones, acids, phenols, ethers, and esters. 162: Analgesics, organometallics—mercurials, silver compounds, arsenicals, and bismuth compounds—dyes, surface active agents, miscellaneous antiseptic agents, sulfonamides, and antibiotics. 163: Pressor principles, myotics, mydriatics, antispasmodics, local anesthetics, barbiturates and related compounds, alkaloids, tannins, cardiac glycosides, sex hormones, and structurally related compounds and vitamins. (3 cred. for 161, 3 cred. for 162, 4 cred. for 163; prereq. Or.Ch. 2) Gisvold

164w-165s. Special Analytical Methods. The Food, Drug, and Cosmetic Act and official analytical methods of the United States Pharmacopoeia, National Formulary, and Association of Official Agricultural Chemists. Laboratory work: special analytical methods, physical and chemical, used in analyses of some drugs and foods. Student uses the viscosimeter, Abbé and Zeiss refractometers, polariscope, Duboscq colorimeter, photoelectric colorimeter, cryoscope, spectrophotometer, and other instruments for quantitative measurements. Professional elective. (3 cred. per qtr.; prereq. 3, 54, Or.Ch. 62; students planning to do graduate work with a major in pharmaceutical chemistry and a minor in organic chemistry should elect 164 for their winter professional elective and Or.Ch. 63 and 64 for their spring professional electives) Soine or DiGangi, and staff

201f,w.s.* Pharmaceutical Chemistry Seminar. (1 cred. per qtr.; required of majors in pharmaceutical chemistry and pharmacognosy) Gisvold

202f-203w-204s.* Advanced Analytical Methods. Analyses of complex food, drug, and cosmetic products. Identification of colors, perfumes, flavoring agents, digestants, adulterants, etc. Precision instruments. (3 to 5 cred. per qtr.; prereq. 165; offered when demand warrants) Rogers, Netz

205f-206w-207s.* Chemistry of Medicinal Products. Chemistry and relationships between constitution and physiologic action of organic compounds. Isolation of active principles and syntheses of medicinal compounds. 205: Central nervous system depressants, central nervous system stimulants, local anesthetics, parasympathomimetics, sympathomimetics, and spasmolytics. Soine. 206: Proteins, enzymes, co-enzymes, respiratory enzymes, biological oxidations and reductions, vitamins, some hormones, and the cardiac glycosides. Gisvold. 207: Organometallics (i.e., mercurials, arsenicals, and bismuth compounds), certain dyes, acridines, sulfones, sulfonamides, amidines, and the complex ureas. Gisvold. (3 to 6 cred. per qtr.; prereq. Or.Ch. 2 and 163 or ‡; offered 1955-56 and alternate years)

208w. Carbohydrates and Glycosides. Origin, isolation, characterization, and chemistry of the carbohydrates and glycosides. (3 to 5 cred.; prereq. 163 or ‡; offered 1956-57 and alternate years) Gisvold

209f.* Alkaloids. Chemistry and experiments on methods used to isolate, purify, and characterize alkaloids. (3 to 5 cred.; prereq. 163 or ‡; offered 1956-57 and alternate years) Soine

210f.* History of Pharmaceutical Chemistry. (3 cred.) Netz

211s.* Terpenes, Carotinoids, Tannins, and Anthocyanins. Discussion of their chemistry and experimental investigation of methods of isolation and characterization of the volatile oils and their constituents. (3 to 5 cred.; prereq. 163 or ‡; offered 1956-57 and alternate years) DiGangi

- 212s.* Fats, Waxes, Sterols, and Related Compounds.** Origin, isolation, characterization, and chemistry of the fats, waxes, sterols, and related compounds. (3 to 5 cred.; prereq. 163 or #; offered 1956-57 and alternate years) Gisvold
- 213f.w.s.su. Research Problems.** Study and experimental investigation of one or more topics, e.g., complex drug and cosmetic products, carotinoids, enzymes, fats, oleoresins, pigments, proteins, resins, vitamins, waxes, etc. (Cred. ar.; prereq. 163 or #) Staff
- 214f.w.s.su. Research in Pharmaceutical Chemistry.** (Cred. ar.) Staff
- 215f-216w. Pharmaceutical Development.** Theoretical and practical problems involved in the development, stabilization, and manufacturing of a wide variety of pharmaceuticals, e.g., tablets, ointments, liquids, and suspensions on a pilot plant scale. (5 cred. per qtr.; prereq. 163 or #; offered 1956-57 and alternate years) Miller
- 218f. Extraction, Distribution, and Partition Coefficients.** The theory and practice of extraction of liquids and solids, countercurrent distribution, solvent and solute effects and chromatography. (3 or 5 cred.; prereq. 163 or #; offered 1955-56 and alternate years) Miller

PHARMACOGNOSY

OFFERED AT THE COLLEGE OF PHARMACY

Professor

Earl B. Fischer, Ph.D.

Associate Professor

Wallace F. White, Ph.D.

For prerequisites and statements on Master's and Doctor's degrees, see Pharmaceutical Chemistry.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, two foreign languages, one of which must be German.

- 162w. Biological Assay of Drugs.** Didactic and laboratory considerations of biological assays of vegetable and animal drugs of the United States Pharmacopoeia and National Formulary. Important nonofficial assay methods are also studied. (3 cred.; registration limited to available instructional facilities; prereq. 57) White
- 201f.202w.203s.* Advanced Pharmacognosy.** Lecture and laboratory courses dealing with a systematic study of the pharmacognosy and pharmacohistology of the official, and a few important nonofficial, vegetable, and animal drugs. Information concerning the microscopic and microchemical properties of cell contents and cell forms such as alkaloids, glycosides, calcium oxalate, carbohydrates, parenchyma cells, stone cells, conducting cells, etc., and their appearance and arrangement in vegetable drug tissue, is applied to the identification, determination of purity, evaluation and detection of adulteration of vegetable and animal drugs. Important microscopical accessories such as the micropolariscope, microphotographic camera, staining reagents, etc. are used. (3 to 5 cred.; prereq. 55, 56, 57; offered when demand warrants) Fischer
- 204f.w.s.su. Research in Pharmacognosy.** (Cred. ar.) Fischer, White
- 205f. Microscopy of Foods.** Identification of food products of vegetable origin, by means of the microscopic structure and microchemical reactions of their tissues and cell contents, together with the determination of purity and the detection of adulteration. (3 to 5 cred.; prereq. 55, 56, 57; offered when demand warrants) Fischer
- 206w. Technical Microscopy.** Study of microscopic characteristics and identification of technical products such as vegetable and animal fibers, woods, barks, cellulose, textiles, seeds, etc. (3 to 5 cred.; prereq. 55, 56, 57; offered when demand warrants) Fischer

207f.208w. Pharmacodynamic Methods. Practical application and evaluation of special techniques used in testing qualitative and especially quantitative drug action on experimental animals. Drug types studied include anthelmintics, diuretics, bactericidal and bacteriostatic agents, analgesics, cardiac drugs, local anesthetics, and antispasmodics. (3 to 5 cred. per qtr.; offered when demand warrants) White

209f.210w,211s. Advanced Experimental Drug Testing Techniques. Projects will be assigned including library and laboratory work to duplicate techniques of selected original investigations reported in the literature in order to prepare the student to carry on original investigations in drug testing. (Cred. ar.; offered when demand warrants) White

PHARMACOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Raymond N. Bieter, M.D., Ph.D., *head*
Harold N. G. Wright, Ph.D.

Assistant Professor

Elizabeth M. Cranston, Ph.D.

The laboratories of the Department of Pharmacology are excellently equipped for study of both the chemical properties of drugs and their actions upon functions of living organs and tissues, for studies on detection, isolation, and estimation of poisons, and for experimental chemotherapy. By co-operation of the clinical departments, special studies may be made of the action of drugs, old and new, upon patients in the University Hospitals and allied hospitals.

Prerequisites—In addition to fulfilling requirements for admission to the Graduate School students should satisfy the requirements for entrance to the Medical School.

Minor—This department offers work for a minor to students in allied sciences.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A.

Doctor's Degree—Work toward the Ph.D. degree is offered in this department.

101f.w.s. Introduction to Pharmacology. The first course in a sequence in which drugs and related chemical compounds are presented for study from the standpoints of chemical structure, beneficial pharmacological actions or effects upon the living body and on living organisms, toxic or harmful effects, and their applications to the treatment of disease. (2 cred.; prereq. Phsl. 106, 107 or equiv.) Bieter, Wright, Cranston

102s. General and Experimental Pharmacology. (Continuation of 101) Laboratory experiments and demonstrations. (9 cred.; prereq. 101; this course runs as a single unit through the spring quarter and the first term of Summer Session) Bieter, Wright, Cranston

105f.w. General and Experimental Pharmacology. (Continuation of 101) Laboratory experiments and demonstrations. (6 cred.; prereq. 101; see 108 below) Bieter, Wright, Cranston

106w.s. General Pharmacology. (Lecture continuation of 105) (2 cred.; see 108 below) Bieter, Wright, Cranston

- 109f.w.s.su. Pharmacological Problems.** (Cred. and hrs. ar.; prereq. 101 and 102 or equiv.) Bieter, Wright, Cranston
- 110f.su. Toxicology.** Systemic qualitative toxicological analysis. (2 or 5 cred.; prereq. #; lect. and lab.; lect. only may be taken) Wright
- 111s. Advanced Toxicology.** Quantitative toxicological analysis. (3 cred.; prereq. 110 or ♯) Wright
- 112w. Spectrochemical Toxicology.** (5 cred.; prereq. 110) Wright
- 113f. Industrial Toxicology.** (2 cred.; prereq. 110) Wright
- 123. Special Topics in Pharmacology.** (2 cred.; prereq. #) Bieter, Wright, Cranston
- 124f.w.s. Pharmacology of Special Systems.** Conferences on the more detailed pharmacology of special organ systems and the clinical applications thereof. (3 cred.) Bieter, Wright, or Cranston
- 203f.w.s.su. Research in Pharmacology.** (Cred. and hrs. ar.; prereq. 101 and 102 or equiv., #) Bieter, Wright, or Cranston
- 204f.w.s. Advanced Pharmacology.** (1 cred.; prereq. 101, 102 or #) Bieter, Wright, Cranston
- 205f.w.s. General Discussions in Pharmacology.** A seminar. (1 cred.; prereq. 101, 102, #) Bieter, Wright, or Cranston

OFFERED AT THE MAYO FOUNDATION

All opportunities for advanced work in pharmacology and therapeutics offered at the Mayo Foundation are in connection with the Departments of Medicine, Pediatrics, and Surgery. For details, see announcements of these departments.

PHYSICAL MEDICINE AND REHABILITATION

OFFERED AT THE MEDICAL SCHOOL

Professor

Frederic J. Kottke, M.D., Ph.D., *head*
William G. Kubicek, Ph.D.

Clinical Professor

Miland E. Knapp, M.D., M.S.

Assistant Professor

Ruby M. Overmann, M.S.

The field of physical medicine and rehabilitation, which includes physical therapy, occupational therapy, vocational counseling guidance and training, is one of the most rapidly expanding specialties in medicine. Trained physiatrists, of whom there are an insufficient number, are in great demand in medical schools, private practice, the Veterans Administration hospitals, and many state hospitals for the chronically disabled. Physical medicine, therefore, offers unusual opportunity to the enterprising young physician who is interested in developing a new medical specialty.

Opportunity for clinical and fundamental research, as well as clinical experience and training, is offered at the University of Minnesota Hospitals. Additional clinical experience is obtained at the Minneapolis General Hospital, the Minneapolis Veterans Hospital, Sheltering Arms Hospital, and Kenny Institute. The student devotes full time to his training program and may not carry on outside practice. The three-year program fulfills the requirements of training for the American Board of Physical Medicine and Rehabilitation. As a part of the program, each graduate student is required to carry out a problem of independent research under

the direction of his major adviser. For the minor field of study, anatomy, physiology, biophysics, or pathology are especially recommended.

Qualified physical therapists with a Bachelor's degree may be accepted for study for the degree of master of science in physical therapy.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—For graduate physicians the M.S. degree is offered under Plan A. This program, which also fulfills the didactic requirements of the American Board of Physical Medicine and Rehabilitation, usually requires three years for completion.

Doctor's Degree—The Ph.D. degree in physical medicine is designed for physicians interested in a career of teaching and research. Completion of this program requires approximately five years. In addition to the clinical training and the participation in the teaching program, extensive experience is obtained in laboratory and clinical research.

103f.w.s.su. Physical Therapy Clinic. Participation in practical application of physical therapy to patient. (Cred. and hrs. ar.) Kottke

200f.w.s.su. Physical Medicine Service. Service at University Hospitals, Minneapolis General Hospital, and other affiliated hospitals. (Cred. and hrs. ar.) Kottke, Knapp

203f.w.s.su. Poliomyelitis Clinic. Follow-up for former poliomyelitis patients, supervising treatment and prevention of deformities. (Cred. and hrs. ar.; for physicians) Kottke

204f.w.s.su. Peripheral Vascular Disease Clinic. (Cred. and hrs. ar.; for physicians) Kottke

210f.w.s.su. Research in Physical Medicine. (Cred. and hrs. ar.) Kottke, Kubicek

220f.w.s. Seminar in Physical Medicine. (Cred. and hrs. ar.) Kubicek

OFFERED AT THE MAYO FOUNDATION

Professor

Frank H. Krusen, M.D.

Associate Professor

Earl C. Elkins, M.D.

Assistant Professor

Gordon M. Martin, M.D., M.S. in Phys. Med.

Instructor

Donald J. Erickson, M.D., M.S. in Phys. Med.

At present there is great need for well-trained medical men in the field of physical medicine and rehabilitation. Hospitals and teaching institutions have sent a number of requests to the Foundation for men with such training.

Clinical training in physical medicine and rehabilitation, and ample opportunity for basic and clinical research are available. Instruction in electrodiagnosis, electrotherapy, fever therapy, hydrotherapy, light therapy, kinesitherapy, thermotherapy, occupational therapy, and physical rehabilitation of the disabled is provided. Employment of physical agents in the various fields of medicine, particularly in treatment of rheumatology, orthopedic surgery, neurology, and various other medical and surgical specialties, is stressed. Diagnostic procedures as well as therapeutic techniques are thoroughly considered. Each fellow is carefully instructed in the administration of a hospital department or institution for physical treatment and rehabilitation of convalescent or seriously dis-

abled persons. Special seminars in didactic phases of physical medicine and rehabilitation are offered. Opportunities in related fields may be arranged.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f,w,s,su. Physical Medicine and Rehabilitation. Staff

M252f,w,s,su. Special service in physical medicine and rehabilitation as related to rheumatology, orthopedic surgery, neurology, and various other medical and surgical specialties. Staff

Research Work on Selected Problems in Physiology. (See Department of Physiology)

Fellows majoring in physical medicine may also take work in biophysics, physiology, rheumatology, neurology and psychiatry, and internal medicine. For details, see these departments.

PHYSIOLOGICAL CHEMISTRY

OFFERED AT THE MEDICAL SCHOOL

Professor

Wallace D. Armstrong, M.D., Ph.D.,
head
David Glick, Ph.D.
Karl Sollner, Ph.D.

Associate Professor

Cyrus P. Barnum, Jr., Ph.D.
Saul L. Cohen, Ph.D.
Ralph Holman, Ph.D.

Assistant Professor

Charles W. Carr, Ph.D.
Helmut R. Gutmann, Ph.D.
Leon Singer, Ph.D.

Prerequisites—A Bachelor's degree with a major in chemistry or physics and a minor in some other science. Prerequisites for admittance as a candidate for the Ph.D. degree with either a major or minor in this department, or for the M.S. degree with a major in this department, are: An.Ch. 1-2 or 101-102 or equivalent; Or.Ch. 63-64 or equivalent; P.Ch. 107-108 or equivalent; and 6 credits of a biological science.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) two foreign languages of which one shall be German or (b) one foreign language which ordinarily shall be German and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A. The following are required of all candidates for the Master's degree with a major in this department: 3 credits of advanced analytical chemistry, 3 credits of advanced organic chemistry, 6 credits of biological sciences, and Ph.Ch. 100-101.

Doctor's Degree—The following are required of all candidates for the Doctor's degree with a major in this department: 6 credits of advanced analytical chemistry, 6 credits of advanced organic chemistry, 6 credits of advanced physical chemistry or physics, 10 credits of Phsl. 106-107, Ph.Ch. 100-101, and four of the five physiological chemistry courses numbered 206, 207, 208, 209, or 211. These are not intended to be interpreted as minimum requirements, however, and each graduate student is

expected to work out his full program in consultation with an adviser, with the understanding that needs may differ in individual cases.

If Ph.Ch. 100-101 or its equivalent has been taken five years or more prior to the time the candidate is to appear for the preliminary oral examination, this course must be retaken.

- 100f,su-101w,su. Physiological Chemistry.** (7 cred. for 100, 6 cred. for 101; pre-req. physics, physical and organic chemistry) Armstrong, Barnum, Glick, Cohen, Carr
- 153f,w,s,su. Problems in Physiological Chemistry.** Special work arranged with qualified students. (Cred. and hrs. ar.; may be taken one or more quarters; pre-req. 100-101) Armstrong, Barnum, Glick, Cohen, Carr
- 155f,w,s. Seminar and Conference on Dental and Oral Biochemistry.** (Cred. and hrs. ar.; pre-req. 100-101 or 104-105) Armstrong
- 200f,w,s. Seminar in Physiological Chemistry.** (1 cred.) Staff
- 205f,w,s,su. Research in Physiological Chemistry.** (Cred. and hrs. ar.) Armstrong, Barnum, Glick, Sollner, Cohen
- 206f.** Advanced Endocrinology and Steroid Chemistry.** (3 cred.; pre-req. 100-101; offered 1955-56 and alternate years) Cohen
- 207w.** Radiotracers and Mineral Metabolism.** (3 cred.; pre-req. 100-101; offered 1955-56 and alternate years) Armstrong
- 208s. Advanced Laboratory Technique.** (3 cred.; pre-req. 100-101 and #; limited to 10 students; offered 1955-56 and alternate years) Staff
- 209f.** Histochemistry.** (3 cred.; pre-req. 100-101 and histology or #; offered 1956-57 and alternate years) Glick
- 211s.** Intermediary Metabolism.** (3 cred.; pre-req. 100-101; offered 1956-57 and alternate years) Barnum
- 212f,w,s,su. Histochemistry Laboratory.** Problems in the field of histochemistry selected to meet individual interests. (Cred. and hrs. ar.; pre-req. 100-101 and #) Glick
- 213f,w,s. Clinical Physiological Chemistry.** (Cred. and hrs. ar.) Staff
- 236f,w,s. Radio-Isotope Seminar.** (1 cred.) Stenstrom, Armstrong, and staff

Biochemistry

OFFERED AT THE MAYO FOUNDATION

Professor

Marschelle H. Power, Ph.D.
Jesse L. Bollman, M.S., M.D.
Harold L. Mason, Ph.D.

Assistant Professor

Gerhard A. Fleisher, Ph.D.
Vernon R. Mattox, Ph.D.
Bernard F. McKenzie, M.S.

Associate Professor

Eunice V. Flock, Ph.D.
Frank T. Maher, M.S., Ph.D., M.D.

Instructor

Warren F. McGuckin, M.S., Ph.D. in Chem.

Many of the opportunities for graduate work in biochemistry in the Mayo Foundation occur in the Departments of Medicine, Pediatrics, and Clinical Pathology, for which see announcements under these departments. In addition, advanced work is offered in the Department of Biochemistry to a limited number of well-prepared students majoring in biochemistry.

** Offered only when eight or more students are registered.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f, w.s. su. Biochemistry. Research work in problems related to metabolism and the chemistry of the blood; includes training in the use of methods of organic and inorganic analysis. Power, Bollman, Mason, Flock, Helmholz, Fleisher, Mattox, McKenzie

Nutrition. (See Department of Medicine)

Students majoring in biochemistry may also carry on research work in physiology. For details, see that department.

PHYSIOLOGICAL HYGIENE

OFFERED AT THE SCHOOL OF PUBLIC HEALTH

Professor

Ancel Keys, Ph.D., *director*

Associate Professor

Joseph T. Anderson, Ph.D.
Josef M. Brozek, Ph.D.
Francisco Grande, M.D.
Ernst Simonson, M.D.
Henry L. Taylor, Ph.D.

Minor—It is suggested that students who major in physiological hygiene present a minor in one of the following fields: physiology, physiological chemistry, or psychology.

Language Requirement—For the Master's degree, French or German. In exceptional cases Spanish or Russian may be substituted by petition. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A.

Doctor's Degree—Work is offered in physiological hygiene leading toward the Ph.D. degree.

Pub.H.191s. Science of Human Nutrition. Surveys, nutritional status, under-nutrition, malnutrition, dietetics in social relief and medical practice. (3 cred.; prereq. 8 cred. in biochemistry, 91, 92, or #; offered when demand warrants) Keys, Anderson

Pub.H.192w. Physiology of Exercise. Muscular efficiency, training, deconditioning, effects of exercise on physiological systems. (4 cred.; prereq. 92 or Phsl. 103 or equiv., and #; offered when demand warrants) Simonson, Taylor

Pub.H.194w. Human Factors in Industry. Job requirements; physiological cost of work; industrial fatigue, hazards, accidents, absenteeism. (3 cred.; prereq. #) Brozek

Pub.H.195w. Public Health Aspects of Heart Disease. (Cred. ar.; prereq. #) Keys and staff

Pub.H.202f, w.s. Seminar in Physiological Hygiene. Nutrition, tests and measurements of human physical fitness, gerontology, adaptation in health and disease, circulatory dynamics, and related topics. (1 cred.) Staff

Pub.H.220f, w.s. Readings in Problems of Physiological Hygiene. (Cred. ar.; prereq. #) Staff

Pub.H.290f.w.s. Research in Physiological Hygiene and Related Areas. (Cred. ar.) Staff

PHYSIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Maurice B. Visscher, M.D., Ph.D., *head*
 John J. Bittner, Ph.D.
 Ernst Gellhorn, M.D., Ph.D.
 Nathan Lifson, M.D., Ph.D.
 Victor Lorber, M.D., Ph.D.
 Herbert S. Wells, M.D.

Assistant Professor

Marthella J. Frantz, Ph.D.
 Eugene D. Grim, Ph.D.
 Franz Halberg, M.D.
 John A. Johnson, Ph.D.
 Carlos Martinez, Ph.D.

Associate Professor

Ernest B. Brown, Ph.D.
 Joseph T. King, M.D., Ph.D.

Prerequisites—For a major or minor in physiology, acceptable courses in general zoology or anatomy, general chemistry, organic chemistry, and college physics. Physical chemistry is desirable.

Minor—Students majoring in clinical subjects who desire a minor in physiology must have had the courses in these branches usually required of medical students.

Language Requirement—For the Master's degree, German, French, Russian, or Spanish. For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under both Plan A and Plan B, the latter by petition.

Doctor's Degree—Work for the Ph.D. degree is offered to candidates whose background of training is approved by the department.

106s-107su.† Human Physiology. (15 cred.; prereq. organic chemistry, zoology, and neuroanatomy; students may register for lecture without laboratory) Visscher, Gellhorn, and staff

112f. Hemodynamic Measurements. Demonstrations and student participation in the setting up, calibration, and use of modern tools for measurements of blood pressure, blood flow, cardiac output, circulation time, oxygen saturation of blood, blood volume, and vasomotor control of vascular beds. For students specially interested in cardiovascular problems. (2 cred.; prereq. #; limited to 10 students) Swanson

113f.w.s.su. Problems in Physiology. Arranged with qualified students. Each student will be assigned a topic for special laboratory study. Conferences and reading. (3 cred. per qtr. or ar.; may be taken one or more qtrs.; prereq. 106-107 or equiv.) Visscher, Gellhorn, Lifson, King, Brown, and staff

124f. Seminar in Neurophysiology. (2 cred.; prereq. 106-107 with grade of B or better, or special examination) Gellhorn

202.* Readings in Physiology. Topics will be selected for each student, and written reviews will be prepared and discussed. (1 to 3 cred.) Visscher, Gellhorn, King, and staff

- 203f.w.s.su.* Research in Physiology.** (Cred. and hrs. ar.) Visscher, Gellhorn, King, Lifson, and staff
- 206w.* Seminar in History of Physiology and Related Sciences.** (1 cred.) Visscher
- 210f.w.s. Selected Topics in Permeability.** Seminar in advanced permeability. (Cred. and hrs. ar.; prereq. satisfactory completion of a course equivalent to 106-107, #) Lifson, Evans, Johnson, Grim
- 211f.w.s. Selected Topics in Heart and Circulation.** One or more seminars in the advanced physiology of heart and circulation. (Cred. and hrs. ar.; prereq. satisfactory completion of a course equivalent to 106-107, #) Visscher, Evans, Lorber
- 212w.s. Selected Topics in Respiration.** Advanced seminar. (Cred. and hrs. ar.; prereq. satisfactory completion of a course equivalent to 106-107, #) Brown
- 213w.* Selected Topics in Advanced Neurophysiology.** (1 cred. [2 cred. by special arrangement for students preparing term papers]; prereq. 106-107 with grade of B or better, or special examination, #) Gellhorn
- 214f.w.s. Selected Topics in Clinical Physiology.** Seminar in various topics in clinical physiology. Veterans Administration Hospital. (Cred. and hrs. ar.; prereq. satisfactory completion of a course equivalent to 106-107, #) Wells

OFFERED AT THE MAYO FOUNDATION

Professor

Hiram E. Essex, Ph.D.
 Charles F. Code, M.D., Ph.D. in Physiol.
 Victor Johnson, D.Sc., M.D., Ph.D. in Physiol.
 Carl F. Schlotthauer, D.V.M.
 Khalil G. Wakim, M.D., Ph.D. in Physiol.
 Earl H. Wood, M.D., M.S., Ph.D.

Associate Professor

Alexander Albert, M.D., Ph.D.
 Reginald G. Bickford, M.B., Ch.B.
 Ward S. Fowler, M.D.
 Edward H. Lambert, M.D., Ph.D.
 Grace M. Roth, Ph.D.

Assistant Professor

Albert Faulconer, Jr., M.D., M.S. in Anes.
 George A. Hallenbeck, M.D., Ph.D. in Physiol.
 H. Frederic Helmholtz, Jr., M.D.

Much of the graduate work in physiology in the Mayo Foundation is carried out in conjunction with other departments, particularly medicine, surgery, and anesthesiology. In addition to these collaborative undertakings, opportunities for advanced work in physiology are offered in the department for those wishing to major in physiology. For those using physiology in partial fulfillment of the major or minor fields for an advanced degree, the following regular sessions are held: (1) *Review Discussions in Physiology* (1 hour a week for three quarters). Discussions on basic knowledge and recent advances in physiology are led by members of the department with fellows participating. (2) *Demonstrations in Physiology* (2 to 3 hours once a week during three quarters). Demonstrations of classical physiological experiments are conducted by the staff. (3) *Conferences on Problems in Physiology* (1 hour a week for three quarters). Graduate students and staff members present problems of research. (4) *Seminars in Clinical Physiology* (1 hour a week for three quarters). Graduate students present selected topics.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. Research Work on Selected Problems in Physiology. Staff

Surgical Research

OFFERED AT THE MAYO FOUNDATION

Associate Professor

John H. Grindlay, M.D., M.S. in Exp.
Surg., M.S. in Surg.

Assistant Professor

George A. Hallenbeck, M.D., Ph.D. in
Physiol.
Joseph M. Janes, M.D., M.S. in Orth.
Surg.
John W. Kirklin, M.D., M.S. in Surg.

Instructor

Henry W. Dodge, M.D., M.S. in Neuro-
surg.
Franklin H. Ellis, M.D., Ph.D. in Surg.
William H. ReMine, M.D., M.S. in Surg.

Graduate study in surgical research leading to the M.S. or Ph.D. degree with a major in this field is available to qualified students who have already received the degree M.D. or D.V.M. While this field is in many respects similar to physiology, its main emphasis is upon problems of surgical importance which may be studied in the experimental animal.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f,w,s,su. Research on Selected Problems. Grindlay, Hallenbeck

PUBLIC HEALTH

OFFERED AT THE SCHOOL OF PUBLIC HEALTH

Professor

Gaylord W. Anderson, M.D., Dr.P.H.,
director
Herbert M. Bosch, M.P.H.
Ruth E. Boynton, M.D., M.S.
Harold S. Diehl, M.A., M.D., D.Sc.
Ruth E. Grout, Ph.D., M.P.H.
Marion I. Murphy, M.P.H.
J. Arthur Myers, M.D., Ph.D.
Stewart C. Thomson, M.P.H., M.D.
Alan E. Treloar, Ph.D.

Associate Professor

Richard G. Bond, M.S., M.P.H.
Theodore A. Olson, M.A.
Leonard M. Schuman, M.D., M.Sc.

Assistant Professor

Nora F. Cline, M.L.N.Ed.
George S. Michaelsen, M.S.
Ruth von Bergen, M.P.H.

Lecturer

Henry Bauer, Ph.D.
Leslie W. Foker, M.D., M.P.H.
William A. Jordan, D.D.S., M.P.H.

Master's Degree—Offered under both Plan A and Plan B. All candidates for a Master's degree must take basic courses in (1) public health administration, (2) epidemiology, (3) statistics, (4) sanitation, (5) public health nursing, and (6) health education, unless specifically excused by the department.

[Inquiries concerning other work in public health, including courses of study leading to the degrees of master of public health and master of hospital administration, should be addressed to the Director of the School of Public Health, 1325 Mayo Memorial, University of Minnesota, Minneapolis 14.]

100fs. Elements of Preventive Medicine and Public Health. Occurrence and prevention of communicable, degenerative, and industrial diseases; protection of food, water, and milk; maternal and child health. (5 cred. [6 cred. for medical students]; prereq. 3 or 50 or equiv. and a course in bacteriology) Anderson, Thomson

- 122f. Environmental Sanitation I.** Methods for promoting man's health and comfort by controlling his environment. (3 cred.; prereq. 50 or 51 or 100 or ¶50 or 51 or 100) Bosch, Olson
- 123f.w.s.* Public Health Bacteriology.** Bacteriologic and serologic diagnosis, public health laboratory administration and methods. (Cred. ar.; prereq. Bact. 101-102, 116, #) Bauer
- 124w*-125s. Epidemiology.** Factors underlying the spread of infectious diseases, with detailed discussion of selected diseases; simple statistical and epidemiologic methods. (3 cred. per qtr.; prereq. 100 and 140 or ¶140 or ¶110-111) Schuman
- 126w.* Public Health Administration.** Structure, basic functions, and activities of public health agencies. (3 cred.; prereq. 100) Anderson
- 127f. Child and Adult Hygiene.** Maternal, child, and adult hygiene in public health programs. (3 cred.; for physicians, others by permission; prereq. 100) Boynton and staff
- 129s. Institutional Sanitation.** Sanitation practices in hospitals and other institutions. (3 cred.; for hospital administrators, others by permission; prereq. 100, 106) Bosch, Bond
- 112. Public Health Engineering—Plan Examinations.** 112af: Water Supplies. 112bw: Waste disposal systems. 112cw: Swimming pools and plumbing. 1 cred. per qtr.; for engineers; prereq. 102, or #) Bosch
- 113. Public Health Engineering—Field Investigations.** 113aw: Water supplies. 113bs: Waste disposal. 113cs: Swimming pools and plumbing. (2 cred. per qtr.; for engineers, others by permission; prereq. 102) Bosch
- 114f. Environmental Sanitation II.** Public health supervision of activities in field of urban and rural sanitation. (2 cred., §112, 113, 116; prereq. 102) Bosch
- 115w. Food Sanitation.** Sanitary problems in production, processing, and distribution of milk, meat, shellfish, and other foods; methods of public health supervision. (3 cred.; prereq. 100, 102) Olson
- 116s.* Public Health Engineering Administration.** Administrative organization of environmental sanitation activities. (2 cred., §112, 113, 114; prereq. 102, 100 or 104, and 106 and two of the following: 112, 113, 115) Bosch
- 117f-118w. Sanitary Biology.** Survey of plant and animal forms important in environmental sanitation, with special reference to disease vectors. (3 cred. per qtr.; prereq. #) Olson
- 119f.w.s.su. Field Practice in Environmental Sanitation.** (Cred. ar.; prereq. #) Bosch
- 122s.* Public Health Administration Problems.** Budgeting, program planning, and appraisal of public health procedures. (3 cred.; prereq. 106) Anderson
- 123f.w.s. Topics in Public Health.** Selected readings and problems. (Cred. ar.; prereq. #) Staff
- 125s. Community Health Education Programs.** Development of community-wide health education programs; group procedures; community organization; public relations; and selection, development, and use of media. (3 cred.; prereq. 100, 106) Grout
- 126s. Occupational Health Program.** Industrial hazards and their control. (3 cred.; prereq. 100, In.Ch. 4-5 or equiv., or consent of department) Foker
- 127s. Occupational Health: Nursing Aspects.** Organization and administration of nursing service in industrial health programs. (1 cred.; prereq. ¶126)
- 129f.w.s. Field Work in Industrial Nursing.** Visits to selected industrial health services; supervised experience in industrial medical unit. (Cred. ar.; prereq. 65)

- 133w.s. Mental Hygiene.** Emotional factors underlying wholesome family relations; problems which interfere with successful adjustment in family and community. (3 cred.; prereq. 62 or experience in public health nursing) Cline
- 135w. Conservation of Hearing.** Detection, prevention, and amelioration of hearing impairments. (1 cred.; prereq. 100 or ¶100 and 62) Boles and staff
- 136w. Sight Conservation.** Conditions that impair human vision; community programs of vision testing and correction of defects; sight conservation. (1 cred.; prereq. 100 or ¶100 and 62) Hansen and staff
- 137w. Dental Health.** Conditions resulting in tooth decay and loss; preventive and corrective measures; mouth hygiene; community programs for dental health. (1 cred.; prereq. 100 or ¶100 and 62) Jordan
- 139f.w.s. Special Field Work in Mental Hygiene.** Experience in gaining further insight into handling problems of human behavior in all age groups. (Cred. ar.; prereq. #) von Bergen
- 141s. Social and Economic Aspects of Medical Care.** Social and economic forces affecting administration and financing of medical care; sickness insurance, group hospitalization; concern of government in provision of medical care. (3 cred.; prereq. #)
- 152f.w.s. Industrial Hygiene Engineering.** Field and laboratory methods used by industrial hygiene engineers in study and control of occupational health hazards. (3 cred.; prereq. #) Michaelsen
- 170s.* Public Health Nursing Practice.** Organization of public health nursing services; methods of giving service to families and to community groups; teamwork and other disciplines. (3 cred.; prereq. 100 or #) Murphy
- 171f.* Studies in Public Health Nursing.** Application of the scientific method to selected topics; preparation of a study. (3 cred.; public health nurses only) Murphy
- 173f.w.s. Field Work in Supervision of Public Health Nursing.** (Cred. ar.; for public health nurses only; prereq. 170 or #) Murphy
- 174s. Seminar in Supervision and Administration.** Opportunity for analysis of selected aspects of administrative and supervisory process in public health nursing situations. (Cred. ar.; public health nurses only; prereq. 170, 171, 175-176, or #) Murphy
- 181f-182w-183s. Principles and Methods in Community Health Education.** Group procedures, community organization, public relations, and development and use of media. (3 cred. per qtr.; prereq. #) Grout and staff
- 190f.w.s. Field Work in Community Health Education.** Three months of approved field experience. (Cred. ar.; prereq. 125, 181, 227) Grout and staff
- 200f.w.s.* Research.** Opportunities will be offered by the School and by the various collaborating organizations for qualified students to pursue research work. (Cred. ar.) Staff
- 210f.w.s. Seminar in Public Health.** (Cred. ar.) Staff
- 212f.w.s. Seminar in Public Health Engineering and Sanitation.** (Cred. ar.) Bosch
- 215f.w.s. Maternal and Child Health.** Administration of well-child and antepartum conferences; psychosomatic problems of children. (Cred. ar.; for physicians only, with permission) Boynton
- 227f.w.s. Problems in the Community Health Education Programs.** Independent study and experimentation in health education. (Cred. ar.; prereq. #) Grout and staff

RADIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Leo G. Rigler, M.D., *head*
K. Wilhelm Stenstrom, Ph.D.

Clinical Professor

Harold O. Peterson, M.D.
Walter H. Ude, M.D.

Assistant Professor

James F. Marvin, Ph.D.
Halvor Vermund, M.D., Ph.D.

Clinical Assistant Professor

J. Richards Aurelius, M.D.
Daniel L. Fink, M.D.
Jack Friedman, M.D.
Joseph Jorgens, M.D., Ph.D.
Oscar Lipschultz, M.D.

Instructor

Donn G. Mosser, M.D.
Charles M. Nice, Jr., M.D., M.S. in Int. Med.

Graduates of Class A schools who have completed at least one year of a satisfactory internship in a recognized hospital are eligible for appointment as medical fellows with stipend in radiology. Medical fellows without stipend are also accepted if places are available.

Previous preparation in internal medicine or in pathology or both is highly desirable although not required. To qualify for the American Board of Radiology graduate students must obtain six months of graduate study in pathology or its equivalent in addition to the fellowship period. The course itself extends over a period of three years excluding any full time devoted to other subjects. For those who have been away from medical practice for a considerable period, a preliminary program of education in the laboratory sciences and general medicine is highly desirable.

The fellowship period is spent in a number of institutions, and appropriate periods of time are devoted to the physics of radiation, biophysics, radiation therapy, radiographic technique, and Roentgen diagnosis. Co-operation with the staff in physics and in biophysics permits thorough training in the fundamental physics of radiation. Sufficient time is spent on application of superficial and deep radiation therapy, both with Roentgen rays and radium, to give thorough working knowledge in this field. Appropriate periods of time in the various divisions of Roentgen diagnosis are offered including emphasis on fluoroscopy.

Medical fellows are expected to assist in the teaching of undergraduate students and will teach independently in elective courses. A certain amount of investigation and research should be carried out during the course of the program. All fellows are expected to qualify for the degree of master of science in radiology, and where appropriate research is undertaken they may meet qualifications for the Ph.D. degree. In the latter case a period of four years is usually required. In addition to radiology as a major, a minor subject must also be carried—usually chosen from pathology, physics, physiology, or anatomy.

The following institutions are used for practical training in the field of radiology in co-operation with and under the general direction of the Department of Radiology of the University of Minnesota:

1. *University Hospitals and Out-Patient Departments*—A general hospital of approximately 500 beds and a very active out-patient clinic together offer an unusual clinical material, largely of a chronic nature, including especially gastrointestinal, chest, bone, and urological cases. A very active surgical service permits critical appraisal of the results of Roentgen examination.

There is, in addition, the Variety Club Heart Hospital, which is connected directly with the University Hospitals and offers approximately 75 beds for the study of heart disease and an extensive research program in this field.

Another institution closely connected with the University Hospitals is the Students' Health Service, which permits the study of acute cases, particularly in the field of early tuberculosis, gastrointestinal lesions in their earliest stages, and the more acute problems that occur in relatively young individuals.

Included within the University Hospitals group are (a) Cancer Institute, with an out-patient clinic that offers a wide variety of material for study of all types of tumors both from the diagnostic and therapeutic standpoints. It is fully equipped with the newest type of Roentgen therapy machines, a cobalt 60 unit, and has a radium emanation plant. Work with isotopes both for diagnosis and therapy is available. (b) The Eustis Hospital, which offers excellent opportunity for study of orthopedic and pediatric cases. (c) Cancer Detection Clinic, where a large number of apparently well individuals are examined thoroughly for the detection of tumors in an early stage. Opportunity for study of early lesions is thus afforded. (d) Tumor Clinic, an extensive follow-up clinic that permits adequate opportunity for study of the results of therapy and the evolution of tumors.

2. *Minneapolis General Hospital*—A residency in this institution gives valuable experience particularly in acute pulmonary conditions, in chronic cardiac diseases, and in traumatic lesions of the skeleton. Certain fellows will be assigned to this service for a period of not less than one year.

3. *Ancker Hospital, St. Paul*—Here, as in the Minneapolis General Hospital, there is abundant opportunity to observe both acute and chronic processes. In addition, the tuberculosis division of this hospital gives opportunity for the study of tuberculosis in its various forms.

4. *Veterans Administration Hospital*—A hospital of approximately 1,000 beds catering entirely to veterans participates actively in the graduate program of this department. Rotation of some of the graduate students through the Veterans Administration Hospital is accomplished. Here there is seen a very large variety of cases exhibiting practically the entire gamut of disease processes. There is also extensive opportunity for investigation and research.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

102f.w.s. X-Ray Conference. Weekly departmental meetings at which the important cases seen in the University, Minneapolis General, Ancker, and Veterans Administration hospitals during the previous period are reviewed. (1 cred.) Rigler and staff

104f.w.s. Roentgen and Radium Therapy. Lectures on theory and practice of Roentgen and radium therapy. (1 cred.) Stenstrom

111f.w.s.su. Medical Roentgenologic Conference for Medical Clerks. (1 cred.; prereq. ¶Med. 111) Rigler and staff

124f.w.s.su. Pediatric-Roentgenologic Conference for Pediatric Clerks. (1 cred.; prereq. ¶Ped. 124) Rigler and staff

135f.w.s.su. Surgical Roentgenologic Conference for Surgical Clerks. (1 cred.; prereq. ¶Surg. 215) Rigler and staff

163f.w.s.su. Neurosurgical-Roentgenologic Conference for Neurosurgical Clerks. (1 cred.; prereq. ¶Surg. 318) Peterson, Peyton

200f.w.s.su. Research in Roentgenology. Problems in Roentgen diagnosis. (Cred. and hrs. ar.) Rigler, Nice

- 201w. Roentgen Diagnosis of Diseases of the Head and Upper Respiratory Tract.** Roentgen diagnostic procedures and Roentgen findings in the study of the head, including diseases of the skull, sinuses, mastoids, orbits, intracranial conditions, and in the study of the upper respiratory passages. (2 cred.) Peterson
- 204f.w.s. Tumor Clinic Conference.** (Cred. and hrs. ar.) Stenstrom, Zimmermann
- 205f.w.s.su. Research Related to Radiation Therapy.** (Cred. and hrs. ar.) Stenstrom
- 206f.w.s.su. Roentgenoscopy.** The theory and practical application of roentgenoscopy particularly to diseases of the gastrointestinal tract, lungs, and heart. (3 cred.; hrs. ar.) Rigler, Nice
- 207f.w.s.su. Roentgen and Radium Therapy.** Treatments of patients under supervision both with medium and high voltage machines and with radium. Problems in connection with these treatments will be thoroughly discussed. (Cred. and hrs. ar.) Stenstrom, Vermund
- 208f.w.s. Radiology Seminar.** Weekly presentations of research studies or reviews of the literature on subjects of importance in radiology. (1 cred.) Rigler, Stenstrom
- 209f.w.s.su. Roentgen Diagnosis.** The theory and practical application of Roentgen diagnostic methods to medical cases in general. (3 cred.; hrs. ar.) Rigler, Nice
- 210f.w.s.su. Roentgen Technique.** The theory and practical application of the principles of Roentgen technique including the study of X-ray machines and X-ray tubes, exposure, technique, and darkroom work. (2 cred.; hrs. ar.) Rigler, Nice
- 211w. Roentgen Diagnosis of Diseases of Gastrointestinal Tract.** (1 cred.) Fink
- 212s. Roentgen Diagnosis in Obstetrics and Gynecology.** (1 cred.) Ude
- 213f. Roentgen Diagnosis of Pulmonary Diseases.** (1 cred.) Rigler
- 214w. Roentgen Diagnosis of Diseases of Bones and Joints.** (1 cred.) Rigler
- 215s. Roentgen Diagnosis of Diseases of Gallbladder and Urinary Tract.** (1 cred.) Aurelius
- 216w. Roentgen Diagnosis of Traumatic Lesions of the Skeleton.** (1 cred.) Lipschultz
- 220f.w.s.su. Urologic-Roentgenologic Conference for Graduate Students.** (1 cred.) Nice, Creevy
- 236f.w.s. Radio-Isotope Seminar.** (1 cred.; prereq. ¶Ph.Ch. 236) Stenstrom, Marvin
- 237f.w.s. Measurement of Ionizing Radiation.** X rays, radium, radioactive isotopes. (1 cred.) Marvin
- 238f.w.s.su. Roentgen-Surgical Pathology Conference.** (1 cred.) Rigler, Lober, Nice
- 240f.w.s.su. Radiation Therapy Conference.** Discussion of details of treatments of specific patients. (1 cred.) Stenstrom, Vermund

OFFERED AT THE MAYO FOUNDATION

Professor

Harry M. Weber, M.D.

Associate Professor

Robert E. Fricke, M.D.

Clarence A. Good, Jr., M.D., M.S. in Rad.

Eugene T. Leddy, M.D.

Assistant Professor

David G. Pugh, M.D.

Instructor

Andre Bruwer, M.B., Ch.B., M.S. in Rad.

Donald S. Childs, Jr., M.D., M.S. in Rad.

Malcolm Y. Colby, Jr., M.D., M.S. in Rad.

John R. Hodgson, M.D., M.S. in Rad.

Colin B. Holman, M.D., M.S. in Rad.

Martin M. Van Herik, M.D., M.S.

All branches of work with the X ray and radium as applied to medicine are covered at the Mayo Foundation. The fundamental plan gives the graduate student an opportunity for close observation of cases and practical experience in routine work. In addition, informal instruction is given as occasion presents. Frequent seminars are held. The library of the clinic and that of the section are well supplied with texts and journals dealing with radiology. Individual research is encouraged in any radiologic problem which especially interests the student.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. General Roentgenologic Technique. At least three months' service. Practical experience in all varieties of roentgenologic apparatus including transformers, vacuum tubes, tables, films, intensifying screens, etc. This training in roentgenologic technique prepares the fellow to make roentgenograms in his subsequent work. Unless the fellow minors in physics, he must also, during this period, become acquainted with the physics of the Roentgen ray. Kirklin, Good, Weber, Hodgson

M252f.w.s.su. Applied Roentgenologic Diagnosis. At least eighteen months' service. Student becomes familiar with roentgenography of the osseous system, chest, heart, lungs, and urinary system, and with special techniques required in roentgenography of the accessory sinuses, mastoids, teeth, genitourinary tract, ventricles of the brain, and other anatomical regions. Unusual facilities and material for the roentgenoscopy and roentgenography of the gastrointestinal tract. Thorough training in reading of films and screen images, the recognition of normal and abnormal conditions, Roentgen signs of disease, both direct and indirect roentgenologic diagnosis, correlation of plate and screen findings, and correlation of clinical and roentgenologic findings. Cholecystographic interpretation is stressed. Seminar. During this period of eighteen months fellows have brief services in rotation with the Departments of Urology, Obstetrics and Gynecology, Neurology and Psychiatry, and Dentistry. Good, Weber, Hodgson

M253f.w.s.su. Therapeutic Radiology. This department is responsible for the examination and treatment of patients affected with the various benign and malignant diseases to which radium and Roentgen treatment is applicable. Techniques suitable for the various conditions are taught by practical demonstration, and both the early and late effects of such therapy are carefully observed. Instruction in radiation physics and in prevention of untoward effects from therapeutic applications of radium and the Roentgen ray and avoidance of danger from high tension currents. Fricke, Leddy, Childs

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Necropsy Service. (See Department of Pathology)

Students majoring in radiology may also take work in biophysics and physiology. For details, see these departments.

SURGERY

(Including Divisions of General Surgery, Anesthesiology, Neurosurgery, Orthopedic Surgery, Proctology, and Urology)

General Surgery

OFFERED AT THE MEDICAL SCHOOL

Professor

Owen H. Wangenstein, M.D., Ph.D.,
head
Richard L. Varco, M.D., Ph.D.

Clinical Professor

Orwood J. Campbell, M.D., Ph.D.
Walter A. Fansler, M.D.
Thomas J. Kinsella, M.D., Ph.D.
N. Logan Leven, M.D., Ph.D.
Charles E. Rea, M.D., Ph.D.
Oswald S. Wyatt, M.D.
Arthur A. Zierold, D.D.S., M.D., Ph.D.

Associate Professor

Ivan D. Baronofsky, M.D., Ph.D.
Donald J. Ferguson, M.D., Ph.D.
Lyle J. Hay, M.D., Ph.D.
F. John Lewis, M.D., Ph.D.
C. Walton Lillehei, M.D., Ph.D.

Clinical Associate Professor

George S. Bergh, M.D., Ph.D.
N. Kenneth Jensen, M.D., Ph.D.

Clinical Assistant Professor

William C. Bernstein, M.D.
Victor P. Hauser, M.D.
Laurence D. Hilger, M.D.
Bernard G. Lannin, M.D., Ph.D.

Clinical Instructor

John M. Culligan, M.D.

Graduate work in surgery in the Medical School is designed to offer superior training to a limited number of fellows in three or more years of residence. The practical and scientific aspects of a well-rounded surgical course are emphasized equally. Each appointment is for a year, and re-appointment is contingent upon continued superior performance.

The prospective fellow must be able to qualify as a candidate for the Ph.D. degree. (See Requirements for Advanced Degrees, pages 8 and 11.)

The fundamental laboratories of the Medical School offer numerous graduate courses closely related to surgery. (See statements of Departments of Anatomy, Bacteriology, Pathology, Pharmacology, Physiology, and Physiological Chemistry.) Opportunity for special investigative and research work is found in these departments. The minor subjects must be taken in one of the above departments. The proximity of the medical buildings and arrangement of courses afford opportunity for co-ordination of clinical and laboratory work.

Supervised work is offered by the Department of Surgery in the Experimental Laboratories of Research as well as in its hospital and out-patient departments in surgical diagnosis and operative surgery, and similar opportunities are available in some of the surgical specialties, such as anesthesiology, neurosurgery, orthopedics, and urology.

Unexcelled opportunities for technical and experimental work under aseptic conditions comparable to a first-class operating room are offered in the laboratories of animal and experimental surgery. In these laboratories the fellow conducts investigative work for his thesis.

The University Hospitals fellowship provides a house surgeonship in the University Hospitals, with or without residence. Senior resident surgeons are chosen each year from among the surgical fellows, of whom there are approximately thirty. First-year fellows, in turn, are chosen yearly, largely from our own surgical intern group. The fellow aids the surgical staff in diagnosis and in the preoperative and postoperative care of patients. He helps to direct and supervise the work of the interns, and

after his first year assists in the bedside teaching of the surgical clerks. He acts as first assistant in operations performed by the general surgical staff. As soon as he proves himself capable, the more simple major operations are delegated to him to perform, with a staff surgeon acting as first assistant. Later he is permitted to operate under the supervision of the surgeon, and finally, when he has demonstrated his ability, he operates independently. Increasingly difficult cases are assigned as his ability warrants. Supervision is always given until the staff surgeon is satisfied concerning the fellow's ability to operate independently.

Medical School surgical fellowships are offered also at the Veterans Hospital in Minneapolis (25), Minneapolis General Hospital (10), Ancker Hospital in St. Paul (3), Mount Sinai Hospital (private) in Minneapolis (2). The respective surgical staffs of the affiliated hospitals supervise the training of their surgical fellows. Arrangements can be made for rotation between the surgical services of the various affiliated hospitals and the service at the University of Minnesota Hospitals.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

The following courses are all given at all of the participating hospitals unless otherwise indicated. Registrants taking fellowships at Veterans Hospital, Minneapolis General Hospital, or Ancker Hospital should indicate which of these sessions they are in by adding after the course number either the notation "Section V" for Veterans Hospital or "Section G" for Minneapolis General Hospital or "Section A" for Ancker Hospital.

- 200f.w.s. Out-Patient Clinic in Surgery.** The student is required to assist in the out-patient surgical clinic, and in this connection studies the diagnosis and treatment of selected cases. (1 cred. per qtr.) Wangenstein and staff
- 202f.w.s. Applied Surgical Anatomy on the Cadaver.** Weekly exercises in which the student prepares anatomical dissections on the cadaver illustrating anatomic principles important to the surgeon. University Hospitals. (1 cred. per qtr.) Staff
- 203f.w.s. Proctoscopy and Sigmoidoscopy (Hospital).** The treatment and diagnosis of the pathological conditions found in the lower bowel, including minor surgical operations. (1 cred. per qtr.) Bernstein and staff
- 204f.w.s. Tumor Clinic.** Combined clinical and pathological consideration of tumors. Insofar as available material permits, a systematic presentation of the manifestations and effects of malignant tumors which come in the province of general surgery and its divisions will be made. (1 cred. per qtr.) Wangenstein and staff
- 205f.w.s. Surgical Diagnosis.** The graduate student assists in the practical instruction of the clinical clerks and interns and makes a special study of problems in surgical diagnosis on patients in the Out-Patient Department as well as in the wards. (1 cred. per qtr.) Wangenstein and staff
- 208f.w.s. Surgical Service.** The graduate student acts as house surgeon and in connection with the service is required to study the patients, preparing them for clinics and observing them after operations. (1 cred. per qtr.) Wangenstein and staff
- 211f.w.s. Operative Surgery.** The surgical fellow acts as first assistant at all operations by the teaching surgical staff. When properly qualified, the fellow is permitted to operate, beginning with simpler surgical procedures. (1 cred. per qtr.) Wangenstein and staff
- 214f.w.s. Surgical Ward Conference.** A weekly exercise in which cases offering interesting problems are presented by the student. (1 cred. per qtr.) Wangenstein and staff

- 215f.w.s. Roentgenological-Surgical Conference.** A weekly exercise in which the films of all surgical patients presenting interesting Roentgen findings are reviewed. Staffs of the Departments of Radiology and Surgery. (1 cred. per qtr.) Wangenstein and staff
- 216f.w.s. Surgical Research.** Properly qualified students may undertake original investigation of problems in either experimental or clinical surgery. (1 cred. per qtr.) Wangenstein and staff
- 217f.w.s. Surgical Seminar.** Conference for reports on surgical literature with presentation and discussion of especially interesting cases and problems as well as research work by members of the surgical staff. (1 cred. per qtr.) Wangenstein and staff
- 218f.w.s. Medical-Surgical Pathological Conference.** A weekly exercise in which the student prepares instructive cases for review by the medical, surgical, and pathological staffs. (1 cred. per qtr.) Wangenstein and staff
- 245f.w.s. Surgical Literature Conference.** The leading surgical journals are assigned to the fellows, who read and report on important articles at weekly conferences. (1 cred. per qtr.) Wangenstein and staff

OFFERED AT THE MAYO FOUNDATION

Professor

O. Theron Clagett, M.D., M.S. in Surg.
 Virgil S. Counseller, M.D., M.S. in Surg.
 Claude F. Dixon, M.D., M.S. in Surg.
 Howard K. Gray, M.D., M.S. in Surg.
 Charles W. Mayo, M.D., M.S. in Surg.
 James T. Priestley, M.D., M.S. in Exper.
 Surg., Ph.D. in Surg.
 Waltman Walters, M.D., M.S. in Surg.
 John M. Waugh, M.D., M.S. in Surg.

Associate Professor

B. Marden Black, M.D., M.S. in Surg.
 Deward O. Ferris, M.D.C.M., M.S. in Surg.
 Edward S. Judd, M.D., M.S. in Surg.

Assistant Professor

Oliver H. Beahrs, M.D., M.S. in Surg.
 George A. Hallenbeck, M.D., Ph.D. in Physiol.
 John W. Kirklin, M.D., M.S. in Surg.
 Joseph H. Pratt, M.D., M.S. in Surg.

Instructor

Franklin H. Ellis, M.D., Ph.D. in Surg.
 Karl A. Lofgren, M.D., M.S. in Surg.
 William H. ReMine, M.D., M.S. in Surg.

Opportunities for preparation in surgery at the Mayo Foundation are principally in the fields of surgical pathology, and/or physiology, in general and surgical diagnosis, and in operative surgery. The usual program occupies four years.

Fellows majoring in surgery usually include in their work three months in postoperative care of ambulatory patients; six or nine months in surgical pathology or physiology; and at least one year in general diagnosis. This general diagnostic work is divided into services of six months each. Fellows select the diagnostic sections in which they desire to work, and their requests are followed so far as arrangements of the schedule will permit. The work in the minor field (surgical pathology, pathologic anatomy, or physiology) and that in diagnostic work should be completed before the fellow begins his operative service.

In their operative service, fellows act as second assistants in special surgery (anesthesiology, neurosurgery, orthopedic surgery, plastic surgery, proctology) for at least six months and in general surgery for one year or longer. The service also includes postoperative care of all patients in the operative service in which the fellow is on duty with occasional opportunity to act as first assistant.

Fellows who are considered best qualified are appointed first assistants for an additional period of one or two years. There are approximately twenty-five such first assistantships.

Operative service for fellows in general surgery is given at Methodist Hospitals.

The Methodist Hospitals contain 545 beds with approximately 150 available for general surgery. In addition to general surgical conditions, emphasis is given to thoracic and cardiac surgery, gynecology, thyroid, and colon surgery, and urology.

St. Marys Hospital contains over 900 beds, 400 of which are available for general surgery. In addition to general conditions, emphasis is given to gynecology, to open urologic surgery, to colon surgery, to upper abdominal surgery, and to thoracic surgery.

Group seminars are held regularly in the Department of Surgery.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) one foreign language and the option of a collateral field of knowledge.

M251f.w.s.su. Peripheral Vein Surgery. Treatment of complications, surgical and medical, and varicose veins. Staff

M252f.w.s.su. Operative Surgery. Second assistantship in operating rooms; substitute service as first assistant. Residence. Seminar. Staff

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Research on Problems in Physiology. (See Department of Physiology)

Anatomy for General Surgeons. (See Department of Anatomy)

General Medical and Surgical Diagnosis. (See Department of Medicine)

Diagnosis in Relation to Obstetrics and Gynecology. (See Department of Obstetrics and Gynecology)

Medical Hospital Residence. (See Department of Medicine)

Special Anesthesia. (See Division of Anesthesiology)

Fellows majoring in surgery may also take work in anesthesiology, necropsy service, neurosurgery, orthopedic surgery, plastic surgery, proctology, radium and Roentgen therapy, and urology. For details, see these divisions.

Anesthesiology

OFFERED AT THE MEDICAL SCHOOL

Associate Professor

Frederick H. Van Bergen, M.D., M.S.,
acting director

Instructor

Joseph J. Buckley, M.D.
Ellis N. Cohen, M.D., M.S.

Clinical Associate Professor

Joe W. Baird, M.D.

Graduate work in anesthesiology in the Medical School offers superior training to a number of fellows with opportunity for large clinical experience and investigative work in all types of general and regional anesthesia.

In addition, work in co-operation with other departments is available. The standards of the certifying specialty boards are fully met.

The M.S. degree is offered in anesthesiology under Plan A, with major in anesthesiology and minor in one of the laboratory sciences.

265f-w-s-su. General Anesthesia. Observation and instruction in all types of clinical general anesthesia followed by administration under supervision, and finally by responsible administration and instruction of interns and clinical clerks. (12 cred. per qtr.)

- 266f-w-s-su. Regional Anesthesia.** Observation and instruction in all types of clinical, local, regional, and spinal anesthesia, followed by administration under supervision, and finally by responsible administration and instruction of interns and clinical clerks. (4 cred. per qtr.)
- 267f-w-s-su. Pre- and Postoperative Evaluation.** Observation of patients in the wards before and after operation with co-ordination of pathological conditions and risks with the selection and dosage of sedative and anesthetic drugs and methods. Statistical study of anesthesia case records in relation to pre- and postoperative complications and recovery. (2 cred. per qtr.)
- 268f-w-s-su. Seminar in Anesthesia.** Review of literature of anesthesia and reports of specially interesting cases and problems and of research under way by members of the Division of Anesthesiology. (2 cred. per qtr.)
- 269f-w-s-su. Research in Anesthesia.** In addition to the following special courses in the fundamental laboratories of the Medical School, specially qualified students may undertake investigation of anesthesia problems either in the laboratory of experimental surgery or in clinical anesthesia. (Cred. ar.)

It is recommended that fellows in anesthesiology also register for courses in other departments selected from the following offerings:

- Anat.129f-130w. Topographic Anatomy**
Med.202f,w.s.su. Diseases of the Cardiovascular Apparatus
Phcl.103su,w. General Pharmacology (in continuation)
Phcl.109f,w.s.su. Pharmacological Problems
Phcl.203su,f.w.s. Research in Pharmacology
Phsl.113su,f.w.s. Problems in Physiology
Phsl.203f,w.s.su. Research in Physiology
Ph.Ch.205f,w.s.su. Research in Physiological Chemistry
Surg.137f,w.s. Roentgenological-Surgical Conference
Surg.217f,w.s. Surgical Seminar

OFFERED AT THE MAYO FOUNDATION

Professor

John S. Lundy, M.D.

Assistant Professor

Albert Faulconer, M.D., M.S. in Anes.

Associate Professor

R. Charles Adams, M.D.C.M., M.S. in Anes.

Thomas H. Seldon, M.D.C.M., M.S. in Anes.

Instructor

Robert T. Patrick, M.D., M.S. in Anes.
 John A. Paulson, M.D., M.S. in Anes.

Fellows in anesthesiology at the Mayo Foundation have opportunity for the study of methods of producing anesthesia as well as for study of numerous fields related to anesthesiology. Seminars, lectures, and quiz sections are held routinely. The following is a list of suggested studies:

- Local, regional, and spinal anesthesia, including diagnostic and therapeutic nerve blocks, intravenous and rectal anesthesia, intravenous infusions, and blood transfusion.
- Inhalation anesthesia, including endotracheal and endobronchial anesthesia.
- General diagnosis, particularly in relation to cardiac and respiratory conditions.
- Research in one or more of the laboratory sciences.
- Special studies, including clinical topographic anatomy, biochemistry, biophysics, bronchoscopic aspiration and resuscitation, clinical pharmacology, serology and hematology, metabolism, and oxygen and other gas therapy.

A fellow who is particularly interested in study of a certain branch of anesthesia may make arrangements to stress that phase.

M251f, w.s.su. General Anesthesia. Observation and instruction in all types of clinical general anesthesia followed by administration under supervision, and finally by responsible administration. Lundy and staff

M252f, w.s.su. Special Anesthesia. Intravenous anesthesia including intravenous sedation and pre- and postoperative medication and care; intravenous infusions and transfusion of blood and blood substitutes; oxygen resuscitation and other gas therapy; intravenous technique and venipuncture; diagnostic and therapeutic nerve block; inhalation and endotracheal methods and rectal anesthesia; spinal and continuous spinal anesthesia; caudal and continuous caudal anesthesia; bronchoscopic aspiration; regional anesthesia. Lundy and staff

M253f, w.s.su. Anesthesiology as Applied to All Types of Oral Surgery. Lundy and staff

Anatomy for General Surgeons. (See Department of Anatomy)

Physics in Relation to Anesthesiology. (See Department of Biophysics)

Research Work on Selected Problems in Physiology. (See Department of Physiology)

General Medical and Surgical Diagnosis. (See Department of Medicine)

Neurosurgery

OFFERED AT THE MEDICAL SCHOOL

Professor

William T. Peyton, M.D., Ph.D., *director*

Associate Professor

Lyle A. French, M.D., Ph.D.

Clinical Assistant Professor

Wallace P. Ritchie, M.D., Ph.D.

Three-year fellowships in neurosurgery are offered to students working toward a graduate degree in neurosurgery.

305f, w.s.su. Neurosurgical Diagnosis. The neurosurgical fellow assists in the instruction of the clinical clerks and interns, and studies problems in diagnosis in the Out-Patient Department and in the University Hospitals. (3 cred.) Peyton, French

308f, w.s.su. Neurosurgical Service. The neurosurgical fellow acts as house surgeon at the University Hospitals. (4 cred.) Peyton, French

311f, w.s.su. Operative Neurosurgery. The neurosurgical fellow acts as first assistant at operations in the University Hospitals, and later may be permitted to operate. (4 cred.) Peyton, French

316f, w.s.su. Neurosurgical Research. Problems in experimental or clinical surgery. University Hospitals surgical staff. (3 cred.) Peyton, French

318f, w.s.su. Neurosurgical Conference. A review of X rays and case histories on neurosurgical service. (1 cred.) Peyton, French

OFFERED AT THE MAYO FOUNDATION

Professor

Winchell McK. Craig, M.D., M.S. in Surg.
J. Grafton Love, M.D., M.S. in Surg.

Colin S. MacCarty, M.D., M.S. in Neurosurg.

Hendrik J. Svien, M.D., M.S. in Surg.
Alfred Uihlein, M.D., M.S. in Surg.

Assistant Professor

George S. Baker, M.A., M.D., M.S. in Surg.

Instructor

Henry W. Dodge, Jr., M.D., M.S. in Neurosurg.

Preparation for neurosurgery at the Mayo Foundation is made in the Departments of Pathology, Neurology and Psychiatry, and General Surgery.

To acquire competence in neurologic surgery it is essential that the training in neurologic surgery itself be preceded by an adequate background in neurologic diagnosis, neuropathology, neuroanatomy, and neurologic ophthalmology. In addition it is highly desirable that some knowledge of other fields, such as neuroroentgenology, neurophysiology, and electroencephalography, be obtained. To acquire a sound background in neurologic diagnosis, fellows in neurosurgery have opportunity to work as assistants in the diagnostic section on neurology and psychiatry and on the hospital services for periods of six months or more. For those who are qualified, opportunities to extend this training by acting as first assistants in neurology may be available. Training in neuropathology is under the supervision of the section on pathologic anatomy. During the period of at least six months in which fellows are assigned to this section they see not only the specimens obtained at necropsy but also the pathologic specimens obtained at operation. The vast amount of material in the pathologic museum as well as the clinical records of patients with neurologic disease are available for fellows who wish to carry out research problems in this phase. For those who wish to obtain a background in neurophysiology, opportunities are available in the Departments of Physiology both at the Mayo Foundation and at the Medical School to conduct research along these lines. Training in neuroanatomy is given in the Departments of Anatomy at the Mayo Foundation and at the Medical School. Experience in neurosurgical procedures and in the preoperative and postoperative care of patients is acquired on the neurosurgical services. Opportunities are available to act as first assistant to one or more of the members of the staff. All of these activities are so closely integrated that fellows in neurosurgery constantly have before them the relationship of the laboratory sciences to diagnosis and treatment in neurosurgery and allied fields.

M251f.w.s.u. Surgery of the Nervous System. Operative technique and study of special problems involved. Residence. Seminar. Craig, Love, Baker, MacCarty, Uihlein, Dodge, Svien

Neuroanatomy. (See Department of Anatomy)

Neuropathology. (See Department of Pathology)

Neurophysiology, Electroencephalography. (See Department of Physiology)

Diagnosis in Neurology and Psychiatry. (See Section on Neurology and Psychiatry)

Hospital Residence in Neurology. (See Section on Neurology and Psychiatry)

Necropsy Service. (See Department of Pathology)

Neuro-ophthalmology. (See Department of Ophthalmology)

Fellows in neurosurgery may also take work in general pathology, physiology, and general surgery. For details, see these departments.

Orthopedic Surgery

OFFERED AT THE MEDICAL SCHOOL

Professor

Wallace H. Cole, M.D., *director*

Clinical Assistant Professor

Harry B. Hall, M.D.

Leonard F. Peltier, M.D., Ph.D.

Clinical Instructor

Malvin J. Nydahl, M.D., M.S. in Surg.

Three-year fellowships are offered to students working toward a graduate degree in orthopedic surgery. This work is carried on at the University Hospitals, Gillette State Hospital for Crippled Children, Shriners Hospital for Crippled Children, etc., and there is an interchange with the Orthopedic Department of the Mayo Foundation.

- 405. Orthopedic Diagnosis.** The orthopedic fellow assists in the instruction of the clinical clerks and interns, and studies problems in diagnosis in the Out-Patient Department and in the University Hospitals. (Cred. ar.) Cole and staff
- 408. Orthopedic Service.** The orthopedic fellow acts as house surgeon at the University Hospitals. (Cred. ar.) Cole and staff
- 411. Orthopedic Operative Surgery.** The orthopedic fellow acts as first assistant at operations at the University Hospitals, and later may be permitted to operate. (Cred. ar.) Cole and staff
- 416. Orthopedic Research.** Problems in experimental or clinical surgery. University Hospitals. (Cred. ar.) Cole and staff

OFFERED AT THE MAYO FOUNDATION

Professor

Ralph K. Ghormley, M.D.

Associate Professor

William H. Bickel, M.D., M.S. in Orth. Surg.

Mark B. Coventry, M.D., M.S. in Orth. Surg.

H. Herman Young, M.D., M.S. in Orth. Surg.

Assistant Professor

John C. Ivins, M.D., M.S. in Orth. Surg.

Joseph M. Janes, M.D., M.S. in Orth. Surg.

Paul R. Lipscomb, M.D., M.S. in Orth. Surg.

Instructor

Edward D. Henderson, M.D., M.S. in Orth. Surg.

Einar W. Johnson, Jr., M.D., M.S. in Orth. Surg.

Orthopedic surgery at the Mayo Foundation embraces not only the deformities of childhood but practically all deformities of the extremities and the spine in the adult. Fractures, recent and old; osteomyelitis, acute and chronic; and bone tumors are cared for by the orthopedic service. In addition all the usual congenital deformities such as clubfeet, dislocated hips, and torticollis are seen on this service. To cope successfully with such a broad field of surgery the surgeon must have a sound general surgical training. Operative services are available in St. Marys Hospital and the Methodist Hospitals. Here hospital care of orthopedic patients is carried on. All emergency cases such as recent and compound fractures, acute osteomyelitis and other traumatic conditions are also treated. Services include orthopedic diagnosis, treatment of nonoperative patients, manufacture and fitting of braces, and out-patient and postoperative service.

Fifteen three-year fellowships are available for fellows showing special aptitude for orthopedic surgery. Such fellows will have one year in orthopedic diagnosis, at least one year in orthopedic surgery, service in specialties closely allied to orthopedic surgery, and a minor in either pathology or anatomy. Ample opportunity will be given the men majoring in orthopedic surgery for first assistantship in the operating room and in the office, and also for study of the manufacture and use of orthopedic appliances. Seminars are held regularly.

There is also a department of physical medicine and rehabilitation in which fellows majoring in orthopedic surgery have opportunity to work.

Through special arrangements, fellows in orthopedic surgery at the Mayo Foundation may spend six months at the Gillette State Hospital, St. Paul, working under the direction of Dr. W. H. Cole, where a wider experience in the care of orthopedic conditions in children may be secured.

M251f.w.s.su. Orthopedic Diagnosis. History taking and physical examination of orthopedic cases. Study of braces, material and construction, measurements and fitting; application and use of plaster of Paris; interpretation of radiograms of orthopedic cases; care of nonsurgical and postoperative cases. Seminar. Ghormley and staff

M252f.w.s.su. Orthopedic Surgery. One year in service is offered to fellows majoring in orthopedic surgery. Seminar. Ghormley and staff

Orthopedic Anatomy. (See Department of Anatomy)

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Students majoring in orthopedic surgery may also take work in necropsy service, physiology, neurology, and physical medicine. For details, see these departments.

Proctology

OFFERED AT THE MAYO FOUNDATION

Professor

Louis A. Buie, M.D.

Assistant Professor

John R. Hill, M.D., M.S. in Proc.
Raymond J. Jackman, M.D., M.S. in Proc.

The section on proctology of the Mayo Foundation offers opportunities for the study of diseases of the anus, rectum, and colon. Patients are referred to this section from general diagnostic sections. The chief complaint of the patient may be limited to some proctologic disorder, but often proctoscopy is desired to determine the relationship of the proctologic condition to some general complaint. Therefore, opportunity is provided to study diseases of the colon and their relationship to systemic disorders. The major service in proctology extends over a period of five years. It includes a minimum of six months in a minor, usually surgical pathology, approximately two to three quarters in general medical and surgical diagnosis with special reference to diseases of the intestines, three months in regional anesthesia with special reference to sacral anesthesia, in diagnostic roentgenology, in radium treatment of malignant and other conditions, and six to eight quarters in diagnosis and surgical treatment of diseases involving the anus, rectum, and colon. In addition, six quarters are devoted to abdominal surgery in which special attention is given to conditions that involve the colon.

M251f.w.s.su. Proctology. Buie, Jackman, Hill

General Medical and Surgical Diagnosis. (See Department of Medicine)

Medical Hospital Residence. (See Department of Medicine)

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Fellows majoring in proctology may also take work in physiology, roentgenology, and regional anesthesia. For details, see these departments.

Urology

OFFERED AT THE MEDICAL SCHOOL

Professor

Charles D. Creevy, M.D., Ph.D., *director*

Clinical Professor

Frederic E. B. Foley, Ph.B., M.D.

Clinical Associate Professor

Theodore H. Sweetser, M.D.

Clinical Assistant Professor

Baxter A. Smith, Jr., M.D., M.S.

Three-year fellowships, approved by the Council on Medical Education, are offered to students working toward a graduate degree in urology. All work in urology is done at the University Hospitals.

- 250f.w.s.su. Urological Surgery.** (4 cred. per qtr.) Creevy and staff
251f.w.s.su. Cystoscopy and Urological Diagnosis. (4 cred. per qtr.) Creevy and staff
252f.w.s.su. Urological Conference. (4 cred per qtr.) Creevy and staff
253f.w.s.su. Research in Urology. (4 cred per qtr.) Creevy and staff
254f.w.s. Urological Seminar. (3 cred. per qtr.) Creevy and staff
255f.w.s. Urological Radiological Conference. (3 cred. per qtr.) Creevy and staff
256f.w.s. Urological Pathological Conference. (3 cred. per qtr.) Creevy and staff

OFFERED AT THE MAYO FOUNDATION

Professor

Gershon J. Thompson, M.D., M.S. in Urol.
 John L. Emmett, M.D., M.S. in Urol.

Associate Professor

Edward N. Cook, M.D., M.S. in Urol.
 Ormond S. Culp, M.D.
 Laurence F. Greene, M.D., Ph.D. in Urol.
 T. Lloyd Pool, M.D., M.S. in Urol.

Instructor

James H. DeWeerd, M.D., M.S. in Urol.

Major training in urology extends over a period of three years. This includes a minimum of one and one-half years devoted to the diagnosis and treatment of diseases involving the urinary tract and six months in surgical pathology or other basic sciences. Surgical training includes at least one and one-half years in all phases of urologic surgery, both transurethral and open. On the surgical services at the Methodist and St. Marys hospitals daily rounds are made with one of the consultants; this provides ample opportunity for thorough discussion of the individual cases. Second and first assistants participate in the diagnostic procedures and with operations.

Surgical procedures include transurethral prostatic resection, transurethral removal of vesical neoplasms, lithotripsy, manipulation of ureteral calculi, all phases of renal surgery such as nephrectomy, pyelolithotomy, plastic operations on the renal pelvis, ureterolithotomy, ureterointestinal anastomosis, total and partial cystectomy for bladder tumors, suprapubic, retropubic, and perineal prostatectomy, and plastic operations for hypospadias and other urethral and genital abnormalities.

Excretory urographic and cystoscopic conferences are held daily where roentgenograms, including pyelograms, are interpreted with discussions of cystoscopic findings. Each fellow has an opportunity to perform a large number of cystoscopic examinations.

Opportunity for the fellows to receive training in general surgery, acting as assistants to general surgeons who are also interested in certain phases of urologic surgery, is provided.

Conferences and seminars are held regularly. Fellows are expected to attend weekly staff meetings and special lectures on other phases of medicine and surgery.

M251f,w,s,su. Urologic Diagnosis and Special Urologic Treatment. Cystoscopic examination. Urography; both retrograde and excretory. History-taking and clinical examinations in diseases of the genitourinary tract. Study and treatment of acute and chronic infections of the genitourinary tract. Seminar. Staff

M252f,w,s,su. Urologic Surgery, Including Endoscopic and Open Procedures. Staff

M253f,w,s,su. General and Genitourinary Surgery. Counsellor, Priestley, Walters, Ferris

Necropsy Service. (See Department of Pathology)

Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Fellows majoring in urology may also take work in anatomy, biochemistry, clinical pathology, physiology, and dermatology. For details, see these departments.

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5/24/55
5/24/55

Bulletin of the
UNIVERSITY OF MINNESOTA



College of Pharmacy 1955-1957

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable George W. Lawson, St. Paul, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Edward B. Cosgrove, Le Sueur; The Honorable Daniel C. Gaine, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Marjorie J. Howard, Excelsior; The Honorable Lester A. Malkerson, Minneapolis; The Honorable Charles W. Mayo, Rochester; The Honorable Karl G. Neumeier, Stillwater; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

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COLLEGE OF PHARMACY

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Charles V. Netz, Ph.D., Chairman of the Committee on Student Scholastic Standing; Professor of Pharmacy and Head of the Department

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Ole Gisvold, Ph.D., Professor of Pharmaceutical Chemistry and Head of the Department
Willard J. Hadley, Ph.D., Professor of Pharmacy
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Frank E. DiGangi, Ph.D., Associate Professor of Pharmaceutical Chemistry
Wallace F. White, Ph.D., Associate Professor of Pharmacognosy
Robert H. Miller, Ph.D., Assistant Professor of Pharmacy
_____, Assistant Professor of Pharmacognosy

College of Pharmacy

GENERAL INFORMATION

Courses of Study

The College of Pharmacy offers one undergraduate course consisting of one year of prepharmacy and four years of professional study leading to the degree bachelor of science in pharmacy (B.S. in Phm.).

The College of Pharmacy and the School of Business Administration offer an optional combined course consisting of one year of prepharmacy study and five years of study in pharmacy and business administration leading to the degree of bachelor of science in pharmacy (B.S. in Phm.) and bachelor of business administration (B.B.A.). This optional course is open only to those students who register in the College of Pharmacy either with or without advanced standing and who can present evidence of better-than-average ability. Students who are permitted to register for this course of study must take the professional and business administration courses in the sequence in which they are offered. See page 11.

Admission to the College of Pharmacy is based upon the earned honor point ratio in required prepharmacy studies. The prepharmacy year for each of these two courses must include specified subjects and elective credits as follows:

- Inorganic Chemistry 6, 7, 12 (15 credits)
- Mathematics 15-16 (10 credits)
- Communications 1-2-3 (12 credits)
- Pharmacy 1A-1B (3 credits)
- Humanities (3-5 credits)

An honor point ratio of 1.5 (C+) or above, assures admission for resident applicants. Applicants with honor point ratios below 1.5 will be considered individually and will be notified of their admission status about September 1 of each year. Nonresident applicants presenting above average records will be considered individually. Applications for admission to the prepharmacy year should be made to the Office of Admissions and Records. The work of the prepharmacy year is given in the College of Science, Literature, and the Arts at the University of Minnesota or at other accredited institutions.

Graduate study with major work in pharmaceutical chemistry or pharmacognosy, leading to the degrees of master of science (M.S.) and doctor of philosophy (Ph.D.) respectively, is offered by the Graduate School. Graduate work with a major in pharmaceutical chemistry or pharmacognosy is open to those students who have shown exceptional scholarship and ability in the undergraduate course of this or some other college of pharmacy of equal standing. Consideration will then be given to the applications of those students who are not graduates in pharmacy but whose pattern of undergraduate work includes training in such allied or related subjects as would implement them to pursue work successfully at the graduate level with a major in pharmaceutical chemistry or pharmacognosy. Detailed information on graduate courses in pharmaceutical chemistry and pharmacognosy is contained in the *Bulletin of the Graduate School*.

Prospective Students

Applicants for both pharmacy and prepharmacy should apply to the Office of Admissions and Records. Persons with college work should request that complete transcripts from all colleges attended be sent to that same office as soon as possible. A student's credentials will not be reviewed unless a completed official application form (obtained from the Office of Admissions and Records) has been filed by him with the Office of Admissions and Records. The submitting of an Application for Admission form does not obligate a student to enroll in the University. As soon as an applicant's official transcript has been reviewed, he will be notified of his admission status. Directions for registration will be sent to those whose applications have been approved.

It is recommended that those students who are still in high school and who contemplate making application for admission to the College of Pharmacy after completion of their prepharmacy year in the College of Science, Literature, and the Arts or other accredited institution should attempt to incorporate in their high school training courses in bookkeeping, higher algebra, solid geometry, trigonometry, botany, chemistry, physics, and physiology.

Students who have graduated from high school and wish to complete the prepharmacy curriculum at another college or university and enter here upon the professional pharmaceutical work in the College of Pharmacy, should arrange their programs so as to include all subjects in the prepharmacy year on page 10.

A review of the pharmacy curriculum will show it to be comprised of 237 to 239 credit hours of work in professional, scientific, and pharmacy administrative courses (most of it required) of which approximately 50 per cent is laboratory instruction. This must be preceded by the required credits of the prepharmacy year.

It follows that if a student is to do creditably in his studies either as a prepharmacy student or as a student in the professional college he is precluded from engaging in such outside work as will interfere with his application and study both in and out of school. A student who finds it necessary to support himself wholly or partially is advised to take more time in which to complete the requirements for the B.S. in pharmacy degree. Arrangements to do this can be made with the dean or chairman of the Committee on Student Scholastic Standing.

Adult Special Students

Persons of mature age and experience (generally 24 years of age or older) who desire a specific and limited course of study and who are not at present candidates for an undergraduate degree, or persons who hold Bachelor degrees, may, upon approval of the dean of the college concerned, be admitted as adult special students. An adult special student may not become a candidate for a degree without the approval of his college, nor will advanced standing be allowed while the student is in the adult special classification. Applicants for adult special standing are subject to the ruling on residency. Registered pharmacists who desire to pursue the work of any one or more of the courses offered in the curriculum may do so with the approval of the dean.

Examinations and Standings

For information on examinations and standings, see *Bulletin of General Information*.

Fees and Expenses

For a detailed statement of fees and expenses, see *Bulletin of General Information*. For course fees, see *Class Schedule* issued at registration.

Admission of High School Graduates

Evidence of high school graduation or its equivalent is required for admission to the prepharmacy course in the College of Science, Literature, and the Arts. For details concerning the requirements for admission, consult the *Bulletin of General Information*.

Admission by Examination

Students who do not meet the requirements for admission by certificate may qualify for admission on the basis of entrance tests as described in the *Bulletin of General Information*.

Admission to the Professional Work of the College of Pharmacy

In order to maintain instruction at the necessary professional level, it is imperative to restrict admissions to the College of Pharmacy. Students interested in entering the professional college at the beginning of any fall quarter should apply for admission as soon as possible after completion of the required work of the prepharmacy year, and not later than August 1. Applications should be accompanied by an official transcript of the student's record. These applications will be reviewed and all applicants will be notified within thirty days after complete application and transcript have been received. All resident applicants with honor point ratios of 1.5 (C+) or above, and meeting all prerequisites, will be admitted to the College. Nonresident applicants presenting above-average records will be considered individually. Other applicants (those with honor point ratios below 1.5 and those removing deficiencies) will be considered individually and will be notified of their admission status either before or shortly after September 1.

Students who plan to complete course deficiencies during a Summer Session should proceed as indicated above, being sure to supply information on (1) deficient subjects to be removed; (2) the dates of Summer Sessions at which work will be taken; (3) the college at which the courses will be pursued; and (4) application for admission to the professional work of the first year in pharmacy.

Prepharmacy and other University of Minnesota students desiring to transfer to the College of Pharmacy should make application at window 5, Office of Admissions and Records.

Students from other institutions who desire admission with advanced standing should likewise file application forms and credentials with the Office of Admissions and Records.

Graduation Requirements

An over-all C average in the required and elective courses in the curriculum is a requirement for graduation. Scholastic averages for graduation will be based only on work completed at the University of Minnesota. In addition, all candidates for the degree of bachelor of science

in pharmacy are required to pass a comprehensive examination covering the four years of work as set forth in the curriculum. The comprehensive examination will be given during the spring quarter final examination period.

A student who has met all other requirements for graduation but has failed in the comprehensive examination is eligible for re-examination during the week immediately preceding any subsequent announced commencement. Application for re-examination must be made at the College office not less than fifteen days prior to the particular examination he wishes to take. A fee of \$5 is charged for each re-examination.

Pharmacy Law Requirements

Section 10 of the pharmacy laws of the State of Minnesota, as amended by the Legislature on March 28, 1941, reads as follows:

To be entitled to examination by the State Board of Pharmacy as a pharmacist, the applicant shall be a citizen of the United States, of good moral character, at least twenty-one years of age, and shall be a graduate of the College of Pharmacy of the University of Minnesota or of a college or school of pharmacy in good standing, of which the Board shall be the judge, and shall have at least one year of practical experience in a pharmacy.

On July 18, 1941, the Minnesota State Board of Pharmacy issued the following regulation on above passage:

Only graduates of the College of Pharmacy of the University of Minnesota and graduates of other schools and colleges of pharmacy accredited by the American Council on Pharmaceutical Education will be eligible for licensure examination.

The College of Pharmacy is not only specifically named in the law but also accredited by the American Council on Pharmaceutical Education.

In January 1940 the Minnesota State Board of Pharmacy issued a regulation to the effect that an official or certified transcript of scholastic work must accompany the application for examination for licensure to practice pharmacy in this state. Transcripts of Minnesota graduates may be obtained from the Office of Admissions and Records of the University. Requests for transcripts should be made not later than ten days prior to the date upon which the application is to be filed with the Board of Pharmacy.

In order that practical experience obtained as an apprentice during summer vacations may be credited toward the year of practical experience required by law, a student must file two statements with the Board of Pharmacy, (1) notice of employment form showing the date his apprenticeship began, and (2) an affidavit by his employer showing the date on which it ended, this regardless of the length of time employed. These forms may be obtained from the secretary of the Minnesota State Board of Pharmacy. A complete file of those registered pharmacists who have signified their willingness to serve as preceptors is available in the office of the dean.

Minnesota State Board of Pharmacy

The State Board of Pharmacy meets at the College at least twice each year to examine candidates for registration. For information concerning all matters coming under the jurisdiction of the State Board, address Secretary of the Minnesota State Board of Pharmacy, 3965 Minnehaha Avenue South, Minneapolis 6.

Medicinal Plant Laboratory and Garden

The facilities of the medicinal plant garden, plant laboratory, and conservatory afford opportunity for instruction in methods of cultivating, collecting, preparing, drying, and milling many official and nonofficial drugs. Approximately five hundred species of plants of medicinal and economic importance grown in the garden and greenhouses provide ample and varied material for study of the gross anatomical, histological, and chemical characteristics of these plants, for the preparation of herbarium specimens, for research in medicinal plant cultivation, etc.

Military Science and Tactics

(Elective Course)

All Army ROTC Branch Training (Signal, Engineer, Quartermaster, Pharmacy, etc.) has been discontinued at the University. The student entering Army ROTC will not specialize in any one military field but instead will pursue the general military science course. The aim of this course is to produce officers qualified for service in any branch of the Army.

Early in the senior year, the professor of military science and tactics, together with University authorities, will recommend to the Department of the Army branch assignments for each student. Recommendations will be based on student preference, academic achievement, and leadership potential. The Department of the Army will determine branch assignments based on the recommendations and needs of the Army.

For detailed information on ROTC programs, see *Bulletin of the Army-Navy-Air Force ROTC*.

Special Lectures

From time to time through the school year, outstanding men in the fields of pharmacy and related sciences address the students of the College of Pharmacy. Students are required to attend.

Melendy Memorial Lectures

Annually some pharmacist of national reputation delivers a lecture at the College of Pharmacy on a subject intended to advance the interests of the profession. This lectureship has been made possible by the Samuel W. Melendy Memorial Fund.

Pharmaceutical Education Trip

Once during the academic year, usually during the spring vacation, an opportunity is afforded students in the College of Pharmacy to visit the laboratories of at least one pharmaceutical and/or biological manufacturer. Students are urged to make at least one of these trips at some time during their four years in college.

Electives in Other Colleges of the University

All of the facilities of the University are open to students of this College. Therefore, students having the necessary prerequisites may elect subjects in other colleges of the University, if such election does not interfere with the required work in the College of Pharmacy. Subjects elected must be approved by the Committee on Student Scholastic Standing.

Textbooks

Textbooks used in all courses may be obtained after coming to the University.

Scholarships, Fellowships, and Prizes

Scholarships **—Open to veterans †† and undergraduate students regularly enrolled in the College of Pharmacy:

One \$225 *Minnesota State Pharmaceutical Association Scholarship* and a token is awarded to that junior student who is a citizen of the United States and who has earned the highest general average rating at the completion of the first three years of professional pharmaceutical work up to ten days before Cap and Gown Day and who intends to become a candidate for the degree B.S. in Phm. from this College. If the student receiving this award should fail to return to the college the following year to complete his senior work, the said sum will be awarded to the student next highest in standing who also meets the other requirements.

Three \$200 *Samuel W. Melendy Scholarships* are available to freshman students in the College of Pharmacy, based upon the earned honor point ratio in the prepharmacy year in the College of Science, Literature, and the Arts of the University of Minnesota.

Three \$200 *Samuel W. Melendy Scholarships* are available to sophomore students in the College of Pharmacy.

Three \$200 *Samuel W. Melendy Scholarships* are available to junior students.

Three \$200 *Samuel W. Melendy Scholarships* are available to senior students.

The bases upon which these scholarships are awarded are: (1) outstanding scholarship in academic and professional courses of study of the preceding year; and (2) character, personality, and outstanding qualities of leadership.

For information about all-University scholarships, see "Financial Aids" in the *Bulletin of General Information*.

Fellowships ††—Open to graduate students with majors in pharmaceutical chemistry or pharmacognosy in the College of Pharmacy, University of Minnesota.

One \$500 *Minnesota State Pharmaceutical Association Fellowship* with exemption from tuition, open to qualified graduates of the College of Pharmacy of the University of Minnesota.

Two *Samuel W. Melendy Memorial Fellowships*, without exemption from tuition, not to exceed \$1500 each, to be offered annually. The major study must be in pharmaceutical chemistry or pharmacognosy and full time devoted to graduate study and research.

Graduate fellowships have been made available by the *American Foundation for Pharmaceutical Education* to graduate students majoring in pharmaceutical subjects. Applications for such fellowships should be made directly to the American Foundation for Pharmaceutical Education, 1507 M St. N.W., Washington 5, D. C.

** Applications for these scholarships should be made to the dean of the College of Pharmacy.

†† Awards to veterans will be based upon their scholarship during the last year they were in attendance before entering the service.

‡‡ Applications for fellowships should be made to the office of the Graduate School.

Prizes—*Bristol Laboratories Prize*—Bristol Laboratories, Inc., New York, awards annually an embossed copy of *Howard's Modern Drug Encyclopedia* to that senior student having the highest numerical average in the course in compounding and dispensing.

Kappa Epsilon Prize—The Alumnae Chapter of Kappa Epsilon, national pharmacy sorority, offers the interest on \$425 as a prize to the Kappa Epsilon student who has earned the highest scholastic average at the end of four years. The sum is to be used to defray the expenses of the State Board examination and registration.

Lehn and Fink Gold Medal—Lehn and Fink Products Corporation, of New York City, awards annually a gold medal to that student in the College of Pharmacy who graduates with the degree, B.S. in Phm., and who has earned the highest general average rating during the four years of undergraduate study.

Merck Award—Merck and Company, Inc., manufacturing chemists of Rahway, New Jersey, offers annually the Merck Award to two senior students in the College of Pharmacy who have earned the highest scholastic average in the four years of professional work. This award consists of the *Merck Index* and *Merck Manual*.

Rho Chi Award—Mu Chapter of the Rho Chi Society, a national honorary pharmacy organization, annually presents to the highest ranking sophomore student a membership for one year in the American Pharmaceutical Association. This includes a one-year subscription to the *Journal of the American Pharmaceutical Association*.

Wulling Club Key—The Wulling Club of the College of Pharmacy awards annually an appropriate gold key to that student in the College of Pharmacy who graduates with the degree, B.S. in Phm., and who has earned the second highest general average rating during the four years of undergraduate study.

Communications

Correspondence relating to registration or advanced standing should be addressed to the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Official transcripts for advanced standing will be evaluated by the Office of Admissions and Records only when accompanied by a completed Application for Admission form. All other inquiries should be addressed to Office of the Dean, College of Pharmacy, University of Minnesota, Minneapolis 14.

COURSE OF STUDY

Pharmacy Curriculum

(1 Year Prepharmacy, 4 Years Pharmacy)

Upon the recommendation of the faculty of the College of Pharmacy, of the All-University *ad hoc* committee appointed by the President to study a proposed 1-4 curriculum in pharmacy, and with the endorsement of the Administrative Committee of the Senate, the Board of Regents of the University of Minnesota, at its meeting on June 13, 1953, approved the 1-4 curriculum in pharmacy. This curriculum became effective in the fall of 1954.

Beginning in 1960, graduation from an extended course of study will be a requirement for the B.S. in Phm. degree from all colleges that are members of the American Association of Colleges of Pharmacy.

The National Association of Boards of Pharmacy approved the extended course of study at its meeting in 1953, and therefore, it may be assumed that before or after 1965, graduation from an extended course of study will become a requirement for licensure examination.

Students from high school who are beginning their college attendance will register as prepharmacy students in the College of Science, Literature, and the Arts, University of Minnesota, or at any other accredited institution. Upon completion of the required prepharmacy courses, they make application for admission to the professional work in the College of Pharmacy.

PREPHARMACY YEAR

(In the College of Science, Literature, and the Arts or at any accredited college)

(Credits shown in parentheses)

In.Ch.6f,7w,12s—Inorganic Chemistry (5f,5w,5s)

Math.15f,16w—Elementary Mathematical Analysis (5f,5w)

Comm.1f,2w,3s—Communications (4f,4w,4s)

Phcy.1Af,1Bs—Orientation, Law (1f,2s)
Hum.—Humanities (3-5s) **

Total for Prepharmacy Year—

(15f,14w,14-16s = 43-45)

FIRST YEAR

Zool.1f,2w,3s—General Zoology (3f,3w,4s)

Bot.1f,2w—General Botany (3f,3w)

Phcy.3s—Pharmaceutical Calculations (3s)

Phm.C.1w,2s—Inorganic Pharmaceutical Products (4w,4s)

Phys.4f,5w,6s—General Physics (5f,5w,5s)

Pub.H.50f—Personal and Community Health (3f)

Total for First Pharmacy Year—

(14f,15w,16s = 45)

SECOND YEAR

Bact.53f—General Bacteriology (5f)

Anat.4—Elementary Anatomy (5s)

Or.Ch.61f,62w,63s—Elementary Organic Chemistry (4f,4w,3s)

Phcg.1f,2w,3s—Drug Collection and Medicinal Plant Study—Vegetable Drug Histology (3f,3w,3s)

Phm.C.54f,55w—Quantitative Pharmaceutical Chemistry (5f,5w)

Econ.8w,9s—General Economics (3w,3s)
Electives—(3s)

Total for Second Pharmacy Year—

(17f,15w,17s = 49)

** Recommended elective. A student who is pursuing his prepharmacy year at an accredited institution other than the University of Minnesota may substitute college algebra, 5 quarter credits, and trigonometry, 5 quarter credits, for Math. 15-16, may defer Phcy. 1 until his first year in pharmacy, and may substitute Comp. 4-5-6, 9 quarter credits, for Comm. 1-2-3. In this last substitution 3 additional elective quarter credits must be taken.

THIRD YEAR

Phcy.54f,55w,56s—Pharmaceutical Preparations (4f,4w,4s)	Phm.C.53s—Pharmaceutical Biochemistry (5s)
Phcg.55f,56w,57s—Medicinal Properties of Drugs of Biological Origin (3f,3w,3s)	Econ.24f,25w—Principles of Accounting (3f,3w)
Phsl.4f—Human Physiology (4f)	Electives—(3w)
Phm.C.161f,162w,163s—Organic Pharmaceutical Products (3f,3w,4s)	Total for Third Pharmacy Year— (17f,16w,16s = 49)

FOURTH YEAR

Phcy.58f,59w,60s—Prescription Compounding (5f,6w,5s)	Pub.H.75f—Community Sanitation (3f)
Phcy.70s—First Aid (1s)	Professional Electives (3f,3w,3s)
Phcy.71s—Pharmaceutical Specialties (3s)	Total for Fourth Pharmacy Year— (16f,18w,17s = 51)
Phcy.64s—Pharmaceutical Jurisprudence (3s)	Grand Total including Prepharmacy Year— (43-45, 45, 49, 49, 51 = 237-239)
B.A.67f—Retail Store Management (3f)	
Phcg.59w—Biological Products (3w)	
Phcl.101f,105w,106s—Introduction to Pharmacology (2f,6w,2s)	

Professional Electives—Each student may elect 9 quarter credits of professional electives. Any combination of subjects is acceptable. The six combinations which follow are suggested to permit a student to specialize in a particular phase of pharmacy.

Pharmaceutical Chemistry (with a view to graduate work):

1. Physical Chemistry 107f-108w (6 cred.); and Organic Chemistry 64s (3 cred.)
2. Pharmaceutical Chemistry 164f-165w (6 cred.); and Organic Chemistry 64s (3 cred.)

Pharmacy (retail store, hospital, manufacturing):

3. Pharmacy 65f, 68w-69s (9 cred.)
4. Pharmacy 65f, 166w-167s (9 cred.)

Biology (with a view to graduate work) (retail store, manufacturing):

5. Pharmacy 72f (3 cred.); and Pharmacognosy 162w-164s (6 cred.)
6. Pharmacognosy 60w-61s, 164s (9 cred.)

Students who have a high degree of predetermination as to what they want to do after graduation may petition the Committee on Student Scholastic Standing to substitute equivalent credits in broadening or cultural subjects that they believe will be more helpful in their life's work than the "professional electives" listed above.

Optional Combined Course in Pharmacy and Business Administration

The College of Pharmacy and the School of Business Administration offer an optional combined course in pharmacy and business administration leading to the degrees of bachelor of science in pharmacy and bachelor of business administration. This optional course is open only to those students who register in the College of Pharmacy either with or without advanced standing and who can present evidence of better-than-average ability. Requirements for these degrees are: (1) the completion of all courses, except Econ. 10 and 30 and B.A. 67 listed in the

four-year course in pharmacy; and (2) completion of the following courses in the School of Business Administration:

(Credits shown in parentheses)

Econ.8-9—General Economics (6)	B.A.88—Advertising (3)
Econ.28—Business Law (3)	B.A.155—Corporation Finance (3)
Econ.22-23—Principles of Accounting (8)	B.A.180-181-182C—Senior Topics: Marketing (9)
B.A.58—Elements of Public Finance (3)	Econ.149—Business Cycles (3)
B.A.70—Statistics Survey (3)	Econ.161—Labor Problems and Trade Unionism (3)
B.A.89—Production Management (3)	Econ.80-81—Intermediate Economic Analysis (6)
B.A.77—Survey in Marketing (3)	
B.A.130—Cost Accounting Survey (3)	Total Business Administration courses (65)
B.A.112—Business Statistics (3)	
Econ.142—Monetary and Banking Policy (3)	

If the professional and administration courses are taken concurrently, it is estimated that between five and six academic years will be necessary to meet the requirements for both of these degrees. There is the possibility that by taking business administration courses during the terms of Summer Session the time necessary to meet the requirements for these degrees could be reduced to the minimum (five years).

DESCRIPTION OF COURSES

Courses Offered in the College of Pharmacy

Following each course title and description is a statement in parentheses of credits, classes of students eligible, prerequisites, and number of lecture and laboratory hours per week. Thus (4 cred.; sr.; prereq. Phcy. 56; 2 lect. and 6 lab. hrs. per wk.) means the course offers 4 credits; is open to seniors; that Pharmacy 56 is a prerequisite; and carries 2 lecture and 6 laboratory hours per week.

All sophomores, juniors, and seniors are required to purchase \$5 Pharmacy Deposit Cards from the Bursar. Breakage and supplies will be deducted from these cards.

PHARMACY

Professor

Charles V. Netz, Ph.D., *head*
Charles H. Rogers, Sc.D.
Willard J. Hadley, Ph.D.

Special Lecturer

Richard H. Bacheider, LL.B.
John R. Hartmann **

Assistant Professor

Robert H. Miller, Ph.D.

Student Pharmacist Supervisor

Ruth Livingston, B.S. in Phm.
Harold Rafferty

Chief Pharmacist

Hallie Bruce, Phm.G.

1A. Orientation. General survey of pharmacy and related sciences. Includes: university environment and student activities; use of library, catalogues, periodical indexes, and pharmaceutical reference books. (1 cred.; prepharm.; no prereq.; 1 lect. hr. per wk.) Rogers

1Bs. Minnesota Pharmacy Law. State Board regulations; the Minnesota Preceptor Plan; aims and accomplishment of state and national pharmaceutical, medical, chemical, and educational organizations. Development of pharmacy throughout the ages, including historical transitions in the healing arts and sciences. (2 cred.; prepharm.; prereq. 1A; 2 lect. hrs. per wk.) Rogers, Miller

3s. Pharmaceutical Calculations. Weights and measures, balances, thermometry, specific gravity, calculation of doses, and percentage and stock solutions. (3 cred.; soph.; no prereq.; 3 lect. hrs. per wk.) Netz

54f-55w-56s. Pharmaceutical Preparations. (12 cred.; jr.; prereq. Phcy. 3, Or.Ch. 62, Phm.C. 2; 2 lect. and 6 lab. hrs. per wk. per qtr.) Hadley

54f. Waters, infusions, decoctions, solutions, injections, syrups, magmas, gels, mixtures, and lotions.

55w. Soaps, liniments, petroxolins, ointments, cerates, pastes, jellies, plasters, emulsions, effervescent salts, suppositories, masses, pills, troches, and tablets.

56s. Spirits, elixirs, tinctures, fluidextracts, extracts, resins, oleoresins, triturations, mucilages, glycerites, collodions, and miscellaneous official preparations.

58f-59w-60s. Prescription Compounding. Compounding and dispensing of prescriptions written in actual medical practice with special attention to in-

** Director of Safety, Minnesota Chapter, American Red Cross.

- compatibilities. (16 cred.; sr.; prereq. Phm.C. 2, 163, Phcg. 57, Phcy. 56; 3 lect. and 6 lab. hrs. per wk. [fall, spring]; 4 lect. and 6 lab. hrs. per wk. [winter]) Netz, Miller
- 64s. Pharmaceutical Jurisprudence.** Principles of law and legal procedure, legal duties, and public responsibilities of the retail pharmacist; analysis of federal and Minnesota State laws and regulations affecting pharmacy; common legal problems of practical importance to the pharmacist. (3 cred.; sr.; no prereq.; 3 lect. hrs. per wk.) Bachelder
- 65f. Cosmetics.** Composition and methods of manufacture of powders, creams, lotions, soaps, and other cosmetic products. (Professional elective) (3 cred.; sr.; prereq. Phcy. 56, Or.Ch. 62; 2 lect. and 3 lab. hrs. per wk.) Netz
- 68w-69s.** An Introduction to Hospital Pharmacy.** Training for those who expect to practice in a hospital pharmacy. Includes hospital administration and procedure, instruction in purchasing supplies (drugs, rubber goods, surgical supplies, etc.), stock control, records, manufacture of pharmaceutical preparations, prescriptions, and the preparation of parenteral solutions and allergenic extracts. (Professional elective) (6 cred.; sr.; registration limited; prereq. Phcy. 58; 1 lect. and 6 lab. hrs. per wk.) Bruce
- 70f. First Aid.** The standard American Red Cross First Aid course. (1 cred.; sr.; no prereq.; 1 lect. hr. per wk.) Hartmann
- 71s. Pharmaceutical Specialties.** New drugs, medicinal preparations, and sick-room supplies. Lectures by representatives of pharmaceutical manufacturers. (3 cred.; sr.; prereq. Phm.C. 163; 3 lect. hrs. per wk.) Soine
- 72w. Veterinary Products.** Chemical, pharmaceutical, and pharmacological study of agents used in the prevention and treatment of disease in domestic animals and poultry. (Professional elective) (3 cred.; full sr.; 3 lect. hrs. per wk.) Hadley
- 73f.w.s. Special Problems.** Prescription incompatibilities and problems in formulation of pharmaceuticals and their manufacture in small and large quantities. (Cred. ar.; sr.; prereq. Phcy. 56, Phm.C. 163) Netz, Hadley, Miller
- 166w-167s. Pharmaceutical Manufacturing.** Problems involved in the production of pharmaceutical preparations on a pilot-plant scale. Formula development and product stabilization. Manufacture of compressed tablets. Simple and enteric tablet coating and polishing. Milling of ointments. Preparations of granulations, colloidal suspensions, solutions, etc. (Professional elective) (6 cred.; sr.; registration limited; prereq. Phcy. 56; 1 lect. and 6 lab. hrs. per wk.) Miller

PHARMACEUTICAL CHEMISTRY

Professor

Ole Gisvold, Ph.D., *head*
 Charles H. Rogers, Sc.D.
 Taito O. Soine, Ph.D.

Associate Professor

Frank E. DiGangi, Ph.D.

Student Pharmacist Supervisor

Louise Newcombe, B.S. in Phm.

- 1f-2w. Inorganic Pharmaceutical Products.** Histories, sources, commercial methods of manufacture, laboratory preparation, properties, and uses of inorganic chemicals. (8 cred.; soph.; prereq. In.Ch. 12 or equiv.; 2 lect. and 6 lab. hrs. per wk.) Soine

** At the conclusion of the spring quarter, students who have completed Phcy. 68w-69s are offered the opportunity to acquire an additional two weeks' full-time training in the dispensary of the University Hospitals. No fee will be charged for this extra instruction, nor will there be any financial remuneration or scholastic credit given.

- 53s. Pharmaceutical Biochemistry.** Constituents of normal and pathological urine; some of the therapeutic agents excreted in urine; the normal constituents of the blood and the effect of pathological conditions upon these constituents. Qualitative and quantitative tests for abnormal constituents in urine; erythrocyte and leucocyte counts, blood typing, and other clinical determinations. (5 cred.; sr.; prereq. Or.Ch. 62; 3 lect. and 6 lab. hrs. per wk.) DiGangi, Fischer
- 54f-55w. Quantitative Pharmaceutical Chemistry.** Principles, methods, and procedures of gravimetric, volumetric, and oxidation-reduction methods of analyses of inorganic and organic pharmaceutical products. (10 cred.; sr.; prereq. In.Ch. 12, Or.Ch. 62, Phm.C. 2; 3 lect. and 6 lab. hrs. per wk.) DiGangi
- 161f-162w-163s. Organic Pharmaceutical Products.** Sources, methods of production, properties, reactions, relationships of structures to activity, and uses of the natural and synthetic organic compounds. (10 cred.; jr., sr., grad.; prereq. Or.Ch. 2; 3 lect. hrs. per wk. [fall, winter]; 4 lect. hrs. per wk. [spring]) Gisvold
- 161f—Hydrocarbons, halogenated hydrocarbons, alcohols, aldehydes, ketones, acids, phenols, tannins, ethers, and esters
- 162w—Organometallics (i.e., mercurials, silver compounds, arsenicals, bismuth compounds), dyes, surface active agents, miscellaneous antiseptic agents, sulfonamides, and antibiotics
- 163s—Analgesics, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, antispasmodics, local anesthetics, barbiturates and related compounds, alkaloids, cardiac glycosides, sex hormones and structurally related compounds, and vitamins
- 164w-165s. Special Analytical Methods.** The Food, Drug, and Cosmetic Act and many of the official analytical methods of the U.S.P., N.F., and the A.O.A.C. The laboratory work consists of the analyses of some drugs and foods. (Professional elective—students contemplating graduate work with a major in pharmaceutical chemistry and a minor in organic chemistry should elect 164 [3 cred.] for winter professional elective and Or.Ch. 63 [3 cred.] and Or.Ch. 64 [2 cred.] for spring quarter professional elective) (6 cred.; sr., grad.; prereq. Phm.C. 2, Phm.C. 54, Or.Ch. 62; 1 lect. and 6 lab. hrs. per wk.) DiGangi or Soine

PHARMACOGNOSY

Professor

Earl B. Fischer, Ph.D., *head*

Gardener

George Balok

Associate Professor

Wallace F. White, Ph.D.

- 1f. Drug Collection and Medicinal Plant Study.** Method of cultivating and preparing crude drugs from medicinal plants grown in the University of Minnesota medicinal plant garden. The characteristics of living plants which produce vegetable drugs are studied together with methods of evaluating the latter, factors which influence their quality, and the production of volatile oils from them. (3 cred.; soph.; prereq. Bot. 2; 2 lect. and 3 lab. hrs. per wk.) Fischer
- 2w-3s. Vegetable Drug Histology.** The microscopic structure of vegetable drugs including cell contents, cell forms, and types of tissues used in identifying and detecting adulteration in such products. Development, function, and nature of plant parts which furnish vegetable drugs. (6 cred.; soph.; prereq. Phcg. 1, Bot. 2; 2 lect. and 3 lab. hrs. per wk.) Fischer
- 55f-56w-57s. Medicinal Properties of Drugs of Biological Origin.** An evaluation of drugs as therapeutic and toxic agents based upon a correlation of phar-

macodynamic action and physiological, biochemical, and pathological considerations. The drugs studied include crude and purified vegetable drugs and animal products, particularly endocrine drugs and antibiotics. Doses of drugs are stressed. (9 cred.; jr.; prereq. Phcg. 3, Anat. 4, Bact. 53; 3 lect. hrs. per wk.) White

59f. Biological Products. The preparation, standardization, and medicinal and pharmaceutical properties of important biological preparations such as modified virus and bacterial vaccines, antitoxins, immune serums, toxoids, tuberculins, normal serums, blood plasma, diagnostic biological reagents, etc. (3 cred.; sr.; prereq. Bact. 53; 3 lect. hrs. per wk.) Fischer

60w-61s. Pharmacognosy and Pharmaco-Histology. (Continuation of 3) For students wishing to elect further work in this field. The microscopic appearance, structure, and function of drug tissues, cells, and cell contents are considered, by means of which the identity and purity of vegetable drugs are determined. Microscopical accessories such as the micropolariscope, microtome, and microphotographic camera are used. Professional elective. (6 cred.; sr.; registration limited; prereq. Phcg. 3; 1 lect. and 6 lab. hrs. per wk.) Fischer

162w. Biological Assay of Drugs. Essentially a laboratory course intended to present the methods used to measure quantitatively pharmacodynamic action of drugs on living cells. The biological assay of official drugs is reviewed. Brief introduction to biometry. (Professional elective) (3 cred.; sr., qualified grad. students; prereq. Phcg. 57; 1 lect. and 6 lab. hrs. per wk.) White

164s. Insecticides and Fungicides. The principal types of insects and fungi which attack farm and garden crops or cultivated medicinal plants or which may be injurious in the household. Consideration is given to methods and substances used for the prevention or control of damage caused by such insects and diseases. (Professional elective) (3 cred.; sr., grad.; prereq. Phcg. 56; 3 lect. hrs. per wk.) Fischer

207f,208w. Pharmacodynamic Testing Techniques. Application of techniques used on experimental animals to test chemical substances as possible therapeutic agents. Chiefly a laboratory course considering anthelmintics, diuretics, bacteriostatic agents, analgesics, heart drugs, local anesthetics, and antispasmodics. (3 to 5 cred. per qtr.; grad.; offered when demand warrants) White

209f,210w,211s. Problems in Pharmacodynamic Testing. Projects of particular interest to the student will be assigned, including library and laboratory work to test new drugs as possible therapeutic agents. This course is intended primarily for qualified chemistry majors who wish to investigate pharmacodynamic actions of various materials they have isolated or synthesized themselves. (Cred. ar.; grad. students may enter at beginning of any quarter; offered when demand warrants) White

Contributing Schools and Departments

ANATOMY

Professor

Arnold Lazarow, M.D., Ph.D., *head*

Instructor

Richard Hibbs, Ph.D.

4s. General Survey Course in Human Anatomy. (For pharmacy students) (5 cred.; soph.; prereq. Zool. 1-2-3; 4 lect. and 4 lab. hrs. per wk.) Hibbs

BACTERIOLOGY AND IMMUNOLOGY

Professor

Jerome T. Syverton, M.D., *head*

Assistant Professor

Karl R. Johansson, Ph.D.
Edwin L. Schmidt, Ph.D.

53f,w.s.su. General Bacteriology. Lectures, demonstrations, and laboratory exercises are employed for instruction in the morphology, physiology, taxonomy, and ecology of bacteria. The practical applications of these fundamental principles in other phases of science and industry are emphasized. (5 cred.; soph. with a C average in the prerequisite courses, jr., sr.; prereq. 10 cred. in chemistry and 4 cred. in biological sciences, or †; microscope required; students may obtain use of microscope by purchasing \$3 microscope cards from the bursar)

BOTANY

Professor

A. Orville Dahl, Ph.D., *chairman*

1f-2w. General Botany. A survey lecture and laboratory course on the form, structure, and functions of plants; reproduction in plants and the principles of inheritance and variation; relations of plants to environment; the principal groups of plants; and organic evolution. (6 cred.; fr.; no prereq.) Hall and staff

CHEMISTRY

Inorganic Chemistry

Associate Professor

Paul R. O'Connor, Ph.D., *chief*
Thomas D. O'Brien, Ph.D.

6f-7w. General Inorganic Chemistry. A study of the general laws of chemistry and of the nonmetals, metals, and their compounds. (10 cred.; fr.; no prereq.; credits earned in 9 and 10 are accepted in lieu of 6-7) O'Brien and staff

12s. Semimicro Qualitative Analysis.** Laboratory work in systematic qualitative analysis of the cations with lectures on solutions, ionization, chemical and physical equilibria, oxidation, and reduction, etc. (5 cred.; prereq. 7 or 10) O'Brien and staff

Organic Chemistry

Professor

Lee I. Smith, Ph.D., *chief*
Walter M. Lauer, Ph.D.
C. Frederick Koelsch, Ph.D.

Associate Professor

William E. Parham, Ph.D.

Assistant Professor

Stuart W. Fenton, Ph.D.
Wayland Noland, Ph.D.

61f,w.su **-62w.s.su. Elementary Organic Chemistry.** Discussion of important classes of organic compounds, both aliphatic and aromatic. Laboratory work includes the preparation of typical substances. (8 cred.; pharm., premed., predent.; prereq. In.Ch. 12 or 11) Fenton, Koelsch, Noland, and staff

** The student should purchase a \$10 chemistry deposit card from the bursar in the Administration Building. No student will be assigned a desk in the laboratory until he presents this card. Cost of laboratory materials and breakage will be charged against this deposit.

63f.s. Elementary Organic Chemistry. Lecture course. Discussion of the important classes of organic compounds, both aliphatic and aromatic, together with some heterocyclic compounds. 63 and 64 are prerequisite to all other advanced courses in organic chemistry. Those senior pharmacy students who contemplate pursuing graduate work with a major in pharmaceutical chemistry and a minor in organic chemistry must elect 63 and 64 as their professional elective of the spring quarter. Those students who contemplate pursuing graduate work and intending to obtain a minor in organic chemistry must have completed, before their preliminary examination, P.Ch. 101, 102, 103, 104, 105, 106. In the case of a split minor in organic chemistry, P.Ch. 107 and 108 will have to be completed before their preliminary examination. (3 cred.; 3 lect. hrs. per wk.) Parham

64f.s. Elementary Organic Chemistry.** Laboratory course, to accompany 63. Preparation of typical substances, some original work. (3 cred.; 1 lect. and 6 lab. hrs. per wk.; prereq. 63 or 163) Parham and staff

ECONOMICS AND BUSINESS ADMINISTRATION

Professor

Richard L. Kozelka, Ph.D., *dean*
George Filipetti, Ph.D.
Carl L. Nelson, Ph.D.

Assistant Professor

Stanley C. Hollander, Ph.D.

Economics

Econ.8w-9s. General Economics. Principles of economics with special emphasis upon their application to current problems such as money, banking, conservation, insurance, international commerce, monopolies, transportation, labor, socialism, public ownership, and finance. (6 cred.; credit may not also be obtained for 6-7, 62-63; soph.; no prereq.) Filipetti

Econ.24f-25w. Principles of Accounting. The balance sheet, profit and loss statement, and the recording process; uses of accounting data and special methods of recording. Adjusting entries, work sheets, closing entries, cash inventories, depreciation and an introduction to cost accounting. (6 cred.; credit may not also be obtained for B.A. 54-55; 3rd qtr. fr., soph., jr., sr.; no prereq.) Nelson

Business Administration

B.A.67f. Retail Store Management for Pharmacy Students. Principles of retail store management including the planning and control of store operation, the nature of consumer demand, and the analysis of retailing costs. (3 cred.; jr., sr.; prereq. Econ. 30 or 25) Hollander

PHARMACOLOGY

Professor

Raymond N. Bieter, M.D., Ph.D.,
head
Harold N. Wright, Ph.D.

Assistant Professor

Elizabeth M. Cranston, Ph.D.

101f. Introduction to Pharmacology. The first course in a sequence in which drugs and related chemical compounds are presented for study from the standpoints of chemical structure, beneficial pharmacological actions or

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effects upon the living body and on living organisms, toxic or harmful effects, and their applications to the treatment of disease. (2 cred.; sr.; prereq. Phsl. 106, 107, or equiv.) Bieter, Wright, Cranston

105w. General and Experimental Pharmacology. (Continuation of 101) Includes laboratory experiments and demonstrations. (6 cred.; sr.; prereq. 101) Bieter, Wright, Cranston

106s. General Pharmacology. (Continuation of 105) Lecture course. (2 cred.; sr.; prereq. 105) Bieter, Wright, Cranston

PHYSICS

Professor

Alfred O. C. Nier, Ph.D., *chairman*

4f-5w-6s. General Physics. (Primarily for premedical and pharmacy students) 4: Mechanics. 5: Heat and electricity. 6: Sound and light. Laboratory work is an integral part of course. (15 cred.; prereq. Math. 15-16 [or with permission of department chairman Math. 6, and either Math. 7 or 8, which are courses in college algebra]...premedical and prepharmacy students should take Math. 15-16)

PHYSIOLOGY

Professor

Maurice B. Visscher, M.D., Ph.D. *head*

4s. Human Physiology. Lecture, demonstrations, and quiz. (4 cred.; for pharmacy, SLA, home economics, and other students; prereq. one qtr. zoology, one qtr. chemistry)

PUBLIC HEALTH

Professor

Gaylord W. Anderson, M.D.,
Dr.P.H., *director*
Stewart C. Thomson, M.D., M.P.H.

Associate Professor

Donald W. Cowan, M.D., M.S.
John E. Eichenlaub, M.D.

3f,w,s. Personal Health.** Normal body function; causes and prevention of disease. (2 cred.; fr., soph....not open to students who have taken G.C. 10C; no prereq.) Thomson

51f.w. Community Hygiene.** Community programs for disease control. (3 cred.; jr., sr....not open to students who have taken P.H. 4, 50, 52, or 100; prereq. 3, or G.C. 10C) Cowan, Eichenlaub

ZOOLOGY

Professor

Dwight E. Minnich, Ph.D., *chairman*

Associate Professor

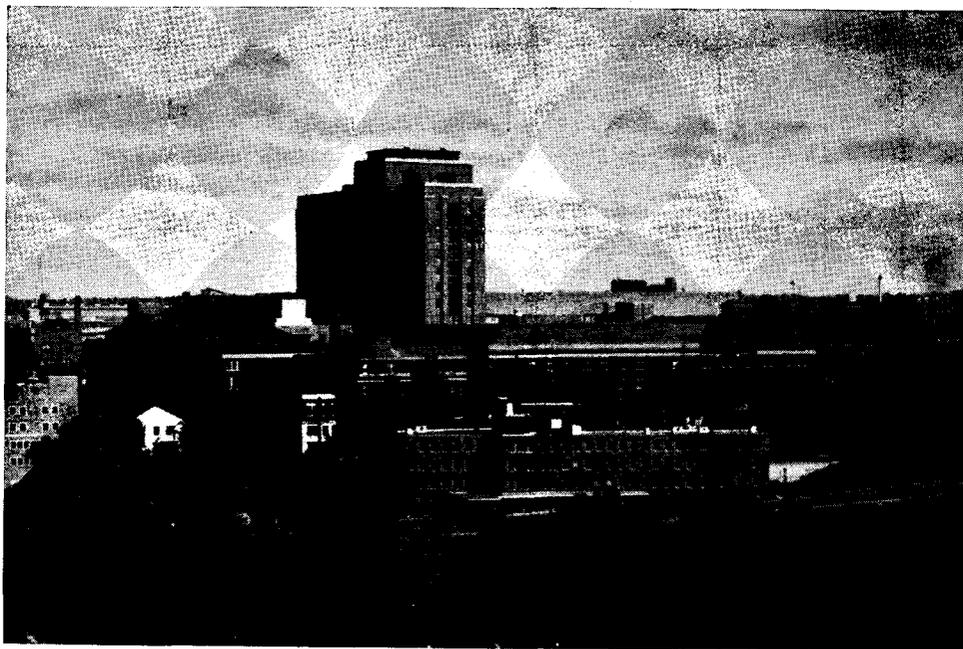
Magnus Olson, Ph.D.

1f-2w-3s. General Zoology.** Structure, physiology, embryology, classification, and evolution of animals. (10 cred.; no prereq.) Minnich, Stephens

** All quarters of this course must be completed before credit will be granted for any quarter.

5/16/55
5/16/55

Bulletin of the
UNIVERSITY OF MINNESOTA



Course in Medical Technology
1955-1957

How To Use This Bulletin

The *Bulletin of the Course in Medical Technology* for 1955-1957 is divided into three major parts:

Section 1. General Information. All students and prospective students should read this section carefully. It contains information relating to the following topics:

Admission Requirements, page 5
Registration Procedures, page 6
Fees, page 6
Health Examination, page 6
Residences, page 7
Student Aid, page 7
Degrees, page 7
National Registration, page 8
College Regulations, page 8

Section 2. Curricula. This section contains specific course requirements and quarterly programs.

Medical Technology, page 9
Special Course in Clinical Laboratory Techniques, page 10
Course for Laboratory Aides, page 11

Section 3. Description of Courses (page 12). This section gives a brief description of required courses.

All students and prospective students will need to refer to the *Bulletin of General Information* and the *Bulletin of the College of Science, Literature, and the Arts*. These bulletins are available at the information booth in the Administration Building or may be obtained by writing to the Office of Admissions and Records, University of Minnesota, Minneapolis 14.

Days and hours when classes meet and the place of meeting are contained in the *Class Schedule* published just before the registration period each quarter.

Information about classes during Summer Session can be obtained by writing the Summer Session Office, 135 Johnston Hall, University of Minnesota, Minneapolis 14.

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable George W. Lawson, St. Paul, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Edward B. Cosgrove, Le Sueur; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Marjorie J. Howard, Excelsior; The Honorable Lester A. Malkerson, Minneapolis; The Honorable Charles W. Mayo, Rochester; The Honorable Karl G. Neumeier, Stillwater; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

James Lewis Morrill, B.A., LL.D., L.H.D., President
Malcolm M. Willey, Ph.D., L.H.D., LL.D., Vice President, Academic Administration
William T. Middlebrook, B.A., M.C.S., Vice President, Business Administration
Robert Edward Summers, M.S.(Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

MEDICAL TECHNOLOGY

Administration

Harold S. Diehl, M.A., M.D., D.Sc., Dean of the Medical Sciences
Gerald T. Evans, M.D.C.M., Ph.D., Professor of Medicine; Director, Hospital Laboratories; Director, Course in Medical Technology
Ellis S. Benson, M.D., Assistant Director, Hospital Laboratories
Ruth F. Hovde, M.S., Assistant Professor of Medical Technology
Verna L. Rausch, M.S., Assistant Professor of Medical Technology
Grace Mary Ederer, B.A., Administrative Laboratory Technologist

Faculty

Wallace Armstrong, M.D., Ph.D., Professor and Head of Physiological Chemistry
James R. Dawson, M.D., Professor and Head of Pathology
Mary Beth Dempsey, M.S., Instructor in Medical Technology (Veterans Hospital)
Elaine Duerr, B.S., Instructor, Histologic Technique Laboratory
Esther Freier, B.S., Instructor, Chemistry Laboratory
Lorraine Gonyea, M.S., Instructor, Hematology Laboratory
Doris Hansen, B.S., Instructor, Blood Bank and Serology Laboratory
Robert Hebbel, M.D., Ph.D., Professor of Pathology
Arnold Lazarow, M.D., Ph.D., Professor and Head of Anatomy
Paul H. Lober, M.D., Assistant Professor of Pathology
Dwight E. Minnich, Ph.D., Professor and Chairman of Zoology
Dorothy Ness, B.S., Instructor, Bacteriology Laboratory
R. Dorothy Sundberg, M.D., Ph.D., Associate Professor of Anatomy; Hospital Hematologist
Jerome T. Syverton, M.D., Professor and Head of Bacteriology and Immunology
Maurice Visscher, M.D., Ph.D., Professor and Head of Physiology

Franklin G. Wallace, Ph.D., Associate Professor of Zoology; Consultant in Parasitology
Lydia Wetzel, M.S., Instructor in Medical Technology (Veterans Hospital)
Robert I. Wise, M.D., Ph.D., Assistant Professor of Bacteriology and Immunology; Hospital Bacteriologist
Newell R. Ziegler, M.D., Ph.D., Associate Professor of Bacteriology and Immunology; Director, Blood Bank

Student Technologist Supervisors

Janice Annis, B.S., Students' Health Service Laboratory
Teena Bruich, B.S., Dispensary Laboratory
Virginia Burris, B.S., Blood Bank Laboratory
Kathleen Clayson, B.S., Chemistry Laboratory
Marian Gaffey, B.S., Bacteriology Laboratory
Kathryn Grave, M.S., Hematology Laboratory
Eloise Greenwood, B.S., Heart Hospital Laboratory
Jean Hageman, B.S., Histologic Technique Laboratory
Ben Hallaway, B.S., Chemistry Laboratory
Margaret Halsted, B.S., Basal Metabolism Laboratory
Kathryn Hammer, B.S., Chemistry Laboratory
Patricia Hanauer, B.S., Night Technologist
Ruth Heinemann, B.S., Chemistry Laboratory
Marlene Johnson, B.S., Chemistry Laboratory
Virginia Johnston, B.S., Hematology Laboratory
Greta Lilleberg, B.S., Bacteriology Laboratory
Marilyn Nelson, B.S., Chemistry Laboratory
Betty Newman, B.S., Heart Hospital Laboratory
Ruth Nygard, B.S., Electrocardiography Laboratory
Marilyn O'Brien, B.S., Chemistry Laboratory
Margaret Ohlen, B.S., Chemistry Laboratory
Charlotte Page, B.S., Electrocardiography Laboratory
Alice Pierce, B.S., Urinalysis Laboratory
Ruth Rosendahl, B.S., Hematology Laboratory
Betty Ruspino, B.S., Blood Bank Laboratory
Diane Schmidt, B.S., Blood Bank Laboratory
Janet Schultz, B.S., Dispensary Laboratory
Margaret Smith, B.S., Chemistry Laboratory
Ella Spanjers, B.S., Hematology Laboratory
Joan Thorson, B.S., Heart Hospital Laboratory
Jean Urbank, B.S., Dispensary Laboratory
Karla Vevle, B.S., Parasitology Laboratory
Helen Weir, B.S., Students' Health Service
Betty Weisel, B.S., Dispensary Laboratory
Marilyn Wolcott, B.S., Histologic Technique Laboratory

Course in Medical Technology

GENERAL INFORMATION

The Course in Medical Technology was established at the University of Minnesota in 1923 to prepare men and women for professional work in clinical laboratory procedures. This course aims to provide both a strong foundation in basic sciences and practical experience in the clinical laboratory.

A medical technologist is trained in the performance of various diagnostic procedures used by physicians. The work includes hematology, urinalysis, bacteriology, serology, electrocardiography, basal metabolism, parasitology, blood bank work, the preparation of tissues for microscopic study, and the chemical analysis of blood and urine. This work requires intelligence, accuracy, and reliability of a high order. As a general rule, a student who has excelled in scientific subjects in high school will succeed in medical technology.

The broad training obtained in these fields enables the graduate to qualify for positions requiring general or specialized laboratory experience in hospital laboratories, clinics, and physicians' offices. In larger hospitals where there are several technologists, one may be occupied principally or entirely with hematology, bacteriology, or chemistry. There are opportunities for graduates with sufficient ability to work in research and teaching laboratories associated with larger clinics, foundations, and universities.

Admission Requirements

Admission to the Freshman Class—The requirements for admission to preprofessional work of this course of study are the same as those for admission to the College of Science, Literature, and the Arts. For complete information consult the *Bulletin of General Information*. Qualified applicants, men or women, may enter at the beginning of any quarter, but the curriculum outlined is based on entrance in the fall quarter. If a student enters at any other quarter, Summer Session attendance may be necessary to make up the irregularities in the student's program.

It is recommended that prospective students take mathematics, physics, chemistry, and biology in high school.

Admission with Advanced Standing—After one or more years of work at an accredited college or university, admission with advanced standing can be made by filing an application, together with official college transcripts, with the Office of Admissions and Records. This application should be made at least a month before the beginning of the quarter you plan to enter.

Admission to the Junior Class—For admission to the Course in Medical Technology the student must have completed 90 credits including the required courses with a total of 90 honor points. For each 5 honor points in excess of 1 honor point per credit the number 90 is diminished by 1.

Students in residence at the University of Minnesota who expect to complete the requirements for admission to the junior year must file an application for change of college with the Office of Admissions and Records by June 5. Those with sufficient credit but having course deficiencies should consult with advisers in the Medical Technology office regarding their status.

Students from other accredited colleges and universities may transfer to the University of Minnesota to complete the Course in Medical Technology. Courses which are equivalent to those given at the University of Minnesota are accepted to satisfy the requirements for entrance to the Course in Medical Technology.

Students transferring from other colleges may obtain application for admission with advanced standing from the Office of Admissions and Records. These applications must be filed with the Office of Admissions and Records by September 1.

In some instances, students transferring from other colleges may be able to make up their deficiencies, such as in bacteriology and histology, by attending Summer Session classes. This would make them eligible for admission to the special medical technology courses as much as one year earlier than would be possible otherwise. Transfer students with three or more years of college training elsewhere will be permitted to begin the senior year as soon as all required courses are completed. Because certain of these courses are offered only at the University, it is usually necessary for transfer students to spend one or more quarters in attendance before beginning the senior practical work. It is necessary for all students to earn at least 45 credits in residence at the University of Minnesota before they are eligible to receive a degree. It is strongly advised that transfer students ascertain their status by writing to the Director, Course in Medical Technology, C205 Mayo Building, University of Minnesota, Minneapolis 14, before May 1 so that, if necessary, they may take courses during the Summer Session.

Admission as an Adult Special Student—Men and women with proper qualifications of education and experience who may want individual courses or groups of courses to meet special personal needs may be admitted as "adult special" students. In such cases credit earned as an adult special may be applicable toward a degree upon recommendation of the Scholastic Committee in Medical Technology. Application for admission as an adult special is made to the Office of Admissions and Records.

Registration Procedures

Dates for registration in this course and specific procedures to be followed are published each quarter in the Official Daily Bulletin of the *Minnesota Daily*.

Students registering for the first time should present their admission certificate to the Office of Admissions and Records in the Administration Building before proceeding with registration at the Medical Technology office.

All students in either the preprofessional curriculum in the College of Science, Literature, and the Arts or in the Course in Medical Technology are requested to submit registrations each quarter to advisers in the Medical Technology office for approval and assistance with program planning.

Fees

For complete information about fees and expenses, consult the *Bulletin of General Information*.

Health Examinations

In addition to the physical examinations required on admission, all students are expected to arrange for appointments at the Students' Health

Service for medical examination and necessary immunizations both before entering and after completing the senior year. This procedure is required as a protection for the student.

Residences

Information about residence halls may be obtained from the Director of Women's Residences at Comstock Hall or from the Director of Centennial Hall (for men). Information about private rooming houses is furnished by the Student Housing Bureau, 209 Eddy Hall.

If you select quarters in residences not already approved by the University, you must have the approval of the director of the Student Housing Bureau before occupying them.

Student Aid

The University of Minnesota offers many opportunities to those students in need of financial assistance to meet the expenses of their education. The usual criteria by which the merits of requests for financial assistance are considered are scholastic record, financial need, character, and vocational promise in the student's chosen field.

Several scholarships for entering freshmen chosen from among graduates of Minnesota High Schools are supported by the Greater University Fund. Applications should be made through Minnesota high school principals in January. There are also other scholarships and merit awards offered annually to students in recognition of outstanding achievement record.

For students needing financial assistance, loan funds have been established to help any student who is making normal progress toward an educational objective.

In addition to general University loan and scholarship funds, there are two funds especially for students in medical technology, the William A. O'Brien Scholarship Fund and the W. K. Kellogg Foundation Loan Fund.

Complete information about obtaining assistance through scholarships and loans is available from the Bureau of Student Loans and Scholarships, 201 Eddy Hall.

For students needing part-time employment to meet school expenses, the Student Employment Bureau, 153 TSF, is maintained for this purpose. It should be pointed out that each of the first three years of the Course in Medical Technology includes several courses which require many hours of work in the laboratory, and it is advised that only students who are proficient in their studies should attempt to do part-time work. During the fourth year, the hospital courses require as much time as a full-time position, and no student should arrange for outside or part-time work that will interfere with such a program.

Graduates of this course are assisted in finding employment by consultation with advisers in the Medical Technology office. Notices of job opportunities in this field from all parts of the country are received in the office and are posted for the information of the students.

Degrees

The requirements for graduation are the completion of all the required courses or their equivalents, the completion of the practical work, and a total of 180 credits and 180 honor points—an average of 1 honor

point per credit. The total number of required credits may be reduced in accordance with the quality credit rule of the College of Science, Literature, and the Arts.

Upon satisfactory completion of the prescribed course of study the degree, bachelor of science, will be conferred by the Board of Regents. Students completing the course with an average of 2 honor points for each credit may graduate "with distinction" and those with an average of 2½ honor points for each credit may graduate "with high distinction."

Application for degree must be filed with the Office of Admissions and Records three quarters before the time of graduation.

Students completing the hospital internship any time after the date of the March graduation and before the date of the December graduation will be eligible to apply for the June graduation. Students completing requirements at other times will be eligible for graduation in December and March as determined by the date of completion of the senior year.

National Registration

Graduates from the Course in Medical Technology of the University of Minnesota are eligible to take the national examination for certification as a Medical Technologist conducted by the Board of Registry of the American Society of Clinical Pathologists. Many hospitals require this certification for employment.

Successful passing of the examination makes the technologist eligible for membership in the district, state, and national medical technology organizations. Full information is available in the Medical Technology office.

College Regulations

All students in the first two years of this curriculum are registered in the College of Science, Literature, and the Arts, and are subject to the regulations of that college. For full information about these regulations, consult the *Bulletin of the College of Science, Literature, and the Arts*.

In the last two years, students are registered in Medical Technology, a course in the College of Medical Sciences, and are subject to the regulations established for this course.

Any student not making satisfactory progress in the curriculum may be placed on scholastic probation upon recommendation of the Committee on Student Scholastic Standing, also known as the Scholastic Committee. This committee is composed of members of the faculty of Medical Technology.

Unsatisfactory work is defined as an average less than C (1 honor point for each credit) for all credits earned in any one year or in any one quarter. Students who fail to make satisfactory grades after being on probation for one quarter are in danger of being dropped from the course. Grade records are reviewed each quarter by the Scholastic Committee and grade conferences are held each quarter for students in the senior year.

The period of the first sixteen weeks of the senior year (hospital courses) constitutes a period of probation for all students. During this time the student is expected to make normal progress and to demonstrate acceptable technical aptitude in performance of the work in the clinical laboratory units. After this time, if in the judgment of the Scholastic Committee the student is not able to carry out technical procedures in a satisfactory manner, the student will be advised to discontinue this course.

CURRICULA

A. Medical Technology

Freshman and Sophomore Years—Registration is in the College of Science, Literature, and the Arts. The following courses or their equivalents must be completed before admission to the junior year:

(Credits are shown in parentheses)

An.Ch.7—Quantitative Analysis (4)	Med.T.10-11-12—Orientation in Medical Technology (1)
Anat.4—Elementary Anatomy (5)	Med.T.30-31-32—Case Presentations (1)
Bact.53—General Bacteriology (5)	Or.Ch.61-62—Elementary Organic Chemistry (8)
Comp.4-5-6—Freshman Composition (9)	Phys.1-2-3—Introduction to Physical Sciences (9)
or	Zool.1-2-3—General Zoology (10)
Comm. 1-2-3—Communication (12)	Zool.54—Histology (5)
or	Electives to make a total of 90 credits for the two years' work.
Engl.A-B-C—Freshman English (15), or exemption from requirement	
In.Ch.1-2, or 4-5—General Inorganic Chemistry (8)	
In.Ch.11—Semimicro Qualitative Analysis (4)	

There is no essential limitation to the subjects which may be taken as electives. However, a program that includes scattered electives will not be approved.

Some of the above courses are offered only one quarter a year. Therefore it is essential that the student's program be arranged in such a way as to include these in the proper quarter. The following program arrangement is suggested:

FIRST YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engl. A, 4, or Comm. 1	Engl. B, 5, or Comm. 2	Engl. C, 6, or Comm. 3
Zool. 1	Zool. 2	Zool. 3
In.Ch. 1 or 4	In.Ch. 2 or 5	In.Ch. 11
Med.T. 10	Med.T. 11	Med.T. 12
Electives	Electives	Electives

SECOND YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
An.Ch. 7	Or.Ch. 61	Or.Ch. 62
Phys. 1	Phys. 2	Phys. 3
Zool. 54	Bact. 53	Anat. 4
Med.T. 30	Med.T. 31	Med.T. 32
Electives	Electives	Electives

Junior Year—The following courses must be completed before assignment to the senior year of hospital training can be made.

(Credits are shown in parentheses)

Anat.165—Hematology (4)	Med.T. 61—Introductory Clinical Microscopy (4)
Bact.102—Medical Bacteriology (4)	Phsl.60—Human Physiology (6)
Bact.116—Immunology (4)	Ph.Ch.100-101—Physiological Chemistry (13)
Med.T.51-52—Clinical Diagnosis by Laboratory Methods I (4)	Zool.51—Introductory Animal Parasitology (5)
Med.T. 60—Blood Grouping and Cross Matching (2)	Electives to make a total of 135 credits for three years' work

The following program arrangement is suggested:

THIRD YEAR

Fall	Winter	Spring
Anat. 165	Bact. 116	Bact. 102
Ph.Ch. 100	Ph.Ch. 101	Med.T. 52
Zool. 51	Phsl. 60	Med.T. 60
	Med.T. 51	Med.T. 61

Senior Year—Students are not eligible to begin the year of clinical training until they have completed all the requirements of the first three years. The scholastic standing in the first three years determines the order in which students are assigned to the clinical year. Students may enter the year of clinical training each quarter.

FOURTH YEAR

(twelve months)

Clinical laboratory training in the laboratories of the University of Minnesota Hospitals includes the following courses in Medical Technology:

(Credits are shown in parentheses)

70—Laboratory Methods in Clinical Chemistry (6)—6 weeks	78—Urinalysis and Parasitology (4)—4 weeks
71—Advanced Techniques in Clinical Chemistry (5)—5 weeks	80—Clinical Bacteriology (5)—5 weeks
73—Electrocardiography (2)—2 weeks	82—Blood Bank Techniques and Serology (5)—5 weeks
74—Basal Metabolism Testing (2)—1 week	85—Histologic Techniques (4)—4 weeks
75—Clinical Hematology (6)—6 weeks	90—Applied Laboratory Methods (3)—9 weeks
76—Applied Clinical Microscopy (2)—4 weeks	95—Clinical Diagnosis by Laboratory Methods II (1)

B. Special Course in Clinical Laboratory Techniques

This program is designed for those students already possessing a baccalaureate degree and wanting the opportunity to have practical experience in clinical laboratory techniques. Emphasis is placed on performance of technical procedures in the hospital laboratories. Selection of students and arrangement for courses are made on an individual basis upon presentation of proper credentials.

Requirements for admission—Degree from an accredited college with a major in one of the basic sciences with a scholastic average of 1.5 (1.00 average is a C average, 2.00 is a B average) and completion of the courses comparable to the requirements of the first two years of the medical technology curriculum (see page 9 of this bulletin).

Registration—Students in this special program are registered as adult special students in medical technology (see page 6 of this bulletin). Before filing applications, students are requested to submit a transcript of previous college work to the director of the Course in Medical Technology, C205 Mayo, University of Minnesota, Minneapolis 14.

Program—This program is fifteen months in length. Three months are spent in such classes as may be necessary to complete the student's background for clinical training in hematology, parasitology, bacteriology, and physiological chemistry. The final twelve months include a rotating service in the laboratory units of the University of Minnesota Hospitals. The

student in this period is subject to the regulations established for clinical training in the degree of the Course in Medical Technology.

Fees—The schedule of fees as outlined in the *Bulletin of General Information* applies to students in this special program.

Certification—Satisfactory completion of this program enables the student to be eligible for application for certification as a medical technologist by the Registry of Medical Technologists (see page 8 of this bulletin). No degree will be granted by the University upon completion of this program.

C. Course for Laboratory Aides

The Course for Laboratory Aides offered by the General Extension Division of the University of Minnesota in co-operation with the College of Medical Sciences aims to prepare young women for work as nonprofessional technical assistants to medical technologists and doctors in clinical laboratories. This course combines instruction in fundamental principles in selected phases of laboratory techniques with clinical experience in hospital laboratories.

Requirements for admission—Graduation from high school with rank in the upper half of the high school graduating class.

Program—Twelve consecutive months of training includes six months in residence on the campus in day classes and six months in clinical experience in laboratories of participating hospitals in Minnesota.

Fees—For the first six months on campus, tuition and incidental fees are \$188. No tuition is charged for the last six months in training. (University fees are subject to modification without notice.)

Certification—Upon satisfactory completion of all class work, hospital training, and comprehensive examinations, a certificate of completion is awarded by the General Extension Division of the University of Minnesota.

For further information about this course write to the General Extension Division, 54 Nicholson Hall, or to the Medical Technology Office, C205 Mayo Memorial, University of Minnesota, Minneapolis 14.

DESCRIPTION OF COURSES

Other courses which are equivalent or more comprehensive may be substituted for the required courses. The quarterly *Class Schedule* issued at the time of registration should be consulted for class hours and any special fees.

Medical Technology

All courses numbered above 50 are open only to students registered in the Course in Medical Technology.

- 10-11-12. **Orientation in Medical Technology.** Orientation in the principles and practices in medical technology. (1 cred.; freshmen only)
- 30-31-32. **Case Presentations.** Demonstrations and discussion of clinical laboratory techniques in relation to diagnosis and treatment of disease. (1 cred.; sophomores only)
- 51-52. **Clinical Diagnosis by Laboratory Methods I.** Relation and use of clinical laboratory methods in clinical medicine. Introduction to clinical pathology. (4 cred.)
60. **Blood Grouping and Cross Matching.** Introduction to fundamental principles and laboratory techniques in blood grouping and crossmatching. (2 cred.)
61. **Introductory Clinical Microscopy.** Fundamental techniques in hematology and urinalysis. (4 cred.)
70. **Laboratory Methods in Clinical Chemistry.** Basic methods and techniques used in clinical chemistry. (6 cred.)
71. **Advanced Techniques in Clinical Chemistry.** Laboratory methods and additional experience in special procedures used in clinical chemistry. (5 cred.)
73. **Electrocardiography.** Principles and practice in the use of electrocardiographs. (2 cred.)
74. **Basal Metabolism Testing.** Principles and practice in the use of metabolors. (2 cred.)
75. **Clinical Hematology.** Laboratory methods in hematology. Morphology of blood cells. (6 cred.)
76. **Applied Clinical Microscopy.** Application and use of laboratory methods in hematology and urinalysis in the out-patient laboratory. Practice in venapunctures. (2 cred.)
78. **Urinalysis and Parasitology.** Routine and special examinations of body fluids and feces by chemical and microscopic methods. (4 cred.)
80. **Clinical Bacteriology.** Identification of bacteria by microbiologic techniques. Correlation with clinical cases. (5 cred.)
82. **Blood Bank Techniques and Serology.** Application of technical methods in procurement of blood and blood grouping and crossmatching for transfusions. Practice in serologic techniques. (5 cred.)
85. **Histologic Techniques.** Preparation of tissue specimens for microscopic study. (4 cred.)
90. **Applied Laboratory Methods.** General experience in all phases of clinical laboratory procedures with emphasis of independent work including night duty and special projects. (3 cred.)

- 95. Clinical Diagnosis by Laboratory Methods II.** (Continuation of 51-52) Includes review of laboratory methods used in diagnosis and treatment of disease. Orientation in related hospital practices. Independent reading encouraged. Term paper required. (1 cred.)

Anatomy

- Anat.4. Elementary Anatomy.** Elementary human anatomy. (5 cred.; prereq. Zool. 1-2-3)
- Anat.165. Hematology.** Blood and blood forming organs; emphasis on blood and bone marrow from standpoint of diagnosis and prognosis. (4 cred.; prereq. Zool. 54)

Bacteriology

- Bact.53. General Bacteriology.** Instruction in the morphology, physiology, taxonomy, and ecology of bacteria. The practical applications of these fundamental principles in other phases of science and industry are emphasized. (5 cred.; prereq. 10 cred. in chemistry and 4 cred. in biological sciences)
- Bact.102. Medical Bacteriology.** The pathogenic bacteria, especially in their relationship to disease; principles of infection and immunity; microbiological techniques for laboratory diagnosis and antibiotic determination. (4 cred.; prereq. 116)
- Bact.116. Immunology.** Mechanisms of the interactions between host and parasite. Techniques and theories of serologic procedures; laws of hemolysis, quantitative relationship between antigen and antibody; opsonins, serums, vaccines, toxin, antitoxin, complement fixation; neutralization, precipitative and agglutinative reactions, blood grouping, atopy, anaphylaxis. (4 cred.; prereq. 53)

Chemistry

- In.Ch.1-2. General Inorganic Chemistry.** Study of the general laws of chemistry and of the nonmetals and metals and their compounds. (8 cred.; no prereq.)
- In.Ch.4-5. General Inorganic Chemistry.** Study of the general laws of chemistry and of the nonmetals and metals and their compounds. More intensive than 1-2. (8 cred.; prereq. entrance cred. in chemistry)
- In.Ch.11. Semimicro Qualitative Analysis.** Laboratory work in systematic qualitative analysis of the cations with lectures on solutions, ionization, chemical and physical equilibria, oxidation and reduction, etc. (4 cred.; prereq. In.Ch. 2 or 5)
- An.Ch.7. Quantitative Analysis.** Introductory course covering the general principles and methods of quantitative analysis, both gravimetric and volumetric. Typical problems are assigned and attention is given to proper laboratory practice. (4 cred.; prereq. In.Ch.11)
- Or.Ch.61-62. Elementary Organic Chemistry.** Discussion of important classes of organic compounds, both aliphatic and aromatic, together with some heterocyclic compounds. Laboratory work includes the preparation of typical substances. (8 cred.; prereq. 12-15 cred. in chemistry)

English

IMPORTANT NOTE—No student may register for any course in Freshman English without taking a placement test. Assignment to a particular course in Freshman English will depend on the student's record in this placement test.

Engl.A-B-C. Freshman English. A combined course in literature and composition. The composition is equivalent to that in Comp. 4-5-6 and meets the requirement for graduation. The literature consists of novels, short stories, plays, and poetry—both English and American, and mostly modern—and is intended to interest the student who would enjoy, and profit from, the study of literature but who wants to major in some other subject. (15 cred.)

Comp.4-5-6. Freshman Composition. Practical training in reading and writing. (9 cred.)

Comm.1-2-3. Communication. A course to help students use the English language more effectively, with constant practice in speaking and writing, in listening and reading. 1: How words convey meaning; social attitudes toward various language practices. 2: Logical and psychological means of persuasion. 3: The mass communication mediums of press, radio, and film, with special attention to the causes of blocked, distorted, and inadequate communicating. Nine regular conferences with the instructor, use of speech equipment, and special conferences with the speech or writing consultants. The course is accepted as equivalent to Comp. 4-5-6 in satisfying any requirements of the University. (12 cred.)

Physics

Phys.1-2-3. Introduction to Physical Science. Demonstration lectures on the principles of physics and the physical phenomena underlying these principles. (9 cred.; prereq. high school algebra and plane geometry)

Physiological Chemistry

Ph.Ch.100-101. Physiological Chemistry. (13 cred.; prereq. organic chemistry and physics)

Physiology

Phsl.60. Human Physiology. (6 cred.; prereq. courses in physiological chemistry and human or mammalian anatomy)

Zoology

Zool.1-2-3. General Zoology. Structure, physiology, embryology, classification, and evolution of animals. (10 cred.; no prereq.)

Zool.51. Introductory Animal Parasitology. An elementary course dealing with parasitic protozoa, worms, and arthropods, and their relation to diseases of man and animals. (5 cred.; prereq. 1-2-3)

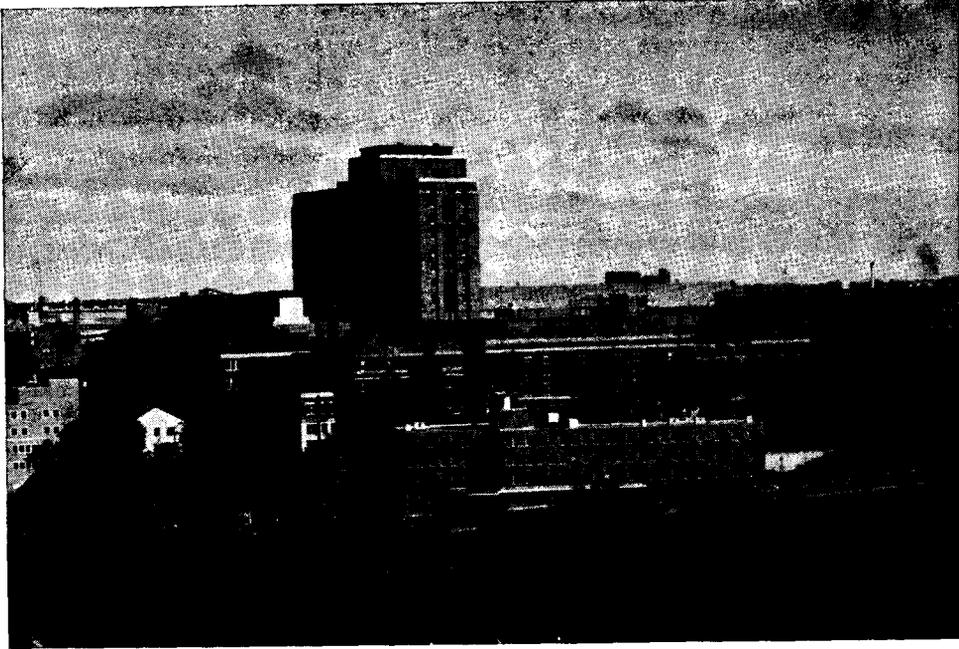
Zool.54. Histology. Microscopic structure of the tissues and organs. (5 cred.; prereq. 1-2-3)

9/12/55

10/19/55

Bulletin of the

UNIVERSITY OF MINNESOTA



*Department of Physical Medicine
and Rehabilitation 1954-1957*

● Physical Therapy

● Occupational Therapy

UNIVERSITY OF MINNESOTA

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Department of Physical Medicine and Rehabilitation

PHYSICAL THERAPY

Physical therapy is that part of medical science which is concerned with the treatment of disease or injury by the effective properties of heat, light, water, electricity, massage, and by therapeutic exercises and rehabilitation techniques. These techniques are carried out by the physical therapist under the direction of the physician.

Because of the complexity of the equipment to be used and the exacting nature of the duties to be performed, it is essential for the therapist to be well grounded in the fundamental sciences of anatomy, physiology, pathology, physics, and psychiatry.

Qualifications for a career in physical therapy are much the same as those for any other profession in the field of medicine. The essentials are good health, tact, emotional stability, personal integrity, and an interest in science and the medical field.

Employment opportunities in this field are extremely varied and almost unlimited. It is the purpose of the programs described in this bulletin to prepare such well-trained physical therapists to take their place in the wide field of medicine and perform their duties intelligently and efficiently to the benefit of the patient.

The University of Minnesota offers a four-year curriculum leading to a bachelor of science in physical therapy. Transfer students may enter in the junior year if they have earned 90 credits, including certain required courses.

Graduates are eligible to take the American Registry for Physical Therapists, administered by the American Congress of Physical Medicine and Rehabilitation. They are also eligible to join the American Physical Therapy Association, their professional organization.

Admission Requirements

Applicants for admission to the freshman or sophomore year of the Course in Physical Therapy must meet the requirements of the College of Science, Literature, and the Arts. It is recommended that prospective students take physics, algebra, or geometry in high school. (See *Bulletin of General Information* for specific requirements and procedures.) Graduates of accredited high schools may enter at the beginning of any quarter, but the curriculum as outlined is based on entrance in the fall quarter. The sequence of courses in the last two years cannot be altered and must begin in the fall.

Fifteen credit hours per quarter is considered the average student load. Note the courses required for entrance. Students who have taken the first two years at other institutions must have taken the equivalent of these courses. Students who have completed two years toward physical therapy should apply for admission to the professional school by contacting the Office of Admissions and Records, University of Minnesota,

Minneapolis 14. An official transcript for the first two years should be filed with that office for evaluation toward physical therapy.

Selection of students will be based on scholastic standing (particularly in the basic science courses) and upon character and personal fitness as disclosed by personal interview. Each student must pass a physical examination in the Students' Health Service of the University of Minnesota.

Nonresidents note section on admission in the *Bulletin of General Information*.

Further information relating to requirements and training may be obtained from the Physical Therapy Office, 860 Mayo Memorial, University of Minnesota, Minneapolis 14.

General Information

College Expenses

Fees—For complete information about fees and expenses, consult the *Bulletin of General Information*.

Housing—Information about residence halls may be obtained from the director of Women's Residences at Comstock Hall, or from the director of Centennial Hall (for men). Information about private rooming houses is furnished by the Student Housing Bureau, 209 Eddy Hall.

Uniforms—During the junior year, students are expected to provide white uniforms and white duty shoes for clinical practice.

Loans and Scholarships

Information on scholarships and loans open to all University of Minnesota students is listed in the *Bulletin of General Information*. Further information may be obtained by writing the Bureau of Student Loans and Scholarships, 210 Eddy Hall. Information on local and national scholarships specific to physical and occupational therapy may be obtained through the respective offices.

Curriculum

Registration for the freshman and sophomore years takes place in the College of Science, Literature, and the Arts, and during that period the students are subject to the regulations of that college. Course advising will be done by the physical therapy director each quarter.

Ninety credits, including the following courses or their equivalents, must be completed before admission to the junior year:

(Credits are shown in parentheses)

Anat. 4—Elementary Anatomy (5)	GC 7A—Physical Science: Physics (5)
Bact. 53—General Bacteriology (5)	or
or	Phys. 1-2-3—Introduction to Physical Science (9)
Phsl. 4—Human Physiology (5)	Psy. 1-2—General Psychology, plus 3 additional credits (9)
Comp. 4-5-6—Freshman Composition (9)	Zool. 1-2-3—General Zoology (10)
or	From the following social sciences (10)
Comm. 1-2-3—Communication (12)	Hum. 1-2-3
or	Hist. 1-2-3
Engl. A-B-C—Freshman English (15)	Soc. 1, 2
In.Ch. 1-2—General Inorganic Chemistry (8)	Pol. 1-2-3

Although a minor is not required, electives are guided somewhat to prevent scattering. The following program is suggested in order to include courses which are offered only once a year:

FRESHMAN YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engl. A, 4 or Comm. 1	Engl. B, 5, or Comm. 2	Engl. C, 6, or Comm. 3
Zool. 1	Zool. 2	Zool. 3
Phys. 1 or G.C. 7A	Hum. 2	Hum. 3
Hum. 1	Pub.H. 3A	Pub.H. 4

SOPHOMORE YEAR

In.Ch. 1	In.Ch. 2	Anat. 4
Psy. 1	Psy. 2	Psychology
Electives	Bact. 53 or Phsl. 4	P.Med. 2
	Electives	C.W. 40-80
		Electives

JUNIOR YEAR

(Credits are shown in parentheses)

Anat. 58 (5)	Phsl. 60 (6)	Path. 60 (3)
P.Med. 50 (2)	P.Med. 70 (3)	P.Med. 61 (5)
P.Med. 57 (1)	P.Med. 83 (5)	P.Med. 63 (1)
P.Med. 60A (5)	P.Med. 60B (3)	P.Med. 65 (4)
Electives (3-4)	Electives (1-2)	P.Med. 69 (1)
Totals (16-17)	Totals (17-19)	Electives (2-3)
		Totals (16-17)

SENIOR YEAR

Neur. 171A (2)	P.Med. 1 (1)	P.Med. 90 (1)
Neur. 171B (2)	P.Med. 58 (2)	P.Med. 91 (18)
P.Med. 80 (5)	P.Med. 64 (1)	Total (19)
P.Med. 82 (3)	P.Med. 68 (3)	
P.Med. 84 (3)	P.Med. 85 (3)	
P.Med. 97 (2)	P.Med. 98 (3)	
Electives (3)	Electives (2-3)	
Totals (17)	Totals (13-16)	

OCCUPATIONAL THERAPY

Occupational therapy is that part of the medical sciences which employs mental and physical activities as remedial treatment. Occupational therapists work under the direction of a physician and use creative and manual arts, educational, recreational, and prevocational activities in aiding recovery from disease or injury. Occupational therapy clinics in hospitals are used for therapeutic purposes and as laboratories to explore skills and furnish tryout experience for patients in the process of rehabilitation.

Occupational therapy is a profession which offers unlimited opportunities, since the demand for qualified therapists is greater than the supply. Mental hospitals, tuberculosis sanatoria, general, orthopedic, and children's hospitals, schools for the blind, deaf, and feebleminded, rehabilitation agencies, curative workshops, homes for the aged, and homebound services employ occupational therapists.

The University of Minnesota offers an occupational therapy curriculum of four academic years plus one quarter. Upon completion of the prescribed curriculum, students receive the degree of bachelor of science in occupational therapy.

The Course in Occupational Therapy is approved by the Council on Medical Education and Hospitals of the American Medical Association, and the American Occupational Therapy Association. Graduates are eligible to become registered occupational therapists by taking the national registration examination given twice a year by the American Occupational Therapy Association. Registered occupational therapists are urged to become members of this organization whose purpose it is to promote the use of occupational therapy, to advance standards of education and practice, to encourage research, and to engage in other activities advantageous to the profession and its members.

Admission Requirements

Applicants for admission to the freshman and sophomore years for the Course in Occupational Therapy must meet the entrance requirements of the College of Science, Literature, and the Arts. (For specific requirements and procedures see *Bulletin of General Information*.) Graduates of accredited high schools may enter at the beginning of any quarter, but the curriculum as outlined is based on entrance in the fall quarter.

At the end of the sophomore year, students having a total of 90 quarter credits, including the required courses for occupational therapy, or their equivalents, may make application for entrance into the Department of Physical Medicine and Rehabilitation, a unit of the College of Medical Sciences. Quality credits earned at the University will count toward entrance. Students who have completed two years toward occupational therapy should apply for admission to the professional school by contacting the Office of Admissions and Records of the University. Students must make application and file complete transcripts with the Office of Admissions and Records before July 1 of the year in which they expect to enter the course as a junior. Selection of students will be based on scholastic standing, and upon character and personal fitness as disclosed by personal interview. Selections will be made as early as pos-

sible and students notified promptly. Those accepted will transfer into the College of Medical Sciences, Department of Physical Medicine and Rehabilitation, Course in Occupational Therapy. Students attending institutions other than the University of Minnesota during their freshman and sophomore years must meet the same requirements for admission. Nonresidents note section on Admission in the *Bulletin of General Information*.

The Council on Medical Education and Hospitals of the American Medical Association has not sanctioned the acceptance for credit of courses in physical medicine taken in the Armed Forces; however, blanket credits earned in the service may count as electives toward graduation.

Each student must pass a physical examination in the Students' Health Service of the University. Any student who is not physically able to do the work required of occupational therapists will be rejected.

Further information relating to requirements and training may be obtained from the Occupational Therapy office, 860 Mayo Memorial. Appointments may be made by calling Fillmore 7311, extension 2721.

General Information

College Expenses

Fees—For complete information about fees and expenses, consult the *Bulletin of General Information*.

Housing—Information about residence halls may be obtained from the director of Women's Residences at Comstock Hall, or from the director of Centennial Hall (for men). Information about private rooming houses is furnished by the Student Housing Bureau, 209 Eddy Hall.

Uniforms—During the junior year, students are expected to provide white uniforms and white duty shoes for clinical practice.

Loans and Scholarships

Information on scholarships and loans open to all University of Minnesota students is listed in the *Bulletin of General Information*. Further information may be obtained by writing the Bureau of Student Loans and Scholarships, 210 Eddy Hall. Information on local and national scholarships specific to physical and occupational therapy may be obtained through the respective offices.

Curriculum

The work of the first two years of the Course in Occupational Therapy is taken in the College of Science, Literature, and the Arts. If the work is taken at the University of Minnesota, the courses listed for the freshman and sophomore years are required. Students who have taken the first two years of work at other institutions must have taken the equivalents of these courses. It is recommended that prospective students take physics or chemistry and art in high school.

The curriculum includes ten months of clinical training in various types of hospitals or services such as psychiatric, tuberculosis, general, orthopedic, and children's hospitals, rehabilitation agencies, etc. During this period students work a full day which includes attendance at lec-

tures, staff meetings, and clinics, and they are under the supervision of a qualified registered occupational therapist. Maintenance is usually provided at clinical training centers.

FRESHMAN YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engl. 4	Engl. 5	Engl. 6
Zool. 1	Zool. 2	Zool. 3
Hum. 1	Hum. 2	Anat. 4
Art 1	Art 23	Art 44
	Pub.H. 3A	P.E.

SOPHOMORE YEAR

G.C. 7A	G.C. 7C	Phsl. 4
Art 33	Art 34	Art 10
Ind. 15	Ind. 1	Ind. 20
Soc. 1	Psy. 1	Psy. 2
P.Med. 1	C.W. 40 or 80	P.Med. 5

JUNIOR YEAR

(Credits are shown in parentheses)

Psy. 144 (3)	Phys. 145 (3)	P.Med. 61 (5)
Anat. 58 (5)	P.Med. 83 (5)	P.Med. 63 (1)
Neur. 171A,B (4)	P.Med. 2 (1)	P.Med. 77 (3)
P.Med. 71 (3)	P.Med. 72 (3)	P.Med. 73 (2)
P.Med. 74 (3)	P.Med. 75 (3)	P.Med. 76 (3)
Total (18)	P.Med. 92 (3)	P.Med. 84 (3)
	Total (18)	Total (17)

TENTH QUARTER

(I and II terms of Summer Session)

P.Med. 94 (18)

SENIOR YEAR

P.Med. 55 (2)	P.Med. 95 (18)	P.Med. 96 (18)
P.Med. 78 (3)		
P.Med. 79 (2)		
Electives (8-9)		
Totals (15-16)		

DESCRIPTION OF COURSES

Physical Medicine and Rehabilitation (P. Med.)

1. **Orientation to Occupational Therapy.** Survey of field, history, and development. Detailed tour of University Hospitals field trips to other hospital occupational therapy departments; demands of the profession; ethics; and etiquette. (2 cred. for occupational therapy students, 1 cred. for physical therapy students)
2. **Orientation to Physical Therapy and Rehabilitation.** Scope of physical therapy and rehabilitation procedures; specific demands and opportunities of the profession; field trips to physical therapy departments in the Twin Cities. (1 cred.)
5. **Therapeutic Recreation.** Recreational activities for hospital and convalescent patients, such as music, active sports, games, etc. (2 cred.)
50. **Physics for Physical Therapy.** Mechanics, heat, light, and electricity as applied to physical medicine and rehabilitation. Lectures and laboratory demonstrations with participation by students. (2 cred.)
55. **Process of Rehabilitation.** Lectures and recitation on function of social and educational agencies concerned with rehabilitation of the handicapped; public laws; hospital programs; job opportunities; industrial trends. (2 cred.)
57. **Ethics and Administration.** Lectures covering appropriate conduct of the physical therapist; orientation to the hospital and its department function; professional and related organizations. (1 cred.)
58. **Bandaging, Aseptic, and Isolation Techniques.** Methods and principles of bandaging, splinting, and taping; care and wrapping of the amputee stump; medical asepsis includes preparation for and cleansing and dressing of wounds; isolation procedures for all contagious diseases. Laboratory practice of all techniques. (2 cred.)
- 60A. **Theory and Technique of Thermo-, Photo-, and Hydrotherapy.** Lectures, demonstrations, student practice, and clinical applications to patients under supervision. (5 cred.)
- 60B. **Theory and Technique of Electrotherapy.** Lectures, demonstrations, student practice, and clinical application to patients under supervision. (3 cred.)
61. **Theory and Technique of Physical Medicine and Rehabilitation Applied to Medical Sciences.** Lectures include related fields of surgery, orthopedics, pediatrics, dermatology, medicine, neurology, and speech. (5 cred.)
63. **Junior Clinic in Physical Medicine and Rehabilitation.** Correlation clinic. Presentation of hospital cases, with emphasis on therapeutic problems to be treated by occupational and physical therapists. (1 cred.)
64. **Senior Clinic in Physical Medicine and Rehabilitation.** (1 cred.)
65. **Theory and Technique of Muscle Re-education.** Includes complete treatment techniques for poliomyelitis patients and application of these techniques to other disabilities. (4 cred.)
68. **Applied Anatomy.** Review of joint structures, muscles, nerves, and function. Diseases and injuries causing impairment of function and deformities are reviewed and correlated to physical medicine and rehabilitation. (3 cred.)
69. **Applied Anatomy and Physiology in the Treatment of Poliomyelitis.** Résumé of the history, various concepts, and treatment of the disease. (1 cred.)

- 70. Theory and Technique of Massage.** Methods of applying various types of massage, their therapeutic indications, and physiological effects. Laboratory demonstration and practice. Supervised clinical practice. (3 cred.)
- 71-72-73. Theory of Occupational Therapy.** Review of history and development; study of present trends; techniques and correlation of theory with practical application in the treatment of physical and emotional conditions; function of in-hospital rehabilitation programs; departments participating; hospital and departmental organizations; activity analysis; study of hobbies, recreational activities, and bibliotherapy. (8 cred.)
- 74-75-76. Techniques of Occupational Therapy.** Laboratory instruction and review of techniques used in hospitals, with discussion and adaptations for specific disabilities. Activity analysis. (9 cred.)
- 77. Study of Physical Disabilities.** Treatment principles and adaptations of occupational therapy equipment to the physically disabled patient. (3 cred.)
- 78. Principles and Practices of Occupational Therapy.** Practical experience in planning a program for a specific situation, with the existing problems of organization and administration which must be solved. (3 cred.)
- 79. Activities of Daily Living.** Laboratory experience in teaching techniques and in evaluating self-help devices for convalescent patients. (2 cred.)
- 80. Theory and Technique of Therapeutic Exercise.** Scientific application of exercise programs for specific disabilities, including the practical application of all type of apparatus. Lectures, demonstrations, and student practice. Supervised clinical practice. (5 cred.)
- 82. Physiology of Muscles, Nerves, and Circulation.** Specific physiological basis for physical therapy. (3 cred.)
- 83. Theory and Technique of Muscle Function, Tests, and Measurements.** Review of muscles and joints in regard to anatomical and physiological function. Analysis of body mechanics and co-ordinated movement. Theory and technique of muscle testing and joint measurement. Lectures, laboratory demonstration and practice, clinical application under supervision. (5 cred.)
- 84. Theory and Technique of Rehabilitation Procedures.** Working knowledge of the principles used in rehabilitation of the physically handicapped, from the bed patient to ambulation. Lectures, demonstration, and practice. (3 cred.)
- 85. Theory and Technique of Rehabilitation Procedures.** Ambulation and all activities of daily living. Total program of treatment for specific disabilities. (3 cred.)
- 90. Conference.** Discussion of the problems arising from clinical practice in the field of physical therapy. (1 cred.)
- 91. Clinical Practice.** Clinical application of techniques under supervision in the physical therapy departments of the affiliated hospitals. (18 cred.)
- 92. Preliminary Hospital Practice in Occupational Therapy.** Directed clinical experience in application of therapeutic activities to hospital patients. (3 cred.)
- 94-95-96. Clinical Affiliation.** At least ten months are devoted to clinical training at affiliated hospitals. For occupational therapists. (18 cred. per quarter)
- 97. Introduction to Scientific Research.** Use of source material, evaluation of literature, fundamentals of medical research, graphic presentation of data, technique of writing. (2 cred.; prereq. sr. in P.T. or O.T.)
- 98. Special Problems in Physical Therapy.** Opportunity to participate in selected research areas. (3 cred.; prereq. 97)

4/23/55

7/31/55

Bulletin of the
UNIVERSITY OF MINNESOTA



School of Nursing, 1955 - 1957

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable George W. Lawson, St. Paul, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Edward B. Cosgrove, Le Sueur; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Marjorie J. Howard, Excelsior; The Honorable Lester A. Malkerson, Minneapolis; The Honorable Charles W. Mayo, Rochester; The Honorable Karl G. Neumeier, Stillwater; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

James Lewis Morrill, B.A., LL.D., L.H.D., President
Malcolm M. Willey, Ph.D., L.H.D., LL.D., Vice President, Academic Administration
William T. Middlebrook, B.A., M.C.S., Vice President, Business Administration
Robert Edward Summers, M.S. (Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

SCHOOL OF NURSING

Administration

Harold S. Diehl, M.A., M.D., D.Sc., Dean of the College of Medical Sciences
Katharine J. Densford, M.A., D.Sc., LL.D., Director, School of Nursing
Ruth Harrington, M.A., Assistant Director, School of Nursing

Associated Administrative Officers

Walter W. Cook, Ph.D., Dean of the College of Education
Horace T. Morse, Ph.D., Dean of the General College

Faculty Standing Committees

Admissions	Public Information
Curriculum	Research and Studies
Advanced Curricula	Student Welfare
Basic Nursing Curricula	Joint Committee with School of Agriculture (for practical nursing and home management)
Practical Nursing Curricula	
Library and Audio-Visual Education	

School Offices

Office of the Director, 125 Owre Hall (Ext. 6273-6274)
Office of the Counselor, 124 Millard Hall (Ext. 7111)
Office of Nursing Records, 125 Owre Hall (Ext. 6273-6274)

For other office numbers consult corridor bulletin board outside 125 Owre Hall or call School of Nursing Office (Ext. 6273-6274)

Faculty

Professor

Katharine J. Densford, M.A., D.Sc.,
LL.D.
Ruth Harrington, M.A.

Associate Professor

Ruth V. Johnston, Ph.D.
Florence J. Julian, M.N.A.

Assistant Professor

Myrtle H. Coe, B.A.
Margaret F. Grainger, M.A.
Cecelia R. Lediger, M.S.
Sibyl G. Norris, M.A.
Eugenia R. Taylor, M.A.
Dorothy E. Titt, M.A.

Assistant to the Director and Instructor

Frances Lucier, B.S.

Instructor

Mary Adams, M.A.
Lois D. Anderson, M.A.

Helen R. Boyd, M.Ed.
Florence M. Brennan, B.S.
Margaret J. Clipper, B.S.
M. Elizabeth Davidson, B.S.
Frances E. Dunning, M.Ed.
Mary Sue Kern, B.S.
Lily Larson, B.S.
Helen B. Linehan, B.S.
Margery Low, B.S.
Mary Ann McIntyre, B.S.
Marian L. Maschmann, M.A.
Doris I. Miller, M.Ed.
Monica L. Murphy, B.S.
Doris Mae Salem, M.A.
Rosella M. Skalicky, B.S.
Marjorie A. Stronach, B.S.
Helen F. Watters, B.S.
Elizabeth A. Whitney, B.S.
D. Joan Williams, B.S.
Donna T. Wimmer, B.S.

Lecturer and Assistant to the Director
M. Isabel Harris, M.Ed.

Participating Associated Agencies**

*(In most agencies many staff members in addition to
the director are participating)*

Basic Professional Nursing

Hospitals

Glen Lake Sanatorium, Oak Terrace, Hazel Roberts, B.S., Director of
Nursing
Glencoe Municipal Hospital (rural), Glencoe
Charles T. Miller Hospital, St. Paul, Thelma Dodds, B.S., Director of
Nursing
Swift County-Benson Hospital (rural), Benson, Amy Gunderson, R.N.,
Administrator

Public Health Agencies

Family Nursing Service, St. Paul, Irene Donovan, B.S., Executive
Director
Minnesota Department of Health, University of Minnesota, Alberta
Wilson, M.S., Chief, Section of Public Health Nursing
Visiting Nurse Service and Bureau of Nursing, Health Department,
Minneapolis, Jane Taylor, M.P.H., Director

Practical Nursing

Homes for the Aged

Walker Methodist Home, Minneapolis, Linder B. Keith, B.S., Superin-
tendent

Rural Hospitals

Ashley Memorial-Meeker County Hospital, Pipestone, Louisa Mykle-
bust, R.N., Administrator
Sleepy Eye Municipal Hospital, Sleepy Eye, Edythe Williams, R.N.,
Administrator
Swift County-Benson Hospital (rural), Benson, Amy Gunderson, R.N.,
Administrator

Advanced Professional Nursing (student teaching; field practice for psychi-
atric nursing, ward administration, and nursing service; teaching intern-
ship)

Schools of Nursing

Abbott Hospital, Minneapolis, Alta Leonard, B.S., Director of Nurses
College of St. Catherine, St. Paul, Sister Agnes Leon, M.S., Director,
Department of Nursing

** Appropriate facilities within Minnesota and other states are utilized for observation,
field visits, and student experience.

Fairview Hospital, Minneapolis, Nina Dencklau, B.S., Director of Nurses
 Hamline University, St. Paul, Daphne Rolfe, M.A., Dean, School of Nursing
 Lutheran Deaconess Hospital, Minneapolis, Christine Jensen, B.S., Director of Nursing Service and School of Nursing
 Charles T. Miller Hospital (practical), St. Paul, Thelma Dodds, B.S., Director of Nursing
 Minneapolis General Hospital, Minneapolis, Georgia Nobles, B.S., Director, Nursing School and Nursing Service
 Northwestern Hospital, Minneapolis, Dorthea Glasoe, B.S., Director, Nursing Service and Education
 St. Barnabas Hospital, Minneapolis, Dorothy Merrell, M.A., Director of Education and Nursing Service
 Swedish Hospital, Minneapolis, Sena Petersen, R.N., Director, School of Nursing and Nurses

Hospitals and Departments

Abbott Hospital, Minneapolis, Alta Leonard, B.S., Director of Nursing
 Anoka State Hospital, Anoka, Jennie Blankenhorn, R.N., Director of Nursing
 Asbury Methodist Hospital, Minneapolis, Marjorie Larson, R.N., Director of Nursing Service
 Fairview Hospital, Minneapolis, Nina Dencklau, B.S., Director of Nurses
 Fergus Falls State Hospital, Fergus Falls, Lydia Markusen, B.S., Director of Nursing
 Gillette State Hospital for Crippled Children, St. Paul, Verna Mae Blomquist, B.S., Director of Nursing
 Lakeview Memorial Hospital, Stillwater, Christine Strom, R.N., Administrator
 Maternity Hospital, Minneapolis, H. Marie Hopkins, B.S., Administrator and Director of Nursing
 Charles T. Miller Hospital, St. Paul, Thelma Dodds, B.S., Director, School of Practical Nursing and Director of Nursing
 Minneapolis General Hospital, Minneapolis, Georgia Nobles, B.S., Director, Nursing School and Nursing Service
 Minnesota Department of Public Welfare, Medical Services, Annie Laurie Crawford, B.S., Consultant, Psychiatric Nursing
 Northwestern Hospital, Minneapolis, Dorthea Glasoe, B.S., Director, Nursing Service and Education
 Rochester State Hospital, Rochester, Clarice Beacom, R.N., Director of Nursing
 St. Barnabas Hospital, Minneapolis, Dorothy Merrell, M.A., Director of Education and Nursing Services
 Swedish Hospital, Minneapolis, Sena K. Petersen, Director, School of Nursing and Nurses
 Veterans Administration Hospital, Minneapolis, Kirsti Lunde, M.A., Chief, Nursing Service
 Veterans Administration Hospital, St. Cloud, Helen Schnacke, B.S., Chief, Nursing Service

Section I—GENERAL INFORMATION

Philosophy and Objectives of the School

A democratic philosophy of education with its concept of the social role of education in a democratic society, its emphasis upon the inherent worth of the individual and the dignity and value of human life, and its acceptance of the task of building free citizens who strive not only for their own rights and liberties but for those of others and who assume the responsibilities and obligations of free citizenship, best expresses the general educational philosophy of the faculty.

Such a philosophy of education places upon the School of Nursing the responsibilities of providing opportunities for learning which will enable the student: **

1. To develop the knowledge, appreciations, attitudes, and skills which will enable the nurse to function effectively as a member of the health team in meeting the physical, social, psychological, spiritual, and health educational needs of the patient, family, and community.
2. To develop for the regulation of one's personal, professional, and civic life a code of behavior based on ethical principles consistent with democratic ideals.
3. To participate actively as an informed and responsible citizen in solving the social, economic, and political problems of one's community, state, and nation.
4. To participate actively as an informed and responsible member of the nursing profession in solving professional problems.
5. To recognize the interdependence of the different peoples of the world and one's personal responsibility for fostering international understanding and peace.
6. To understand the ideas of others and to express one's own effectively.
7. To understand the common phenomena in one's physical environment, to apply habits of scientific thought to personal, professional, and civic problems, to appreciate the implications of scientific discoveries for human welfare, and to apply scientific principles in the promotion of health.
8. To acquire and use the skills and habits involved in critical and constructive thinking.
9. To attain a satisfactory emotional and social adjustment.
10. To maintain and improve one's own health and to co-operate actively and intelligently in solving community health problems.
11. To understand and enjoy literature, art, music, and other cultural and recreational activities as expressions of personal and social experience, and to participate to some extent in some form of creative activity.
12. To acquire the knowledge and attitudes basic to a satisfying family life.
13. To choose a socially useful and personally satisfying field of work that will permit one to use to the full individual interests and abilities.

Statement of Purpose—The School of Nursing has a three-fold purpose. It aims to prepare young men and women for the practice of professional nursing, for the practice of practical nursing, and for supervisory, teaching, and administrative posts in the various fields of nursing.

Accreditation and Association Membership

The University of Minnesota is accredited by the North Central Association of Colleges and Secondary Schools. The University of Minnesota School of Nursing is accredited by the Minnesota Board of Nursing. It is also accredited by the National Nursing Accrediting Service (1) as a basic degree program which prepares for all beginning positions in nursing, including public health nursing, and (2) as Bachelors' and Masters'

** The statement of objectives has been adopted by the faculty from the objectives of General Education as published in Volume I of *A Report of the President's Commission on Higher Education*, entitled "Higher Education for American Democracy," Washington, D.C., 1947.

programs in nursing education and in nursing administration. The University of Minnesota Hospitals is approved by the Joint Commission on Accreditation of Hospitals and is a member of the American Hospital Association. All other fields used for student experience are accredited by the appropriate agency.

Historical Statement

The University of Minnesota School of Nursing, the first university school of nursing in the world, authorized by the Board of Regents on October 1, 1908, was established March 1, 1909, as a result of the efforts of Dr. Richard Olding Beard. Originally the school carried a basic three-year curriculum leading to the degree of graduate in nursing. On June 9, 1919, a curriculum leading to the degree of bachelor of science and graduate in nursing was established. Until 1949 both a basic and a bachelor of science curriculum were carried. A distinctive feature of the bachelor of science curriculum in this period was the requirement of 75 university credits before the student matriculated in the School of Nursing. As a result, the entire clinical program was made more meaningful than would otherwise have been possible.

Another first step was taken December 14, 1920, when the plan of a central school was approved by the University. It was felt that the inclusion of other hospitals would introduce desirable practice fields for the University School of Nursing and would make possible a uniform standard of preparation for the nurses in these hospitals of a higher level than they could achieve individually. The hospitals wishing to take part in such a venture were the Minneapolis General Hospital, the Charles T. Miller Hospital, and the Northern Pacific Beneficial Association Hospital of St. Paul. The arrangements were completed in 1921. Though no formal contract was made, a memorandum of agreement was drawn up and agreed upon by the University and the allied hospitals. On March 30, 1921, the first students in this central school of nursing were admitted to the University.

On February 19, 1925, the curriculum of clinical experience was further enriched by means of an agreement with the Hennepin County Sanatorium Commission whereby University nurse students were to receive six weeks of clinical experience (later a shortened period) at the Glen Lake Sanatorium in the care and treatment of tuberculosis patients.

The Northern Pacific Beneficial Association Hospital on January 1, 1933, arranged to staff its entire nursing service with graduate nurses and nonprofessional workers, thereby aiding in the solution of the problem of unemployment among graduate nurses.

Beginning in March 1934, all students received six weeks of field experience in public health nursing (many had received it since 1932) in the Community Health Service in Minneapolis or the Family Nursing Service in St. Paul. Due to the overcrowding of facilities, these agencies, beginning in the fall of 1939, no longer were able to give field experience to all basic three-year students. Instead, students received four weeks of experience in nursery school plus two additional weeks in the outpatient department.

In June 1934, the Charles T. Miller Hospital offered to discontinue accepting freshman students for assignment to that hospital, replacing freshman students with graduate nurses and nonprofessional workers. It continued to provide experience in nursing of private patients to all students in the School. Due to the wartime increase in student enrollment, freshman students were assigned there again from September 1942, to September 1946.

Beginning in March 1938, trial was made of having basic three-year students enter in the fall quarter only. Students in the bachelor of science curriculum were admitted to the School of Nursing in both fall and spring quarters.

During World War II, beginning in January 1942, classes were admitted each quarter. This war program was made possible by federal aid which was granted through the United States Public Health Service under grant of Public Law 146 (77th Congress, Chapter 269—1st Session, H.R. 4926). In June 1943, the Congress of the United States appropriated \$45 million for the establishment of the United States Cadet Nurse Corps under the Surgeon General of the United States Public Health Service. The University of Minnesota School of Nursing was one of the training centers, the largest, of the United States Cadet Nurse Corps, admitting students under this plan from 1943 to 1945.

In the spring quarter of 1941, a refresher course for inactive graduate nurses was first offered. Beginning in the fall quarter of 1941, this course was financed through Federal funds. The fall 1941, winter 1942, fall 1942, and winter 1943 classes were taught in Minneapolis. Winter 1942 and winter 1943 classes were also taught in Rochester, Minnesota, and a spring 1942 class in St. Paul.

Other wartime activities were numerous, all members of the faculty participating in some measure in intra- and extracurricular war work.

With the beginning of the postwar period, other changes were made in the curricula of the school. Beginning with the spring quarter of 1947, the only students admitted to the basic professional curriculum were those who had completed satisfactorily the required prenursing credits for the degree curriculum and those who held Bachelor's degrees from accredited colleges and universities. Classes were admitted fall and spring quarters.

To meet the need for a technical group of workers in the field of nursing, a four-quarter program in practical nursing was offered for the first time to both men and women students in 1947. A limited number of these students also qualify for the associate in arts degree. A six-quarter program combining home management and practical nursing, operated jointly by the School of Agriculture and the School of Nursing, was initiated in the fall quarter of 1949.

Beginning with the class admitted to the basic professional program, fall 1949, a four-year (sixteen-quarter) curriculum was established which replaced the former eighteen-quarter curriculum. In the eighteen-quarter curriculum each student had in addition to preparation for professional nursing a major in nursing education or public health nursing. The new sixteen-quarter curriculum shifts the emphasis to an improved general education background with a major in professional nursing. It is open to both men and women students.

The School of Nursing continues to offer the major in nursing education for graduate nurses leading to the Bachelor's degree. Minors in this program include child care, initiated in 1935; ward administration, initiated 1942; and advanced clinical developed during the period of 1946-51 with support from W. K. Kellogg Foundation and during the period 1951-53 with assistance from foundations, groups, and individuals in Minnesota. Beginning July 1, 1947, federal support of psychiatric nursing programs has been provided through the National Mental Health Act. Three areas of concentration, formerly offered in this program, were nutrition, physical therapy, and science teaching in schools of nursing. Nutrition, initiated in 1935 under the title "diet therapy," was offered until 1948. Physical therapy was offered from 1942 to 1946, science teaching in schools of nursing from 1942 to 1955.

Postgraduate courses leading to a certificate in medical, surgical, pediatric, obstetric, and operating room nursing and in the care of private patients were initiated in 1932. All except the program in the care of private patients continued to be offered until 1949 at which time medical, surgical, pediatric, and obstetric programs were discontinued. In 1950 the certificate program in operating room was discontinued. A certificate program in communicable disease nursing was begun in 1936 and was continued until 1949. In January 1944, a certificate curriculum in psychiatric nursing was first offered and is currently continued. The students registered in the first curriculum in psychiatric nursing received full tuition and maintenance scholarships through Federal aid made available by the United States Public Health Service for the preparation of graduate nurses in critical fields. Beginning with the initiation of the advanced minors in the degree program, the certificate programs in clinical areas were markedly enriched through addition of new courses and increase in number of highly qualified faculty members. Another factor contributing to the improvement of the certificate curricula was the change in tuition and maintenance practices. Beginning in the fall of 1946, the students paid regular tuition and provided for their own maintenance. This change permitted freedom of assignment for clinical study.

The first three full-time students in the program in nursing education leading to the master of education degree began their programs in the fall quarter of 1950, the first degree being awarded in the summer quarter of 1951. The first four full-time students in the program in nursing administration leading to the master of nursing degree began their programs in the fall quarter of 1951, the first degrees being awarded in the summer quarter of 1952. The first sixteen full-time students in the program in nursing administration leading to the bachelor of nursing administration degree began their program in the spring quarter of 1955.

Alumnae Association

Graduates of the basic professional curricula in nursing of the University of Minnesota are eligible for membership in the general University of Minnesota Alumni Association and, upon registration by some state board of nurse examiners, are also eligible for membership in the Alumnae Association of the School of Nursing. Graduates of the four-quarter practical nursing program are eligible for membership in the Practical Nurses' Alumnae Association.

Organization

The School of Nursing functions in the field of medical sciences and in the field of education. A faculty of a school of the University of Minnesota, according to the Constitution and By-Laws of the University Senate, controls the internal affairs of the school, including entrance requirements, curricula, instruction, examinations, grading, degrees, discipline, and the selection and conditions of use of the departmental library. The faculty meets frequently as a whole and works also through committees whose responsibility is to analyze, study, and make recommendations to the faculty regarding matters within their province. Standing committees are listed on page 2. *Ad hoc* committees are appointed as needed. Representatives from all agencies which provide facilities for student experience work with the faculty in planning the programs offered by the School.

Committee on Student Scholastic Standing

This committee is made up of the director and the assistant director of the School of Nursing, the director of nursing services of the University of Minnesota Hospitals, a representative from the Office of the Dean of Students, the student counselor of the School of Nursing, and faculty representatives. The committee interprets policies of the faculty as they apply to individual students. It reviews progress toward graduation, determines probationary status when necessary, approves schedule adjustments, and takes action on special requests and problems of individual students. The committee makes recommendations to the faculty concerning the general conduct of the School. Its functions include considering exceptions to programs, assignments, and requirements within the School. Any matters which involve more than one college are cared for by the appropriate University committee.

Cultural and Recreational Opportunities

Students have access to the University Library which is located along the Mall of the University. The nursing library itself is located on the second floor of the University Library as a part of the biological-medical library.

One of the greatest privileges accorded students is that of attending lectures and concerts at the University either free or at markedly reduced student rates. Among these are the symphony concerts given by the Minneapolis Symphony Orchestra, the University Artists Course, the Student Forum, and the Thursday morning convocation lectures, as well as special lectures through the various departments. The University Theatre and the University Film Society offer a rich variety of plays and films each quarter.

Students are entitled to student rates for use of University tennis courts, golf course, skating arena, gymnasium, and swimming pool and on tickets for all athletic events.

The School is nonsectarian; however, students are urged to form church affiliations in accordance with their choice and custom. Churches of various denominations are within walking distance of the residences so that it is possible for students to attend either morning or evening services. Opportunities for worship and religious activities are many. The Y.W.C.A., Newman Club, Hillel Foundation, and various Protestant denominational groups have campus organizations which seek to enrich the spiritual life of the students.

Student Organizations

Students living in Powell Hall hold membership in the Powell Hall Governing Association. The purpose of this association is to deal with all matters pertaining to residence in the hall.

Students in basic professional and practical nursing programs have representation on the School of Nursing College Board which co-operates with the School of Nursing faculty in student affairs. This College Board is made up of elected members and College Board appointees to the All-University Congress and the Minnesota and Third District Student Nurse Councils. The responsibilities of the board include the consideration of matters affecting students in the School of Nursing and the appointment of student representatives to faculty committees. Any student in the School of Nursing is eligible to become a member of the College Board.

Nominal dues are paid upon entrance to the School. The College Board usually sends a representative to the meetings of the American Nurses' Association, the National League for Nursing, the Minnesota Nurses' Association, the Minnesota League for Nursing, and the International Council of Nurses.

Student Personnel Services

Orientation and Counseling Program—To receive maximum benefit from the educational programs of the University, many students need individual assistance in their professional or personal adjustments. Students in all of the nursing curricula are encouraged to become familiar with and make full use of the many personnel services of the University. Handbooks and bulletins containing helpful information concerning these services are issued to students at the time of entrance. The week before the opening of the fall quarter is set aside as Welcome Week. Participation in the activities scheduled at that time helps to orient the students to the academic and social world they are entering.

Throughout the student's enrollment in the University, such facilities as the Student Counseling Bureau, the Speech and Hearing Clinic, and the Students' Health Service are available as sources of aid in individual problems. For description of these facilities, the student is referred to the *Bulletin of General Information* and the *Moccasin*.

Faculty advisers and a counselor who devotes full time to student activities and problems make every effort to become personally acquainted with students in order to help them evaluate and make use of the offerings of the University in relation to their own specific needs and to the requirements of their professional experience.

Activities—The Student Activities Bureau, with headquarters in 114 TSMa, exists to aid all students. During the quarters in the School of Nursing, students take part in any campus activities that can be satisfactorily fitted into their professional program. (See *Bulletin of General Information* and the *Moccasin*.)

Coffman Memorial Union, the center of student activities on the campus, is open to all students. Among the many facilities provided by this modern building are ballrooms adequate for student social affairs, committee and general meeting rooms for student organizations, lounges, luncheonette, fountain grille, and a cafeteria.

The leading student organization of the School of Nursing is the College Board (see Student Organizations). Students in nursing are eligible for membership in honorary and social societies.

Students plan frequent informal teas and parties and any form of recreation which interests them and which can be wisely undertaken in addition to their nursing duties. Alpha Tau Delta and Sigma Theta Tau, the two national nursing organizations which have chapters at the University of Minnesota, have monthly meetings and sponsor various professional and social activities.

Health—Students in all nursing curricula are entitled to the same privileges for health care as are other University students. This includes an entrance physical examination by the Students' Health Service and opportunity for advice and treatment at the Health Service (see *Bulletin of General Information*). It should be noted that there are charges in connection with special services or hospitalization. Before entering the School of Nursing students should be vaccinated for smallpox and immunized against diphtheria and typhoid fever.

Some special provisions apply to students in the basic professional curricula. Those who take their prenursing work at the University of

Minnesota are urged to bring any special health problems to the attention of the Health Service physicians early in the prenursing period in order that advice and treatment may be given before the beginning of the clinical period. Students whose physical condition will not permit admission to the School of Nursing can thus replan their programs toward more suitable goals without waste of time. Upon entrance to the School of Nursing, the applicant must pass satisfactorily the physical examination, including dental examination, given by the Students' Health Service. Students whose conditions need further observation may be admitted tentatively but must cancel later if findings prove them physically unfit for nursing. The increasing emphasis on the maintenance of health and the prevention of disease necessitates that the nurse herself be physically fit.

All students receive periodic physical examinations. From the beginning of clinical assignment, each student receives a photofluorogram quarterly. In addition a Mantoux test is given to all students on entrance, and to negative reactors preceding and following tuberculosis nursing experience. Positive reactors are given chest X rays at these times. A complete physical examination is given on completion of the course, including a chest X ray for students having a positive Mantoux reaction. Students will have chest X rays as often as necessary for the protection of the students and the hospitals.

Through the Students' Health Service, a special examination of students' feet is made and recommendation made for desirable type of shoes and, when indicated, for corrective foot exercises. Students about whom it is decided that tonsillectomy or other surgery was indicated before admission to the School, or students under care of private physician for some minor complaint which does not interfere with the practice of nursing but requires continued treatment, may be asked to pay for this care by the physician or surgeon of their choice.

Except in unusual circumstances, a regular student in the basic professional curricula in the School of Nursing who is disabled by continued illness shall be referred to her home or family as soon as she may be safely discharged from the hospital and permitted to travel, and shall thereafter be eligible for reinstatement under the same rules as apply to any other student. In any case, students must meet the cost of hospital care which is in excess of one month per year of residence in the School.

As a measure of promotion of health and of prevention of illness, students are allowed, during their course, twenty-one school days of illness without being required to make up the time lost. Exception to this rule may be necessary if a student loses more than one week from any one clinical service.

Housing—Students in the basic professional curricula provide their own maintenance through the first two quarters in the School of Nursing and during the eight weeks of public health nursing experience. They may live at home or in any University-approved residence for the first two quarters in the School. Students needing help regarding housing should consult the Student Housing Bureau, 209 Eddy Hall, University of Minnesota, Minneapolis 14. During the last eight quarters of the program maintenance is provided in the various hospital nurses' and approved private residences. The University of Minnesota Hospitals houses students in the Louise M. Powell Hall, situated on ground overlooking the Mississippi River in the group of campus medical buildings. The Charles T. Miller Hospital has several attractive residences. While assigned to Glen Lake Sanatorium, students are housed in an attractive building a short distance from the main hospital. Dining rooms for students are under the direction of qualified dietitians. Rooms are supplied

with all necessary furnishings, including linen. Each residence has a qualified director in charge. The rules governing the residences are made in accordance with University policies and carried out with the joint approval of the faculty of the School of Nursing and the School of Nursing College Board.

Students in all advanced professional curricula and in practical nursing curricula provide their own maintenance throughout their entire program. They may live at home if within easy commuting distance. Room and board may be had in University dormitories, nurses' residences, or approved local rooming houses near the University.

Employment—Students in the basic professional curricula may carry outside employment through the first two quarters in the School of Nursing. However, they are advised to confer with their faculty adviser regarding the number of credits they should take. Some students earn room and board in return for services in private homes; others work for hourly wages in various types of employment. If outside employment is desired, students are advised to consult with the Student Employment Bureau, 153 TSF.

Students in practical nursing who wish to carry outside employment are advised to confer with their faculty adviser regarding the number of hours they should work. They also may use the Student Employment Bureau, 153 TSF.

Part-time employment in Minneapolis or St. Paul hospitals is occasionally available for graduate nurses attending the University. Application for such employment should be made to the Counseling and Placement Service, Minnesota Nurses' Association, 2395 University Avenue, St. Paul 4. The University Hospitals (on campus) can usually arrange for a limited number of graduate nurses who are attending the University to do special duty nursing in the hospitals on weekends or evening hours. Part-time work also is available in fields other than nursing through the Civil Service Personnel Office, University of Minnesota. Graduate nurses who are carrying a full program of class work are strongly urged not to carry outside employment. Students planning to accept part-time employment should consult their major advisers so that hours of employment do not interfere with time needed for conferences, field trips, etc. They should also consider the advisability of carrying less than the full academic load when carrying part-time employment.

Placement Service—The School of Nursing processes the application of senior students and graduate nurses for the Professional Counseling and Placement Service of the American Nurses' Association. The Counseling Service has national offices in New York and Chicago. Each state nurses' association maintains a local counseling and placement office as part of the professional service program of the association. No charge is made to members of the American Nurses' Association. Nurse non-members and licensed practical nurses may register with the Counseling and Placement Service, Minnesota Nurses' Association, for a nominal fee. Counseling and placement may then be obtained at no further cost.

Scholarships, Loans, Prizes

Should you need financial aid or advice, contact should be made with the Bureau of Student Loans and Scholarships in 201 Eddy Hall.

Sally Richards Memorial Loan Fund—Qualified students in any sequence in nursing are eligible for loans from the Sally Richards Memorial Loan Fund.

Richard Olding Beard Loan Fund—The alumnae of the University of Minnesota School of Nursing have made available through the Endow-

ment Fund a sum of \$150 to be used as a loan to graduates of the School for further academic study. The recipient must have had one year of successful nursing experience following graduation.

Minnesota League for Nursing Loan Fund—The Minnesota League for Nursing has made available the sum of \$500 to be used as a loan to qualified graduate nurses for the purpose of further academic study.

Louise M. Powell Prize—A gift of \$50 annually from the Alumnae Association of the School of Nursing for the establishment of the Louise M. Powell Prize of \$25 is awarded to that member of the March and August graduating classes in the School of Nursing who has attained the highest degree of efficiency in practical work.

State Scholarships—The Minnesota Legislature has provided scholarships not to exceed \$600 for students in professional nursing and \$300 in practical nursing. Awards are made to residents of the state on the basis of need and ability. Students must have been accepted in the School of Nursing before they can be recommended for scholarships. Students accepting scholarships are to practice nursing at least one year in Minnesota upon completion of the program.

Marion L. Vannier Scholarship—A gift of \$100 annually from the School of Nursing College Board provides for the Marion L. Vannier Scholarship. The recipient of this scholarship must be a graduate of the School of Nursing or be a senior within four quarters of graduation.

Katharine J. Densford Scholarship—This scholarship fund was established by the faculty of the School in 1949 on the occasion of the fortieth anniversary of the founding of the School of Nursing. It provides annual scholarships of \$100 each for deserving students in any nursing program.

Greater University Fund Scholarship—Scholarships ranging from \$150 to \$400 are awarded freshmen entering from Minnesota high schools on the basis of scholarship, character, leadership, vocational and academic promise, and relative need. Applications should be made through Minnesota high school principals.

Alpha Tau Delta Scholarship—Alpha Tau Delta, national nursing society, grants an annual scholarship of \$100 in honor of Esther M. Thompson, class of 1925. Any nurse student in good standing registered in the School of Nursing, the School of Public Health, the College of Education, or the Graduate School is eligible.

Sigma Theta Tau Scholarship—Sigma Theta Tau, national scholarship society in nursing, provides an annual scholarship of \$100 for a deserving student in basic professional nursing.

Minnesota Department of Public Welfare Scholarship—A limited number of stipends for graduate nurses for the certificate program in psychiatric nursing will be available from the Department of Public Welfare of the State of Minnesota, 117 University Avenue, St. Paul. Admission to the University is required for eligibility to apply for the scholarship.

U. S. Army Nurse Corps Scholarships—For students in professional nursing programs within one calendar year of completing requirements for a Bachelor's or Master's degree. This year comprises one of the three years of Army Nurse Corps enlistment, with yearly salary comparable to that of second lieutenant.

U. S. Public Health Service Mental Health Stipend—Annual stipends of \$1,600 for undergraduate and \$2,000 for graduate study in psychiatric nursing for graduate nurses are available on a competitive basis.

Other Scholarships and Loan Funds—Students are eligible, after two quarters of satisfactory work in the University, to apply for loans from the University loan funds.

In many communities some financial aid to students is available through churches, women's clubs, medical and medical auxiliary groups, American Legion, and service groups such as Rotary, Kiwanis, Zonta, Quota. Students interested should explore local resources.

Many of the district and state nursing associations have established scholarships and loan funds for graduate nurses wishing to take University work. Certain graduate nurses are also eligible for scholarships of the national nursing organizations.

Uniforms

Students in the basic professional curricula pay approximately \$75 for their complete set of uniforms. This charge is payable during the first quarter in the School of Nursing when the order is sent to the manufacturer. At the time uniforms are purchased, students should provide themselves with name tapes for all pieces which are to be laundered. One hundred name tapes should be sufficient.

Students in practical nursing pay approximately \$50 for a complete set of uniforms.

Students in all curricula are expected to be in uniform when having experience or observation in the care of patients. They are responsible for supplying their own uniforms and for having them laundered.

Estimated Costs

Students should refer to the *Bulletin of General Information* for information regarding costs. All students provide their own uniforms (as indicated above), pins, and transportation to and from classes and to and from assigned observation and nursing practice areas. Students in practical nursing should make their estimates on a four-quarter basis. Students in basic professional nursing should make estimates for their ten quarters in the School of Nursing as follows: First two quarters, all usual expenses including maintenance; subsequent eight quarters, all expenses except maintenance. During the eight weeks of field experience in public health nursing which occurs during the last two quarters of the course, the student provides maintenance and travel expenses. Graduate nurse students should make estimates on the basis of the number of quarters required for completion of their program.

Registration and Grade Reports

While in the School of Nursing, students register each quarter and receive grades in accordance with the general University plan.** The passing grades are A, B, C, D. The grade of F in a course indicates failure. A failure in a required course must be removed by repeating the course as soon as it is offered. When a student does not complete the work of a course for any reason, one of several symbols is used to indicate the student's status.

Students in the basic professional curriculum are governed during the prenursing portion of the program by the regulations of the College of Science, Literature, and the Arts in regard to registration, grades, credits, and honor points. Students in advanced professional curricula are governed by the regulations of the college in which they are registered in regard to registration, grades, credits, and honor points.

** Necessary changes in registration are made by filling cancellation forms in the School of Nursing office. Prior to the end of the sixth week in a quarter the student may cancel registration in any course without grade.

Requirements for Graduation

The Board of Regents of the University of Minnesota, upon recommendation of the faculty of the School of Nursing, confers the degree of bachelor of science in nursing upon those students who have completed satisfactorily 255 credits and have met the requirements of the bachelor of science program in nursing as outlined.

The Board of Regents of the University of Minnesota, upon recommendation of the faculty of the School of Nursing, confers the degree of bachelor of science in professional nursing upon those students who held a B.S. or a B.A. degree at the time of entrance to the School of Nursing and who subsequently complete satisfactorily the two-and-one-half-year curriculum.

The bachelor of science degree in nursing education or nursing administration will be granted those graduate professional nurses who have completed satisfactorily the requirements for this degree as outlined for the nursing education area or the nursing administration area.

The master of education degree and the master of nursing administration degree will be granted those graduate professional nurses who have completed satisfactorily the requirements for these degrees.

Upon satisfactorily completing the requirements of the certificate curriculum in psychiatric nursing, in practical nursing, and in practical nursing and home management, a certificate is issued to the student from the Office of Admissions and Records.

State Registration

To practice as a registered nurse in the state of Minnesota, it is necessary to be licensed. Students completing the bachelor of science program in professional nursing are eligible at the age of 20 years to take the state board examination given by the Minnesota Board of Nursing. Successful passing of this examination entitles the nurse to registration in Minnesota and makes her eligible for membership in her district, state, and national nursing organizations. Registration for professional practice is done on an individual application and qualification basis. Graduates from the University of Minnesota School of Nursing are eligible for registration in any part of the United States.

To practice as a licensed practical nurse in the state of Minnesota, it is necessary to be licensed. Students completing the practical nursing curricula are eligible to take the state board examination given by the Minnesota Board of Nursing. Successful passing of this examination entitles the individual to practice in Minnesota as a licensed practical nurse.

Curricula

The following curricula are offered by the School of Nursing and associated divisions of the University. The admission requirements, required courses, and other items of information for each curriculum are described in Section II of this bulletin. Change in courses offerings and requirements are made from time to time. These appear in the quarterly *Class Schedule* and the Official Daily Bulletin of the University. During the registration period, students planning to register in any of the following curricula are urged to consult their advisers in the School of Nursing:

Basic Curricula in Nursing

Advanced Curricula in Nursing

Bachelor of science program in nursing education

- Bachelor of science program in nursing administration
- Master of education program in nursing education
- Master of nursing administration program
- Certificate program in psychiatric nursing
- Practical Nursing Curricula
 - Four-quarter program in practical nursing
 - Six-quarter program in practical nursing and home management

General Extension Courses

The School of Nursing offers through the General Extension Division certain evening classes to meet the need of employed graduate nurses. These are of necessity taught chiefly in Minneapolis and St. Paul. A limited number can be offered outside of the Twin Cities. (See *Bulletin of Evening and Special Classes.*)

Graduate nurses not regularly enrolled in a program leading to a Bachelor's degree may later apply credits earned in certain of the Extension offerings toward a degree if they become regular students. Students regularly enrolled in the College of Education or the School of Nursing must file a petition with the Committee on Student Scholastic Standing for permission to take, for credit, classes offered by the General Extension Division. Graduate nurses wishing to apply Extension courses toward a degree are urged to apply for admission and consult with an adviser in the School of Nursing.

The School of Nursing carries responsibility for the instruction in selected nursing practices of students in X-ray technology.

The School of Nursing also participates in the planning and implementation of instruction of Minneapolis General Hospital School of Nursing students during their first two quarters of residence.

Refresher Courses

From time to time when there is evidence of unusual community needs, the School of Nursing offers refresher courses for groups of graduate nurses who have not been engaged in professional practice for a comparatively long period of time. At any time, the School of Nursing is happy to advise individual graduate nurses who feel the need of re-orientation to professional practice because of having been inactive for a period of time or because their recent practice has been in another country.

Summer Session Courses

The University of Minnesota offers courses during two terms of the Summer Session, during which period students may complete approximately 18 credits of work in prenursing subjects or advanced professional curricula. Courses usually offered cover such subjects as clinical nursing, ward administration, teaching supervision, personnel programs, administration in schools of nursing, and nursing services. It is customary also to offer courses not usually available during the academic year that are of special interest to graduate nurses, with the exception of courses restricted to students registered in required sequences. The courses for graduate nurses are offered only in the first term. Graduate nurses who wish to study during both terms should plan to include desired nursing courses in the first term and courses in education and other related fields during the second term. Faculty advisers are available throughout both terms. A special summer announcement describing these courses may be had upon request to the Summer Session office.

Courses for Nurses from Other Countries

All nurse applicants from countries other than the United States must send application and credentials to the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Nurses qualified for the regularly offered curricula may register for credit toward a degree. Nurses who do not qualify for admission to any of the curricula described may, by special arrangement, be admitted to courses and experiences to meet their individual needs. These courses and experiences will not necessarily carry credit toward a degree or certificate. Ability to read and write English and to understand spoken English is essential.

Section II—CURRICULA

A. BASIC PROFESSIONAL CURRICULA IN NURSING

1. Bachelor of Science Program in Professional Nursing

Purpose—This program aims to prepare nurses for beginning positions in professional nursing under supervision in all areas.

Admission—The ten-quarter basic professional program in nursing constitutes the major in the sixteen-quarter curriculum leading to the bachelor of science degree in professional nursing. Admission to the major is open to men and women who meet the prenursing requirements.

Prenursing Requirements—95 quarter credits (64 semester credits) in general education courses taken in an accredited college or university with a C average (1.0 honor point ratio).

(Credits shown in parentheses)

Engl. A-B-C, Comp. 4-5-6, or Comm. 1-2-3 (9-15)	Psychology (6)
Pub.H. 3B (2)	Child care, child psychology, or child development (3)
Zool. 14-15** or Zool. 1-2-3 (6-10)	Nutrition (2)
In.Ch. 1-2, or In.Ch. 4-5 (8-15)	Physical Education (5)
Sociology or social science (9-12)	Electives (25-40)
History or political science or economics (5)	Total (95††)

Students who take the prenursing credits in the College of Science, Literature, and the Arts at the University of Minnesota must meet entrance requirements of that college. (See *Bulletin of General Information*.) They should, before registering each quarter, review their programs with an adviser in the School of Nursing. Students may enter the University any quarter, including the Summer Session terms.

A suggested six-quarter program in the College of Science, Literature, and the Arts follows:

FIRST YEAR

Fall	Winter	Spring
Engl. 4f or Af or Comm. 1f	Engl. 5w or Bw or Comm. 2w	Engl. 6s or Cs or Comm. 3s
Zool. 14	Zool. 15	Sociology or social science
Physical education	Physical education	Physical education
Electives††	Electives††	Electives††

SECOND YEAR

Fall	Winter	Spring
Psy. 1f	Psy. 2w	Sociology or social science
In.Ch. 4	In.Ch. 5	History or political science
History or political science or economics	Sociology or social science	or economics
Physical education	Physical education	Pub.H. 3B
Electives††	Electives††	Electives††

At the time of entrance to the School of Nursing the student must pass satisfactorily a physical examination by the Students' Health Service.

Students may enter the School of Nursing at the beginning of fall or spring quarter.

Students planning to transfer from the College of Science, Literature, and the Arts to the School of Nursing should make application for transfer at the Office of Admissions and Records.

** Preferred courses.

†† Quality credits earned in the University of Minnesota College of Science, Literature, and the Arts may be used as elective credits for transfer to the School of Nursing.

‡‡ Electives should be chosen to make, on the average, a program of 16 credits per quarter.

Students entering the School of Nursing from other colleges should obtain application materials from the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Completed applications, including transcript of college credits, birth certificate, and photograph must be returned to that office.

Applications for admission to the School of Nursing are reviewed by the admissions committee of the School on an individual basis.

Students applying for state scholarships should process their applications early. Tentative acceptance, pending satisfactory completion of all prerequisites, may be made for scholarship purposes.

Course Requirements in Major in Basic Professional Nursing—

Course No.	Title	Clinical Assignment	Credits	Quarter
<i>Biological Sciences</i>				
Anat. 4	Elementary Anatomy		5	1st
Bact. 53	General Bacteriology		5	2nd
Phcl. 9-10	Pharmacology		4	2nd-3rd
Ph.Ch. 50	Physiological Chemistry		4	1st
Phsl. 60	Human Physiology		6	2nd
<i>Social Science and Public Health</i>				
Soc. 91	Case Method Applied to the Study of Human Problems		3	3rd
Pub.H. 62-63	Principles of Public Health Nurs- ing		10	6th-7th
Pub.H. 100	Elements of Preventive Medicine and Public Health		5	5th
<i>Nursing</i>				
Nurs. 17-18	Introduction to Clinical Nursing ...	Selected Experiences	11	1st-2nd
Nurs. 50-51	Medical and Surgical Nursing	24 weeks	24	3rd-4th
Nurs. 54	Pathology		2	4th
Nurs. 55	Introduction to Communicable Dis- ease		1	4th
Nurs. 56	Nursing in the Operating Room	6 weeks	6	5th, 6th
Nurs. 58	Orthopedic Nursing	2 weeks	2	5th, 6th, 7th
Nurs. 59	Gynecologic Nursing	4 weeks	4	5th, 6th, 7th
Nurs. 60-61	Maternal and Child Nursing	24 weeks	24	5th, 6th, 7th, 8th
Nurs. 66 or N.Psy. 171	Neuropsychiatric Nursing		4	5th, 8th
Nurs. 67	Principles of Psychiatry and Neu- rology		4	5th, 8th
Nurs. 67	Nursing Care of Neuropsychiatric Patients	12 weeks	8	5th, 8th
Nurs. 79	Tuberculosis Nursing	2 weeks	3	9th, 10th
Nurs. 87	Field Experience in Public Health Nursing	8 weeks	10	9th, 10th
Nurs. 88	Rural Nursing	4 weeks	5	9th, 10th
Nurs. 96	Nursing in the Out-Patient Depart- ment	4 weeks	5	9th, 10th
Nurs. 97	Medical and Surgical Nursing	6 weeks	7	9th, 10th
Nurs. 98	The Nursing Profession		3	8th
Nu.Ad. 50	Nursing Administration		1	9th, 10th
	Total credits		162	

The student has most of the clinical experiences, which are an essential part of the courses in nursing, in the University of Minnesota medical center. The University of Minnesota medical center, situated on the Minneapolis Campus, includes the Mayo Memorial, the Elliot Memorial Hospital, the Cancer Institute, the Todd Memorial, Eustis Children's Hospital, the Variety Club Heart Hospital, and the Psychopathic Hospital. They are supported by state appropriations, endowments, gifts, Federal and other special grants, and income from patients. They care for patients referred from all parts of the state. The daily average of in-patients for

the year 1954 was 437; the number of out-patient visits was 101,101. Of this number 16,924 were new patients and 84,179 were revisits.

Other hospitals and agencies are also used for observation and experience. The Nursery School of the University is used for the observation of normal children. The Charles T. Miller Hospital in St. Paul provides experience in nursing care of private and semiprivate patients, patients with diseases of the eye, and maternity patients. The Hennepin County Tuberculosis Sanatorium at Glen Lake offers two weeks of observation and instruction. The Visiting Nurse Service of Minneapolis, the Family Nursing Service of St. Paul, and the State Department of Health give selected field experiences in urban and rural community public health agencies. Gillette State Hospital for Crippled Children is being utilized for additional observation and experience in orthopedic conditions. Many other health and community agencies are used for observation and experience, particularly in the field of public health nursing.

During the ten quarters of the basic professional program the student has ten weeks of vacation. The time allowed for illness is three weeks. Exception to the illness allowance may be necessary if a student is absent through illness for more than one week of a clinical assignment.

Progress in School—In the professional school the necessity for having a thorough foundation of knowledge for each new subject and clinical experience requires that the student satisfactorily complete the work of each quarter before registering for the succeeding quarter. A student is considered to be making satisfactory progress toward graduation as long as she has (1) received a passing grade in each required subject, and (2) received an average of C for the total credits completed. In special circumstances and with the permission of the Committee on Student Scholastic Standing a student may repeat courses in order to raise her honor point average to the necessary level for continuation in the basic nursing program.

A student who misses more than a third of a course or assigned clinical experience through illness or leave of absence may be required to cancel the entire quarter's work. In unusual circumstances it may be necessary for the student to discontinue her program for more than one quarter until such time as the classes and clinical experiences are again offered.

2. Program in Professional Nursing for College Graduates

Admission—Applicants with a Bachelor's degree from an accredited college or university are admitted to a ten-quarter program leading to the degree of bachelor of science in professional nursing. Application blanks may be obtained from the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Each applicant must file with the Office of Admissions and Records an application blank and an official copy of college credits. Applicants who hold a degree from the University of Minnesota file application blanks only. Upon admission to the University the student registers in the School of Nursing.

College graduates should have completed the following prenursing courses or their equivalent: English or communication (9-15 cred.); Pub.H. 3, Personal Health (2 cred.); general zoology (6-10 cred.); chemistry (8 cred.); sociology or social science (9 cred.); history, political science, or economics (5 cred.); psychology (6 cred.); child care, child psychology, or child development (3 cred.); nutrition (2 cred.); and physical education (5 cred.). Applicants not meeting all prenursing course requirements receive special consideration on an individual basis.

During the first two quarters of the program, often referred to as preclinical quarters, the student has observations and experiences preparatory to the full clinical assignment of later quarters. While the student is registered for the two preclinical quarters, she provides her own maintenance at home, in dormitory, or other approved housing. When the student begins her clinical study and experience, she is assigned for residence to Powell Hall and later to hospital nurses' residences in other units. Throughout the clinical quarters, maintenance (board, room, and laundry) is provided, with the exception of the period during which the student is assigned to public health nursing field experience.

Sequence of Required Courses (credits shown in parentheses)

<i>First Quarter</i>	<i>Fourth Quarter</i>	<i>Seventh Quarter</i>
Anat. 4 (5)	Nurs. 51 (12)	Nurs. 61 (12)
Ph.Ch. 50 (4)	Nurs. 54 (2)	Pub.H. 63 (5)
Nurs. 17 (7)	Nurs. 55 (1)	
<i>Second Quarter</i>	<i>Fifth Quarter</i>	<i>Eighth Quarter</i>
Bact. 53 (5)	Nurs. 56 (6)	Nurs. 66 (4)
Phsl. 60 (6)	Nurs. 58 (2)	Nurs. 67 (8)
Phcl. 9 (2)	Nurs. 59 (4)	Nurs. 98 (3)
Nurs. 18 (4)	Pub.H. 100 (5)	
<i>Third Quarter</i>	<i>Sixth Quarter</i>	<i>Ninth-Tenth Quarter</i>
Phcl. 10 (2)	Nurs. 60 (12)	Nurs. 79 (3)
Nurs. 50 (12)	Pub.H. 62 (5)	Nurs. 87 (10)
Soc. 91 (3)		Nurs. 88 (5)
		Nurs. 96 (5)
		Nurs. 97 (7)
		Nu.Ad. 50 (1)

B. ADVANCED PROFESSIONAL CURRICULA

Admission—Applicants for admission to the nursing education and nursing administration curricula must submit evidence of graduation from an accredited high school and school of nursing. Application blanks on which the high school and nursing records should be submitted may be obtained from the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Applicants are required to take a college aptitude test before they can be considered for admission. If the applicant has attended an accredited college or university, an official transcript of work taken should also be submitted. Applications and transcript should be sent directly to the Office of Admissions and Records, University of Minnesota, Minneapolis 14.

Credit toward the bachelor of science degree for professional nursing courses will be determined by the admissions committee which will indicate the number of credits allowed and any additional clinical services to be completed before credit is granted. Such clinical experiences should be completed in the summer following the sophomore year if the student elects a clinical minor; *they must be completed before the beginning of the senior year.* Forty-five credits represent approximately the average advanced standing granted for a satisfactory course of study in a hospital school of nursing; 53 credits for a course in hospital school having its prenursing sciences taught in the University of Minnesota; 55 credits for graduates of a three-year program of other university schools; and 60 credits for graduates of the University of Minnesota School of Nursing.

Applicants for admission to the certificate curriculum in psychiatric nursing must submit evidence of graduation from an accredited high school and an approved school of nursing and one year of successful nursing experience since graduation. Applicants are required to have had a minimum experience of three months in psychiatric nursing either as an undergraduate in a school of nursing or as a graduate nurse. Applicants are required to take a college aptitude test before they can be considered for admission. Final approval for admission is made by the

admissions committee of the School of Nursing on the basis of previous academic record, school of nursing record, and scholastic aptitude test scores. Students are registered in the School of Nursing.

Bachelor of science or bachelor of arts credits submitted as part of the admission requirements for professional Master's degrees (for example, master of education or master of nursing administration) will be reviewed, and recommendations regarding the student's program made on the basis of the general and professional education included in the Bachelor's program. In general, transfer credit for post-Bachelor's courses carried in other universities will not be granted toward the requirements of this degree. All records of courses taken by the applicant will, however, be considered in evaluating her qualifications for admission to the program. Persons who do not meet the usual requirements for admission to the program may, on special consideration, be admitted to selected course work.

In order to assist the School in evaluating the basic nursing knowledge of students in the advanced professional curricula, all students will be asked to take as a part of their admission procedure the Graduate Nurse Qualifying Examination of the National League for Nursing. This examination may be taken at the University of Minnesota Student Counseling Bureau or through the National League for Nursing, 2 Park Avenue, New York 16, N. Y. The fee for this examination is \$6, payable to the National League for Nursing. Students whose scores show inadequate knowledge in the clinical area they have chosen (e.g., medical nursing, pediatric nursing, etc.) may be asked to do supplementary work in that area.

Students register in the College of Education or the School of Nursing and conform to the regulations of the college in which they are registered relative to total credits and honor points.

Students registered in the bachelor of science curricula who plan to continue study after graduation should take into account, in the selection of electives, the specific prerequisites of the post-Bachelor's programs.

Clinical Experience—All advanced professional curricula projects in such areas as nursing care of patients, supervision, administration, and student teaching are carried out at the University of Minnesota medical center and other hospitals in Minnesota. All of the programs make use of additional community health and welfare facilities for providing broader opportunities for study.

1. Bachelor of Science Program in Nursing Education

Major advisers: Katharine J. Densford, Ruth Harrington,
Frances Dunning, Sibyl Norris

Purpose—This program is designed to prepare professional nurses for head nurse, clinical supervisory, and teaching positions in hospitals, clinics, health services, schools of professional and practical nursing, and for other positions in which an understanding of educational principles and practices is needed.

Advanced standing granted to graduate nurses for basic nursing courses usually places the beginning graduate nurse student in the sophomore class. Courses of a general cultural nature and courses prerequisite to education courses and to other Senior College courses should be taken in the sophomore and junior years. Courses in clinical nursing should be taken in the junior year. Students who have included in the advanced standing blanket credits for college or university courses in the basic biological sciences of anatomy, bacteriology, chemistry and physiology; English or communications; psychology; and sociology are exempt from

the comparable course requirements listed below. Such exemption does not reduce the total number of 186 credits required for graduation.

General Requirements (credits shown in parentheses)

Comm. 1-2-3—Communication; or Engl. A-B-C—Freshman English; or Comp. 4-5-6—Freshman Composition; (9-15) or exemption	Physical education (5) Psy. 1-2—General Psychology (6) Science** (4-6) Sociology or social science (6-8)
C.W. 40—Child Training; or C.W. 80—Child Psychology (3)	

Course Requirements for the Nursing Education Major—Of the following courses, Ed. 55N, Nu.Ed. 69, and clinical nursing courses may be taken in the junior year. In the case of students entering the program with senior standing, these courses should be taken in the first two quarters of the senior year. All other courses here listed should be taken in the senior year.

(Credits shown in parentheses)

Ed. 55N—Introduction to Teaching Nursing (5)	Nu.Ed. 171—The Curriculum of the School of Nursing (3)
Ed.T. 51A,B*—The Teaching of Nursing (10)	H.Ed. 180—The School and the Social Order (3)
NuAd. 160—Ward Administration (5)	Clinical nursing (12)
Nu.Ed. 69—Survey of Conditions and Trends in Nursing (3)	Electives in nursing, nursing education, or nursing administration (3)
	Total (44)

The following sequence of courses for the senior year is suggested:

Ed. 55N (5)	Ed.T. 51A (4)	Ed.T. 51B (6)
Nu.Ed. 69 (3)	Nu.Ad. 160 (5)	Nu.Ed. 171 (3)
H.Ed. 180 (3)	Major elective (3)	Electives (6)
Electives (4)	Electives (3)	Total (15)
Total (15)	Total (15)	

For students entering the program with senior standing, the following sequence is usually possible:

Ed. 55N (5)	Ed.T. 51A (4)	Ed.T. 51B (6)
Nu.Ed. 69 (3)	Nu.Ad. 160 (5)	Nu.Ed. 171 (3)
Clinical nursing (8)	Clinical nursing (5)	H.Ed. 180 (3)
Total (16)	Major elective (3)	Elective (3)
	Total (14-17)	Total (15)

The graduate nurse has usually from 50 to 60 elective credits available in the bachelor of science curriculum. These electives may be chosen from any course offerings in the University for which the student meets the prerequisites. It is appropriate to elect courses in natural sciences, social sciences, humanities, arts, anthropology, philosophy, and other fields of special interest to the student. The graduate nurse will also wish to review the elective offerings of the nursing education department and other related professional fields such as education, public health, and child welfare. In addition to elective course offerings which meet her need for general studies and studies in fields related to nursing she may elect a minor in clinical nursing, ward administration, or child development. A description of the available minors follows:

Course Requirements for the Child Development Minor—Minor advisers, Elizabeth Fuller, Doris Mae Salem.

* Requirements for registration in Ed.T. 51A-B are (1) A passing grade in Ed. 55N. (2) Taking College of Education Test Battery. (3) Attainment of an honor point average of 1.5 in completed courses in the nursing education major, including the field in which practice teaching is to be done. A major portion of the work in the teaching field should be completed. (4) A satisfactory rating on the required speech test. (5) Completion of required clinical experience.

** A minimum of 4 credits in biological sciences is required, to be selected from the following fields: anatomy, bacteriology, physiology, physiological chemistry, and zoology (other than Zool. 1-2-3 or 14-15). General Inorganic Chemistry (In.Ch. 1-2, 4-5, or 6-7) and General Zoology (Zool. 1-2-3, or 14-15) are highly recommended and are prerequisite to many courses in biological sciences.

The child development minor is designed to provide background for the nurse and the nurse teacher in the normal development and care of children.

(Credits shown in parentheses)

C.W. 40—Child Training (3)	Ed.T. 59—Methods and Observation in the Nursery School (3)
C.W. 80—Child Psychology (3)	Ed.T. 77—Student Teaching in the Nursery School (5)
Choice of either C.W. 130-131-132 (9 cred.), or C.W. 140-141-142 (7 cred.)	One of the following:
C.W. 130—Motor, Linguistic, and Intellectual Development of the Child	Ar.Ed. 17—Pictorial Expression for Elementary Education (3)
C.W. 131—Personality, Emotional, and Social Development of the Child	Ar.Ed. 18—Design Activities for Elementary Education (3)
C.W. 132—Later Childhood and Adolescence	Ed.T. 57—Nursery School-Kindergarten Laboratory in Art, Literature, and Social Studies (5)
C.W. 140—Behavior Problems in Younger Children	Total (24-28)
C.W. 141—Behavior Problems in Older Children and Adolescents	
C.W. 142—The Psychology of Atypical Children	

Course Requirements for the Ward Administration Minor—Minor adviser, Margaret F. Grainger.

The ward administration minor is designed to provide the student with theoretical background and supervised ward experience in the activities and responsibilities of the hospital head nurse.

(Credits shown in parentheses)

Nu.Ad. 67—Field Practice in Ward Administration (6) or Nu.Ad. 167—Studies and Experience in Ward Administration (8)	Nurs. 165—Analysis of Nursing Care (4)
	Total (10-12)

Course Requirements for the Clinical Minor—Minor adviser, Myrtle H. Coe.

The clinical minor is designed for those students who plan to take positions in a specific clinical area.

All students in the major in nursing education have student teaching related to nursing care of patients in the senior year. The clinical minor affords opportunity for those who wish to include in their curriculum advanced study in one of the clinical fields to gain an enriched clinical background during the year preceding the teaching experience. Whereas the 12 credits of study in clinical nursing required in the nursing education major are designed to provide a core of knowledge fundamental for the student in her student teaching, the clinical minor, with 18 credits in clinical nursing and from 23 to 35 total credits, provides opportunity for (1) more extensive investigation of patient needs in the chosen specialty; (2) more varied experiences in learning measures available for meeting the needs of the patient and the role of the nurse in relation to each; and (3) more adequate opportunity to acquire any new skills which may be included in the clinical courses.

Students interested in a clinical minor should consult the minor adviser very early in their program of study. The sequence of required courses is such that early planning is necessary to avoid undue prolongation of the program.

The student should elect a clinical minor as early in her program as possible, preferably no later than the first quarter of the junior year. A minimum of five quarters is needed to arrange the sequence of required courses in the nursing education major and a clinical minor. A student who elects a clinical minor at a point in her program with less than five quarters remaining to complete the total credit requirements for the bachelor of science degree in nursing education should expect to spend one or more additional quarters to complete the course requirements of the major. Students should note that the general requirement of a mini-

imum of 4 credits in biological sciences is usually taken during the sophomore year. The student is advised to select the particular science course in conference with the minor adviser. The choice will vary with the background of the individual student. In general the science of choice for students in medical, surgical, pediatric, and psychiatric nursing is physiology; in obstetric nursing is bacteriology or physiology; in operating room nursing is bacteriology.

In terms of the customary four-year academic curriculum leading to a bachelor of science degree in the College of Education, the freshman year credits may be considered earned by the advanced standing credits allowed for the School of Nursing basic course previously completed; the second, or sophomore year, in these clinical curricula consists of certain required courses and electives chosen with the field of interest in mind; in the junior year the student may choose advanced clinical study in any one of the following services:

Medical Nursing	Operating Room Nursing	Surgical Nursing
Nursing of Children	Psychiatric Nursing	Tuberculosis Nursing
Obstetric Nursing	Rural Hospital Nursing	

Students electing nursing of children are required to have completed a minimum of six weeks in pediatrics; those electing psychiatric nursing are required to have had a minimum experience of twelve weeks in psychiatric nursing; those electing tuberculosis nursing are required to have satisfactorily completed a basic course in tuberculosis nursing including clinical experience. Students who have not met these requirements must do so before the beginning of their junior year.

The following courses are required of all students electing a clinical minor:

(Credits shown in parentheses)

Nurs. 150—Foundations of Clinical Nursing Specialties (3)	Pub.H. 100, Elements of Preventive Medicine and Public Health (5)
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In addition to the above courses each student is required to select one of the clinical areas listed below and to complete all courses designated in that area:

(Credits shown in parentheses)

<i>Medical Nursing</i>	<i>Psychiatric Nursing</i>
Nurs. 151A-B-C—Medical Nursing (15)	Nurs. 155A-B-C—Psychiatric Nursing (15)
C.W. 166—Maturity and Aging (2)	Psy. 144-145—Abnormal Psychology (6)
<i>Nursing of Children</i>	<i>Rural Hospital Nursing</i>
Nurs. 154A-B-C—Pediatric Nursing (15)	Nurs. 156A-B—Rural Nursing (24)
C.W. 40—Child Training (3)	Soc. 14—Rural Sociology (3)
C.W. 80—Child Psychology (3) or C.W. 140—Behavior Problems of Younger Children (2)	<i>Surgical Nursing</i>
C.W. 132—Later Childhood and Adolescence (3)	Nurs. 157A-B-C—Surgical Nursing (15)
<i>Obstetric Nursing</i>	<i>Tuberculosis Nursing</i>
Nurs. 152A-B-C—Obstetric Nursing (15)	Pub.H. 60—Tuberculosis and Its Control (2)
Pub.H. 58—Maternal and Child Health (3)	Nurs. 158—Tuberculosis Nursing (15)
<i>Operating Room</i>	
Nurs. 153A-B-C—Operating Room Nursing (15)	

Clinical experience is chosen to meet the needs and major interests of each student. The hourly schedule of experience is planned on an individual basis to provide the best possible clinical opportunities compatible with the schedule of academic classes. Clinical courses include patient care, lectures, conferences, seminars, and tours, as well as observation or participation in work of the outpatient department, nursery schools, settlement houses, community health agencies, special hospitals, parent study groups, and other community organizations. Clinical study

is intended to emphasize scientific principles and the art of applying them to the problems of health and illness.

Amount and Quality of Work—A total of 186 credits and 186 honor points (the number of honor points must equal the number of credits), including the required courses in physical education, is needed for graduation.

In the course requirements for the nursing education major (44 credits) an honor point ratio of 1.5 (grade average of C+) is required. For admission to student teaching in nursing education, the student is required to have an honor point average of 1.5 in completed courses in the nursing education major, including courses in the field in which student teaching is to be done.

Residence Requirements—A minimum of 45 credits must be earned while in residence in the College of Education. Of these, 30 credits must be earned in the senior year. *These are minimum residence requirements for graduation, and thus for a degree.*

Correspondence courses and extension classes do not count as residence credits, excepting only extension classes offered in Minneapolis, St. Paul, or Duluth.

The required courses in nursing and education are arranged in a sequence for the junior and senior year and usually require six quarters for completion; except in unusual instances they cannot be completed in less than five quarters.

Degrees and Honors—Students who graduate from the College of Education receive the degree of bachelor of science. Those with outstanding grade records, at least a B average in student teaching, and a minimum of 45 credits completed in residence before the final quarter of the senior year, will be considered for graduation *with distinction* or *with high distinction*. These honors are not automatic, but are conferred upon favorable recommendation by the faculty. Application by the student is not necessary. Anyone entering the College of Education with a previously earned Bachelor's degree is not eligible for graduation with honors, since these awards apply only to students whose first four-year degree will be received from this College.

Application for a Degree—The student should obtain an application for a degree at the information window, and turn it in, filled out, at the professional colleges window, in the Office of Admissions and Records, during the last quarter of the junior year.

Senior Balance Sheet—The senior balance sheet is mailed to the student by the Office of Admissions and Records after application for a degree. It lists the required number of courses the student has completed, the total number of earned credits, the honor point ratio, and deficiencies that must be removed before the student may graduate. It is to be used by the student and the adviser in planning the remainder of the program.

Senior Physical Examination—It is the responsibility of the student to make an appointment at the University Students' Health Service and take the physical examination within one year of the date the degree is to be granted.

Unsatisfactory Work—Any student who is not making satisfactory progress in the nursing education curriculum may be placed on probation for one quarter by the Committee on Student Scholastic Standing. Unsatisfactory work in the College of Education is defined as follows:

1. Grades of D or F in 50 per cent of the work taken in any one quarter.
2. An average less than C (1 honor point for each credit taken) for all credits earned in any one year, and an average of less than C+ (1.5 honor points per credit) in courses in the major subject.

Students who fail to make satisfactory grades in their work after being on probation for one quarter may be dropped.

A student who is required to cancel registration in student teaching is not eligible for graduation with a major in nursing education.

2. Bachelor of Science Program in Nursing Administration

Major advisers: Katharine J. Densford, Ruth Harrington,
Isabel Harris, Margaret Grainger, Doris Miller

Purpose—This program is designed to prepare graduate nurses to assume, more adequately, nursing administrative positions such as team leader, head nurse, nursing supervisor, and administrative assistant.

Advanced standing granted to graduate nurses usually places the beginning graduate nurse student in the sophomore class. Courses in general education and courses prerequisite to Senior College courses should be taken in the sophomore and junior years. Courses in clinical nursing should be taken in the junior year.

Students who have included in the advanced standing blanket credits for college or university courses in English or communications, psychology, and sociology are exempt from the comparable course requirements as listed below. This exemption does not reduce the total number of 180 credits required for graduation.

General Requirements (credits shown in parentheses)

Comm. 1-2-3—Communication; or Engl.	Political science, history, or economics (5)
A-B-C—Freshman English; or Comp.	Psy. 1, 2—General Psychology (6)
4-5-6—Freshman Composition; (9-15) or exemption	Science, laboratory (4)
C.W. 40—Child Training; or C.W. 80—Child Psychology (3)	Soc. 1—Introduction to Sociology (3); Soc. 49—Social Problems (3)

Clinical Minor—A clinical minor in the field of the student's choice is required. (See description under Course Requirements for Clinical Minors.)

Course Requirements for the Nursing Administration Major (credits shown in parentheses)

Nu.Ad. 170—Foundations of Nursing Administration (3)	Nu.Ed. 69—Survey of Conditions and Trends in Nursing (3)
Nu.Ad. 175, 176—Elements of Nursing Administration (10)	Nu.Ed. 162—Personnel Work in Nursing (3)
Nu.Ad. 177—Practicum in Nursing Administration (15)	Elective in nursing, nursing education, nursing administration, or public health (3)
Nurs. 165—Analysis of Nursing Care (4)	Total (41)

Of these, Nu.Ad. 170, Nurs. 165, Nu.Ed. 69, and Nu.Ed. 162 may be taken in the junior year. In the case of students entering the program with senior standing, these courses and the clinical minor should be taken before the remaining courses in the nursing administration major.

Electives—25 quarter credits are to be chosen from fields outside of nursing and nursing administration. The total credit requirement, including necessary additional electives in general studies or professional courses, is 180 quarter credits.

Amount and Quality of Work—A total of 180 credits and 180 honor points is needed for graduation. In the administration major (41 credits) an honor point ratio of 1.5 (grade average of C+) is required.

For admission to field experience in nursing administration, the student is required to have an honor point average of 1.5 in completed courses in the nursing administration major and the clinical minor.

Residence Requirements—A minimum of 45 credits must be earned while in residence in the School of Nursing. Of these, at least 30 credits must be earned in the senior year. Correspondence courses and extension classes do not count as residence credits, excepting only extension classes offered in Minneapolis, St. Paul, or Duluth.

The required courses in nursing and administration are arranged in a sequence for the junior and senior years and usually require six quarters for completion; except in unusual instances they cannot be completed in less than five quarters.

Degrees and Honors—Students who graduate from this curriculum receive the degree of bachelor of science. Those with outstanding grade records (at least a B average in the administration major and at least a B in the field experience [Nu.Ad. 177]) and a minimum of 45 credits completed in residence before the final quarter of the senior year will be considered for graduation *with distinction* or *with high distinction*. These honors are not automatic, but are conferred upon favorable recommendation of the faculty. Application by the student is not necessary. Anyone entering the School of Nursing with a previously earned Bachelor's degree is not eligible for graduation with honors, since these awards apply only to students whose first Bachelor's degree will be received from this School.

Application for a Degree—The student should obtain an application for a degree at the information window, and turn it in, filled out, at the professional colleges window of the Office of Admissions and Records, during the last quarter of the junior year.

Senior Balance Sheet—The senior balance sheet is mailed to the student by the Office of Admissions and Records after application for a degree. It lists the required number of earned credits, the honor point ratio, and deficiencies that must be removed before the student may graduate. It is to be used by the student and the adviser in planning the remainder of the program.

Senior Physical Examination—It is the responsibility of the student to make an appointment at the University Students' Health Service and to take the physical examination within one year of the date the degree is to be granted.

Unsatisfactory Work—Any student who is not making satisfactory progress in the curriculum may be placed on probation for one quarter by the Committee on Scholastic Standing. Unsatisfactory work is defined as follows:

1. Grades of D or F in 50 per cent of the work taken in any one quarter.
2. An average less than C (1 honor point for each credit taken) for all credits earned in any one year, and an average of less than C+ (1.5 honor points per credit) in courses in the major.

Students who fail to make satisfactory grades in their work after being on probation for one quarter may be dropped.

A student who is required to cancel registration in the nursing administration practicum is not eligible for graduation with a major in nursing administration.

3. Certificate Curriculum in Psychiatric Nursing

Students are admitted to the certificate program in psychiatric nursing at the beginning of the fall quarter.

(Credits shown in parentheses)

Fall Quarter

Psy. A—Elementary Psychology; or Psy.
1 and 2, General Psychology (5-6)
Soc. 1—Introduction to Sociology (3)
Nu.Ad. 160—Ward Administration (5)
Nu.Ed. 72—Application of Principles of
Learning to Clinical Instruction (3)
Total (16-17)

Winter Quarter (Rochester State Hospital)

Nurs. 170—Psychiatric Nursing and the
Community (4)

Nurs. 145A—Principles of Psychiatric
Nursing (5)

Nurs. 145B—Field Practice in Psychiatric
Nursing (7)
Total (16)

Spring Quarter (Rochester State Hospital)

Nurs. 145C—Field Practice in Psychiatric
Nursing (15)
Total (15)

Community health and welfare facilities throughout the state provide opportunity for study. The major experience in the clinical area is in the Rochester State Hospital, Rochester, Minnesota.

Schedule of Hours and Vacations—Students in the certificate curriculum have a weekly class schedule comparable to that of students in other colleges of the University. In those courses which include clinical experience as part of the course, students have approximately two to three hours of clinical experience per week for each credit in the course.

Students have the same vacations and holidays as do other students in the University.

4. Master of Education Program in Nursing Education

Major advisers: Katharine J. Densford, Ruth Harrington,
Sibyl G. Norris

The purpose of the program is to prepare professional nurses for positions in educational programs in nursing—basic professional schools, graduate nurse clinical programs, and practical nursing programs—through a broad program of study and experience based upon undergraduate study and experience in nursing education.

The candidates for this program will have completed before admission a major in nursing education leading to a Bachelor's degree or will include the equivalent within the master of education program. Bachelor of science or bachelor of arts credits submitted as part of the admission requirements for this program will be reviewed, and recommendations regarding the student's program made on the basis of the general and professional education included in the Bachelor's program. In general, transfer credit for post-Bachelor's courses carried in other universities will not be granted toward the requirements for this degree. All records of courses taken by the applicant will, however, be considered in evaluating her qualifications for admission to the program.

In addition to the faculty and facilities of the School of Nursing the program utilizes other divisions of the University, as well as schools of nursing and educational programs in nursing within Minnesota.

The course of study is so organized as to provide a central group of courses in nursing education with an opportunity for study in related subjects. Emphasis is placed on the development of an understanding of human behavior, skill in guidance of learning, and effective functioning as nurse educator in schools of nursing and in educational and service agencies.

The program requires a minimum of 45 quarter credits distributed as follows:

(Credits shown in parentheses)

Nursing (5-10, minimum of 5)
Nursing education (12)
Education (9)

Field experience in teaching (8)
Electives (6-11)
Total (45)

Variation in the distribution of credits requires approval of the major adviser and the School of Nursing Committee on Graduate Students.

The following courses are required of all candidates and are arranged in a three-quarter sequence:

(Credits shown in parentheses)

Nurs. 190f—Foundations of Nursing (5)	Ed.C.I. 199Es—Internship (8)
Nu.Ed. 197Ew, 198Es—Advanced Teaching of Nursing (6)	

Other courses are to be selected by the student in consultation with a major adviser from course offerings numbered 100 and above. At least 6 of the elective credits must be selected from fields other than nursing and education.

Candidates who did not complete the following courses or equivalent in an accredited college or university will be required to include them in the master of education program.

(Credits shown in parentheses)

Nu.Ed. 171—The Curriculum of the School of Nursing (3)	Ed.T. 51A-B—The Teaching of Nursing (10)
Ed. 55N—Introduction to Teaching Nursing (5)	Introductory statistics (3)

Candidates must meet the general requirements for the master of education degree as described in the *Bulletin of the College of Education*, with the exception of a teaching minor in an academic field. Note that final comprehensive examinations in education are required.

Satisfactory completion of course work, field experience, projects, and comprehensive examinations in education is required for the granting of the degree. An honor point ratio of 2.0 (grade average of B) is required in the 45 credits of courses numbered 100 and above. A health examination must be taken within one year of the date the degree is to be granted.

5. Master of Nursing Administration Program

The purpose of the program is to prepare professional ~~nurses~~ for positions in nursing administration such as directors, assistant directors, and supervisors.

Bachelor of science or bachelor of arts credits submitted as part of the admission requirements for professional Master's degrees will be reviewed, and recommendations regarding the student's program made on the basis of the general and professional education included in the Bachelor's degree program. In general, transfer credit for post-Bachelor's courses carried in other universities will not be granted toward the requirements of this degree. All records of courses taken by the applicant will, however, be considered in evaluating her qualifications for admission to the program. Persons who do not meet the usual requirements for admission to the program may, on special consideration, be admitted to selected course work.

In addition to its own faculty and facilities the School utilizes other divisions of the University as well as hospital and other health agencies in the area.

The course of study is so organized as to provide a central group of courses related to nursing service administration with complementary instruction in such areas as public administration, educational administration, business administration, hospital administration, personnel administration, and public health administration. Emphasis is placed on the development of an understanding of human behavior and skill in handling people which is basic to the science of administration.

The course requires a minimum of 57 quarter credits distributed as follows:

(Credits shown in parentheses)

Nursing (3)	Related fields (15-17)
Nursing administration (16)	Electives (6-8)
Field experience in nursing service administration (15)	Total (57)

Variation in the distribution of credits requires approval of the major adviser and the School of Nursing Committee on Graduate Students.

The following courses are required of all candidates unless specifically exempted and are arranged in a four-quarter sequence:

(Credits shown in parentheses)

Nurs. 190f—Foundations of Nursing (3)	Pol. 121w—Municipal Administration (3) or
Nu.Ad. 191f, 192w, 193su—Principles of Administration Applied to Nursing Service Administration (16)	Pol. 131f, Public Administration (3)
Nu.Ad. 199Ds or 199Ss—Field Experience in Nursing Service Administration (15)	Econ. 161w—General Manpower Economic and Labor Problems (3)
Pub.H. 161f—History and Development of Hospitals (3)	Statistics (3-5)
	Total (46-48)

Other courses are to be selected by the student in consultation with a major adviser. At least 6 of the elective credits must be selected from fields other than administration. Students who are exempted from certain course requirements will have an increased number of elective credits available. A minimum of 45 quarter credits must be in courses numbered 100 and above.

Satisfactory completion of course work, field experience, projects, and examinations is required for the granting of the degree. An honor point average of 1.5 is required in 57 credits of course work, at least 45 of which are in courses numbered 100 or above, and an honor point average of 2.0 in the required nursing administration courses.

A health examination must be taken within one year of the date the degree is to be granted.

C. PRACTICAL NURSING CURRICULA

1. Practical Nursing Curriculum

Purpose—This program is designed to prepare practical nurses to give nursing service in institutions and homes under the supervision of professional nurses or of doctors.

Admission—The four-quarter practical nursing program is given on the Minneapolis Campus of the University of Minnesota. As part of their admission procedure all students take the National League for Nursing Preadmission and Classification Examination. This examination may be taken at the University of Minnesota Student Counseling Bureau, authorization being given by the University of Minnesota School of Nursing. The fee for this examination is \$3. Accompanied by the authorization of the School, the fee is sent to the National League for Nursing, 2 Park Avenue, New York 16, New York.

Applicants must be high school graduates or meet the requirements for admission to the University by examination as provided for in individual cases. (See *Bulletin of General Information*.) Application should be made, in writing, to the Office of Admissions and Records, University of Minnesota, Minneapolis 14. Application forms on which high school records should be submitted may be obtained from the Office of Admissions and Records, University of Minnesota, Minneapolis 14.

Application is open to men and women. Applicants may be either married or single and should be between 18 and 35 years of age. Those over 35 years of age will be considered on an individual basis. Applicants should submit a recommendation from the high school principal or counselor if they have been out of high school less than two years. Those who have been out more than two years may submit recommendation from an employer or other suitable person.

Students are entitled to the same privileges for health care as are other University students. This includes an entrance physical examination by the Students' Health Service and opportunity for advice and treatment at the Health Service. *Upon first registration in the School of Nursing* students should be vaccinated for smallpox and immunized against diphtheria and typhoid fever.

Applicants are admitted at the beginning of the fall quarter only.

Course Requirements—The student is enrolled for 12 to 15 credit hours per quarter, approximately one half of which is in general education courses. The remaining hours are in practical nursing courses, which include an average of twenty hours per week of laboratory experience in the care of patients.**

(Credits shown in parentheses)

G.C. 41—Practical Applications of Psychology (5); or G.C. 1A—Individual Orientation (4)	P.N. 5—Nursing Care in Special Situations (9)
G.C. 10A-B-C—Human Biology (9)	P.N. 6—Care of the Home (2)
G.C. 14—Normal Diet and Modifications (2)	P.N. 7—Personal and Vocational Relationships (1)
G.C. 42A—Human Development (3)	P.N. 10—Introduction to Mother and Infant Care (2)
G.C. 42B—Personal Adjustment (3)	P.N. 11—Introduction to Child Care (2)
P.N. 1-2-3—Elements of Nursing Care (12)	
P.N. 1A—Introduction to Practical Nursing (2)	

The student has clinical experience in the care of medical and surgical patients, mothers, babies, and children at the University Hospitals. Field trips and tours of public health facilities are planned to give students opportunity to see and understand complete health care. Additional experience in care of the aged and chronically ill is gained in convalescent homes and homes for the aged.

2. Practical Nursing and Home Management Curriculum

The purpose of the program in practical nursing and home management is to prepare practical nurses interested in rural health to give nursing service in institutions and homes under the supervision of professional nurses or of doctors, and to assist with management of homes.

This six-quarter program is offered jointly by the School of Nursing and School of Agriculture. *Inquiry for information and application for admission should be made to the School of Agriculture, University of Minnesota, St. Paul 1.*

In addition to the course which the students carry in the School of Agriculture they register for the following courses in practical nursing:

(Credits shown in parentheses)

P.N. A1A—Elements of Practical Nursing IA (4)	P.N. A2—Elements of Practical Nursing II (8)
P.N. A1B—Elements of Practical Nursing IB (2)	P.N. A3—Practical Nursing III (15)
	P.N. A4—Practical Nursing IV (15)

** The credits in the practical nursing courses are applicable toward an associate in arts degree in the General College.

Section III—DESCRIPTION OF COURSES

The following courses are taught by members of the School of Nursing faculty and co-operating faculty from other departments. Class hours, days, and rooms for these courses are posted on the School of Nursing bulletin board, 125 Owre Hall, at the beginning of each quarter. For summer class schedule see *Bulletin of the Summer Session*.

The description of the required courses and electives in the various curricula which are taught by other departments of the University will be found in the *Bulletin of the College of Science, Literature, and the Arts*, the *Bulletin of the College of Education*, and in the all-University *Class Schedule*.

Attention is called to the fact that a single sharp mark (#) means "consent of the instructor."

NURSING**

- 17-18. Introduction to Clinical Nursing.** Interrelationships of social, economic, medical, emotional, nutritional, and nursing needs of patients; application of principles in nursing care and prevention of illness. (11 cred.; 7 cred. f.s, 4 cred. w,su)
- 50-51. Medical and Surgical Nursing.** Causes, symptoms, treatment, and prevention of medical and surgical conditions; emotional, socio-economic, nutritional, and rehabilitative aspects of patient care; application of knowledge and principles to care of patients. (12 cred. per qtr.)
- 54. Pathology.** Nature and causes of disease; structural and physiological manifestations of general disease processes. (2 cred.)
- 55. Introduction to Communicable Disease.** Basic information concerning etiology and symptomatology of acute communicable diseases. (1 cred.)
- 56. Nursing in the Operating Room.** Principles of aseptic technique; knowledge and skill in performing nursing functions in operating rooms; broad perspective of social, economic, and emotional factors in nursing care of surgical patients. (6 cred.)
- 58. Orthopedic Nursing.** Principles in care of orthopedic patients and clinical experience. (2 cred.)
- 59. Gynecologic Nursing.** Principles in care of patients with pathological conditions of the female generative system; care during radiation therapy; normal physiological processes; preventive aspects of gynecologic conditions. (4 cred.)
- 60-61. Maternal and Child Nursing.** Principles in care of mother and child; preparation for parenthood; normal physiology and development; complications during pregnancy; emotional, social, mental, and physical aspects of nursing care; development of the child in family and community; care of the sick child. (12 cred. per qtr.)

** Courses in nursing, practical nursing, nursing administration, and nursing education utilize a variety of teaching methods as appropriate; lectures, discussions, demonstrations, field trips, projects, conferences, observations, patient studies, seminars, clinics, audio-visual techniques, clinical practice, and other methods are used. Individual student interests, needs, and abilities are recognized in planning the content of courses. Clinical courses for graduate nurses provide particularly for individual planning of content and experience to meet the needs of students with varying backgrounds and vocational objectives.

66. **Neuropsychiatric Nursing.** Understanding and rehabilitative treatment of neuropsychiatric patients; prevention of mental illness. (4 cred.)
67. **Nursing Care of Neuropsychiatric Patients.** Care of neuropsychiatric patients; dynamics of human behavior. (8 cred.)
68. **Nursing Care of Psychiatric Patients.** Classes, observation, and experience in care of psychiatric patients. (4 cred.; open for credit to graduate nurses who have not had psychiatric nursing experience in their basic professional curriculum, and to other graduate nurses upon approval of the School of Nursing)
79. **Tuberculosis Nursing.** Etiology, symptoms, treatment, and nursing care of tuberculosis; epidemiology and socio-economic aspects; case finding, prevention, and rehabilitation. (3 cred.)
87. **Field Experience in Public Health Nursing.** Supervised nursing experience in public health agencies; services rendered by public health nurse. (10 cred.)
88. **Rural Nursing.** Health needs of rural communities; nursing experience in rural hospital; observation of health programs in rural community; participation in community activities. (5 cred.)
96. **Out-Patient Nursing.** Instruction and experience in clinic; sociologic, economic, and preventive aspects of illness; care of ambulatory patients. (5 cred.)
97. **Medical and Surgical Nursing.** Medical and surgical specialties; social, economic, psychological, and public health aspects of care. (7 cred.)
98. **The Nursing Profession.** Problems and status of nursing; legal, socio-economic, professional, legislative, civic, and other. (3 cred.)
102. **Role of Nursing in Gerontology.** Population statistics; changing percentage of persons in older age groups; implications for health field. Social and economic status; facilities for improvement of health status; needs during acute and chronic illness. Role of nurse in preventive, supportive, and therapeutic care. (3 cred.)
103. **Role of Nursing in Cancer Care and Control.** Nursing responsibilities in prevention and early diagnosis of cancer, and in treatment and rehabilitation of cancer patient; emotional, social, and economic problems; utilization of community resources. (3 cred.; offered by Extension Division)
104. **Role of Nursing in Maintaining Emotional Health.** Mental health principles and techniques in nursing care. (3 cred.; offered by Extension Division)
108. **The Nursing Team.** Role of nursing team members in relation to patient teaching; team leadership; analysis of patient needs; development of nursing care plans. (3 cred.; offered by Extension Division)
- 145A. **Principles of Psychiatric Nursing.** Nursing care of mentally ill. (5 cred.; prereq. registration in certificate program)
- 145B,C. **Field Practice in Psychiatric Nursing.** Principles, techniques, and problems of psychiatric nursing; experience in a state hospital. (7 cred. for B, 15 cred. for C; prereq. registration in certificate program)
150. **Foundations of Clinical Nursing Specialties.** Trends in scientific studies and public health aspects of health and disease problems; personal and family resources for maintenance of health and care during illness; public and private community resources. (3 cred.)
- 151A,B,C. **Medical Nursing.** Principles, techniques, and problems of medical nursing; scientific principles, social and economic implications, and community programs for disease control; clinical assignments in patient care; study of patient's resources in relation to needs, participation in nursing team; special diagnostic and therapeutic techniques; resources provided by community agencies. (5 cred. per qtr.)
- 152A,B,C. **Obstetric Nursing.** Principles, techniques, and problems; social and economic implications, and community programs for disease control; clinical assignments in patient care, special diagnostic and therapeutic techniques, and community agency activities. (5 cred. per qtr.)

- 153A,B,C. Operating Room Nursing.** Principles, techniques, and problems; clinical assignments related to selected types of operative procedures. (5 cred. per qtr.)
- 154A,B,C. Pediatric Nursing.** Principles, techniques, and problems in care of normal children; community facilities and programs for improving parenthood and child care; special needs and problems of the sick infant and child; clinical assignments in infant and child care, and community agency activities. (5 cred. per qtr.)
- 155A,B,C. Psychiatric Nursing.** Principles, techniques and problems; social and economic implications, and community programs for promotion of mental health and for disease control; clinical assignments in patient care, special diagnostic and therapeutic techniques, and community agency activities. (5 cred. per qtr.)
- 156A,B. Rural Nursing.** Care of patient in rural hospital with referral to community agencies; problems of small hospitals; observation of community health and welfare agencies; participation in community activities; ward administration and student teaching. (15 cred. for A, 9 cred. for B)
- 157A,B,C. Surgical Nursing.** Principles, techniques, and problems; social and economic implications, and community programs for disease control; clinical assignments in patient care, special diagnostic and therapeutic techniques, and community agency activities. (5 cred. per qtr.)
- 158. Tuberculosis Nursing.** Principles, techniques, and problems; social and economic implications, and community programs for disease control; clinical assignments in patient care, special diagnostic and therapeutic techniques, and community agency activities; rehabilitation and occupational therapy; education of patients and family; orientation of personnel. (15 cred.)
- 160. Dynamics of Emotional Growth and Development Related to the Practice of Psychiatric Nursing.** Dynamic development of personality; observation of and participation experiences with infants and young children; school and recreational activities for adolescent groups. (5 cred.; prereq. registration in clinical minor or clinical courses in psychiatric nursing, and #)
- 165. Analysis of Nursing Care.** Studies in nursing; methods of analyzing and improving practices; individual problems or participation in group studies. (4 cred.)
- 170. Psychiatric Nursing and the Community.** Role of nurse in care of mentally ill and in preventive program; community resources and groups interested in prevention, care, and rehabilitation; social and economic implications. (4 cred.; prereq. registration in certificate program)
- 180. Human Relations in Health Field.** Patterns and problems of relationships among personnel, and between patients and personnel working in hospitals and related fields. (3 cred.)
- 190. Foundations of Nursing.** Role of nursing as one of professions concerned with promotion of health, prevention of illness, and care of persons during periods of illness or helplessness. (3-5 cred.; prereq. registration in master of education or master of nursing administration program)
- 191. Field of Psychiatric Nursing.** Role of nurse in care of mentally ill and in prevention of mental illness; cultural and social influences and issues; schools of psychiatric thought; approaches to treatment. (5 cred.; prereq. #)
- 192. Psychiatric Nursing.** Appraising psychiatric nursing needs and planning nursing care for groups of psychiatric patients; schools of psychiatric thought; approaches to treatment. (3 cred.; prereq. #)
- 193. Medical Nursing.** Study, observation, and practice; arranged on an individual basis for advanced students; evaluation of resources and needs of medical patients; professional team planning of therapy; plans for nursing care. (3 cred.; prereq. #)
- 194. Surgical Nursing.** Study and observation of patients requiring surgery; preoperative, operative, and postoperative nursing; activities arranged on an individual basis for advanced students. (3 cred.; prereq. #)

PRACTICAL NURSING**

- P.N. 1.2.3. Elements of Nursing Care.** Principles of nursing care; meaning of health and illness; safety measures; patient care; community resources. (4 cred. per qtr.)
- P.N. 1A. Introduction to Practical Nursing.** Introduction to care of patient in hospital and home; working with others. (2 cred.)
- P.N. 5. Nursing Care in Special Situations.** Care of patients in nursing homes; first aid; advanced nursing care; participation in team. (9 cred.)
- P.N. 6. Care of the Home.** Care of the patient and family in the home. (2 cred.)
- P.N. 7. Personal and Vocational Relationships.** Relationships of practical nurses with others in patient's environment. (1 cred.)
- P.N. 10. Introduction to Mother and Infant Care.** Care of mothers and newborn infants. (2 cred.)
- P.N. 11. Introduction to Child Care.** Development of the child from one to six; care of the ill child. (2 cred.)
- P.N. A1A. Elements of Practical Nursing IA.** Principles basic to and practice in practical nursing, meaning of health and illness, safety measures, patient care, community resources. (4 cred.)
- P.N. A1B. Elements of Practical Nursing IB.** Introduction to care of patient in hospital and home; working with others. (2 cred.)
- P.N. A2. Elements of Practical Nursing II.** Practical nursing skills in care of the less critically ill, chronically ill, and convalescent adult in a general hospital. (8 cred.; prereq. P.N. A1A, A1B)
- P.N. A3. Practical Nursing III.** The practical nurse's role in community life and rural health program; instruction and experiences in a rural community and hospital; maternal and newborn care; observation and experience in public health facilities, and other facilities for health care. (15 cred.; prereq. P.N. A2)
- P.N. A4. Practical Nursing IV.** Team relationships assisting professional nurse in care of the acutely ill adult and child; experience in care of the chronically ill and aged in nursing homes; vocational relationships and ethics as member of health team and community. (15 cred.; prereq. P.N. A3)

NURSING ADMINISTRATION**

- 50. Nursing Administration.** Senior seminar in principles of administration and application in care of patients. (1 cred.)
- 58. Introduction to Ward Administration.** Place of head nurse in hospital organization; basic principles of maintaining nursing service; analyzing patients' need and directing activities of ward personnel. (3 cred.; offered by Extension Division)
- 67. Field Practice in Ward Administration.** Practice in administration of one ward, supervision of nursing service, planning of students' clinical experience, and participation in ward teaching. (6 cred.; prereq. Nu.Ad. 160, Nurs. 165, and #)
- 70. Work Simplification.** Principles of work simplification with application to situations in nursing. (3 cred.; offered by Extension Division)
- 85. Fundamentals of Nursing Service Administration.** Principles of administration applied to nursing service; organization; administrative relationships; personnel policies, practices, relationships; staff education; income and expenditure, budgeting, salary schedules; public relations; records and reports. (3 cred.; offered by Extension Division)
- 160. Ward Administration.** Hospital organization; principles of administration and application to ward management; analysis and maintenance of nurs-

** Courses in nursing, practical nursing, nursing administration, and nursing education utilize a variety of teaching methods as appropriate; lectures, discussions, demonstrations, field trips, projects, conferences, observations, patient studies, seminars, clinics, audio-visual techniques, clinical practice, and other methods are used. Individual student interests, needs, and abilities are recognized in planning the content of courses. Clinical courses for graduate nurses provide particularly for individual planning of content and experience to meet the needs of students with varying backgrounds and vocational objectives.

- ing service; selection, orientation, assignments, and motivation of personnel; planning and conducting clinical teaching programs. (5 cred.)
- 167. Studies and Experience in Ward Administration.** Application of research techniques to problems in hospital nursing service; hospital organization and departmental interrelationships; practice in managing a nursing service unit, planning patient care, maintaining physical environment, directing activities of personnel; observation and participation in student programs. (8 cred.; prereq. Nu.Ad. 160, Nurs. 165, and #)
- 170. Foundations of Nursing Service Administration.** Principles of administration with application to nursing; current practice in nursing administration. (3 cred.; cannot be taken for credit by students in master of nursing administration program; no prereq.)
- 175. Elements of Administration in Nursing.** Organization and role of nursing service in hospitals; planning and directing patient care; procurement and assignment of nursing personnel; in-service education. (5 cred.; prereq. 170)
- 176. Elements of Administration in Nursing.** Communication within hospital organization; hospital economics; legal aspects of nursing practice; human relations. (5 cred.; prereq. 177)
- 177. Practicum in Nursing Administration.** Field experience and seminar. Assignment to an administrative unit in a hospital; observation and participation in administrative activities; experience planned in accordance with needs of student under guidance of field preceptor and faculty. (15 cred.; prereq. 175 and #)
- 191. Principles of Administration Applied to Nursing Service Administration.** Defining aims, policies, and organization; principles of scientific management; planning and directing nursing care; job analysis; job classification; evaluation of personnel; staff education; personnel policies; methods of recruiting, selecting, appointing, and assigning staff; plant, supplies, and equipment. (5 cred.; prereq. registration in master of nursing administration program or #)
- 192. Principles of Administration Applied to Nursing Service Administration.** Dynamic factors affecting nursing service administration; human relations; communications; research; teaching; personal and professional development. Methods of problem solving. Co-ordination of other departmental activities in nursing service department. (5 cred.; prereq. 191)
- 193. Principles of Administration Applied to Nursing Service Administration.** Principles of budget making; cost accounting; utilization of manpower and materials; community health programs; legal problems. (6 cred.; prereq. 192)
- 199D. Field Experience in Nursing Service Administration.** Assignment to nursing service department of hospital; participation in activities of director or assistant director; experiences arranged in accordance with needs of student under direction and supervision of experienced nursing service administrator and faculty. (15 cred.; prereq. 192 and #)
- 199S. Field Experience in Nursing Service Administration.** Assignment to an administrative unit in a hospital; participation in activities of an administrative supervisor; experiences arranged in accordance with needs of student under direction and supervision of experienced administrative supervisor and faculty. (15 cred.; prereq. 192 and #)

NURSING EDUCATION and EDUCATION**

- 62. Introduction to Personnel Work in Nursing.** Principles, techniques, and application of personnel point of view to nursing; psychological principles; individual differences; counseling techniques appropriate for nursing staff and faculty. (3 cred.; offered by Extension Division)

** Courses in nursing, practical nursing, nursing administration, and nursing education utilize a variety of teaching methods as appropriate; lectures, discussions, demonstrations, field trips, projects, conferences, observations, patient studies, seminars, clinics, audio-visual techniques, clinical practice, and other methods are used. Individual student interests, needs, and abilities are recognized in planning the content of courses. Clinical courses for graduate nurses provide particularly for individual planning of content and experience to meet the needs of students with varying backgrounds and vocational objectives.

68. **Construction and Use of Examinations and Other Measurement in Basic Nursing Courses.** Criteria for judging and improving methods of educational measurement; examinations as aids to student progress; relation of examination scores to grading systems; practice in making and scoring course examinations. (3 cred.)
69. **Survey of Conditions and Trends in Nursing.** Study of conditions existing in nursing as revealed in literature and reports. (3 cred.)
72. **Application of Principles of Learning to Clinical Instruction.** Learning situations in basic professional nursing program; sources and selection of materials; organization of instruction; evaluation of student learning in clinical situations. (3 cred.)
74. **Sciences in a School of Nursing Curriculum.** Objectives, course content, methods of instruction, choice of textbooks, integration of subject matter, and schedule planning as applied to teaching of sciences in schools of nursing. (3 cred.; prereq. #)
162. **Personnel Work in Nursing.** Principles and techniques of personnel work applied to problems in nursing; individual differences; human behavior; psychological tests; personnel records; orientation periods; remedial programs; counseling interviews. (3 cred.)
165. **Problems in Nursing Care.** Research in nursing. (3 cred.; prereq. #)
171. **The Curriculum of the School of Nursing.** Principles of curriculum development applied to educational programs in nursing. (3 cred.; prereq. 69, Ed.T. 51A,B, or #)
175. **Educational Administration in Nursing.** Organization, administration, and support of educational programs in nursing; in schools of professional and practical nursing; in governmental and other nursing services; in continuing education programs for practicing nurses and nurse educators. (3 cred.; prereq. sr., grad., or #)
190. **The Survey in Nursing Education.** Survey techniques in evaluating an educational field study. (3 cred.; prereq. #)
- 197E-198E. **Advanced Teaching of Nursing.** Problems in teaching nursing. (2 cred. for 197E, 4 cred. for 198E; prereq. registration in master of education program, or #)
- Ed.T. 51A,B. **Teaching of Nursing.** Principles underlying clinical and classroom teaching in schools of nursing; planning and evaluation of instruction; observation and study of teaching in nursing school situations; supervised practice in teaching of nursing subjects. (4 cred. for 51A, 6 cred. for 51B)
- Ed.C.I. 199E. **Internship.** Advanced supervised teaching and practice work at the graduate level for candidates for the master of education degree. (8 cred.; prereq. #)

REQUIRED COURSES OFFERED BY OTHER DEPARTMENTS

Basic Professional Nursing Curriculum

(Credits shown in parentheses)

Anat. 4—Human Anatomy (5)	Pub.H. 62—Principles of Public Health Nursing I (5)
Bact. 53—General Bacteriology (5)	Pub.H. 63—Principles of Public Health Nursing II (5)
N.Psy. 171—Principles of Neuropsychiatry (4)	Pub.H. 100—Elements of Preventive Medicine and Public Health (5)
Phcl. 9-10—Pharmacology (4)	Soc. 91—Case Method—Study of Human Problems (3)
Ph.Ch. 50—Physiological Chemistry (4)	
Phsl. 60—Human Physiology (6)	

Practical Nursing Curriculum

G.C. 1A—Individual Orientation (4)	G.C. 41—Practical Applications of Psychology (5)
G.C. 10A—Human Biology (3)	G.C. 42A—Human Development (3)
G.C. 10B—Human Biology (3)	G.C. 42B—Personal Adjustment (3)
G.C. 10C—Human Biology (3)	
G.C. 14—Normal Diet and Modifications (2)	

Nursing Education Major and Minors

- Ar.Ed. 17—Pictorial Expression for Elementary Education (3)
 Ar.Ed. 18—Design Activities for Elementary Education (3)
 C.W. 40—Child Training (3)
 C.W. 80—Child Psychology (3)
 C.W. 130—Motor, Linguistic, and Intellectual Development of the Child (3)
 C.W. 131—Personality, Emotional, and Social Development of the Child (3)
 C.W. 132—Later Childhood and Adolescence (3)
 C.W. 140—Behavior Problems in Younger Children (2)
 C.W. 141—Behavior Problems in Older Children and Adolescents (2)
 C.W. 142—The Psychology of Atypical Children (3)
 C.W. 166—Maturity and Aging (2)
 Ed. 55N—Introduction to Teaching Nursing (5)
 Ed.T. 57—Nursery School-Kindergarten Laboratory in Art, Literature, and Social Studies (5)
 Ed.T. 59—Methods and Observations in the Nursery School (3)
 Ed.T. 77—Student Teaching in the Nursery School (5)
 H.Ed. 180—The School and Society (3)
 Psy. 144-145—Abnormal Psychology (6)
 Pub.H. 58—Maternal and Child Health (3)
 Pub.H. 60—Tuberculosis and Its Control (2)
 Pub.H. 100—Elements of Preventive Medicine and Public Health (5)
 Soc. 14—Rural Sociology (3)

Nursing Administration Program

- Econ. 161—General Manpower Economics, Labor Problems (3)
 Pol. 121—Municipal Administration (3)
 Pol. 131—Public Administration (3)
 Pub.H. 161—History and Development of Hospitals (3)

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Bulletin of

UNIVERSITY OF MINNESOTA



Mortuary Science, 1955-1957

How to Use This Bulletin

This bulletin gives information about the Department of Mortuary Science. Keep it at hand for ready reference.

While this bulletin gives information necessary for program planning, it will be necessary to consult the *Class Schedule* published just prior to each quarter to ascertain room numbers, hours, and days of class sessions, and any last-minute changes in offerings. For any changes in regulations that become effective after publication of this bulletin, you should consult the department office.

Do not attempt to register from the *Class Schedule* alone. The *Bulletin of Mortuary Science* is essential for securing course descriptions and prerequisites, rules and requirements, and other information necessary for sound program planning. Since the fall quarter *Class Schedule* gives the hours and days of courses throughout the year, you should retain it for long-range program planning.

You should also read the *Bulletin of General Information* telling about the University as a whole. New students will be interested in *The Moccasin*, a handbook describing personnel services and campus activities.

Copies of all bulletins of the University can be obtained at the Information Window in the Administration Building.

UNIVERSITY OF MINNESOTA

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**The Department of Mortuary Science
office is located in 155-156 Nicholson Hall**

Mortuary Science

GENERAL INFORMATION

The University of Minnesota, through the co-operation of the Medical School and other departments of the University and the Minnesota State Department of Health, announces its course in mortuary science. This bulletin gives an overview of the curriculum and indicates the activities of the course. The General Extension Division is charged with the administrative responsibilities of this semiprofessional program, but the course of study involves many University departments and agencies. It is an all-University course, which can be completed in 2 or 3 academic years. It is coeducational and open to qualified high school graduates.

A review of the progress of this department reveals that the course of instruction for the mortician was established at the University of Minnesota by act of the Board of Regents on April 4, 1908. The first session under the auspices of the Medical School began January 5, 1914, and lasted 6 weeks. In 1916 the course was extended to 8 weeks. Since then the length of the course has been successively extended to 12 weeks, 24 weeks, 36 weeks, and in 1951 to a concentrated 2-year curriculum.

By action of the Board of Regents of the University on July 8, 1955, an extended 3-year curriculum was approved and is now available to those students seeking this additional scholastic preparation in mortuary science.

The curriculum in mortuary science combines the instruction in the basic sciences, training in the technical details of practical embalming and mortuary management, instruction in the liberal arts, and cultural subjects deemed necessary for general education in this field and those subjects required by the various State Departments of Health as essential to the welfare of the community. One of the primary objectives of the department is to offer scholastic preparation to the student which will best prepare him to accept his obligation in his community, both as a citizen and as a professional man.

The program is specifically planned to assist those who must qualify for licensure in states requiring college experience as a condition to practice. The curriculum, leading to the degree of associate in mortuary science, is offered in two different plans (Plan A and Plan B). This enables the student to choose that plan which fits most closely the requirements of the state in which he intends to apply for licensure. The curriculum will fulfill the requirements of 2 years of college and 1 year of mortuary science that is mandatory in Minnesota and other states with similar regulations, as well as meet the requirements of those states requiring 1 year of college and 1 year of mortuary science training. The course of study is arranged to give preparation in those academic areas that seem essential for the technical subject-matter content of the basic sciences. Both the 9-quarter (Plan A) and the 6-quarter (Plan B) sequence are integrated to bring the maximum of professional success and to contribute most to the general welfare of the student.

Application—Admission—Registration

How to Apply—All credentials and applications for admission to the course in mortuary science should be addressed to the Office of Admissions and Records, University of Minnesota, Minneapolis 14.

Application blanks may be obtained at any Minnesota high school or from the Office of Admissions and Records of the University of Minnesota.

An admission certificate will be mailed to each student who has met the requirements. Students entering from other colleges or universities will also receive a statement of advanced standing. Instructions for registration will either be enclosed with the admission certificate or be mailed later—about one month before the opening of the fall quarter. Students must present their admission certificates when they report for registration.

How to Register—With the admission certificate mailed to qualified applicants, you will be notified of either a special registration appointment or the specified days set aside for registration. When you report for registration you will be given a set of detailed instructions which will make the process of registration relatively simple. Your registration will be completed with the help of either the director of the department or his assistant. See the *Bulletin of General Information* for more specific details and directions.

Further Information—Because of the specialized nature of the work in funeral service, all applicants are urged to consult with the assistant director of the department before registration. Advisers for mortuary science are available for consultation in person or by letter with prospective students. Their offices are located in 155 Nicholson Hall. A pamphlet entitled *Funeral Service as a Profession* is available upon request.

Students Transferring from Another College Within the University—If you have completed work satisfactorily in another college within the University, you may be admitted to the Department of Mortuary Science with advanced standing. Procedure for such admission is described in the *Bulletin of General Information*.

The grades earned in other colleges of the University will carry the appropriate honor points. If you have any failures in courses which ordinarily would grant advanced standing, these will also be transferred, and you must make up any such courses and any such honor point deficiencies as might be required for graduation.

Students Transferring from Another Institution—If you have completed work satisfactorily in another college or university, you may be admitted to the Department of Mortuary Science with advanced standing. Procedure for such admission is described in the *Bulletin of General Information*.

Credits which are accepted from other institutions may be used to satisfy the graduation requirements of this department. However, in determining your honor point ratio, only the grades that you earn in this University are considered.

Registration Dates—Registration for students on campus begins several weeks before the opening of the quarter and is announced in the Official Daily Bulletin of the *Minnesota Daily*. The expiration date is listed in the University Calendar which is included in the *Class Schedule* and the *Bulletin of General Information*. Only in exceptional circumstances may you register after that date, and then you must pay a special privilege fee.

New students entering in the fall come, by appointment, to the University in small groups for two days of orientation and registration dur-

ing the month of September. Those unable to come then and those entering the winter or spring quarters are offered a modified program for two days just before classes begin.

Change of Registration—If you have planned your program carefully, you seldom will need to change a course after completing registration. However, if a change should become necessary occasionally, the procedure is as follows: Students should fill out a "Cancel-Add" form obtained in the departmental office, have it signed by their adviser, and tally it in the tally office. After the sixth week, approval of the Committee on Student Scholastic Standing (sometimes called Scholastic Committee) is also required.

The addition of a new course after the first week of classes must be approved by a representative of the Scholastic Committee and normally it is not permitted.

Courses may be canceled without grade during the first six weeks of classes, although if the total load falls below 12 credits, the approval of the Scholastic Committee is required. After the six weeks, cancellation of a course in which you are failing is recorded as "cancellation with fail"; if you are passing, it is recorded "cancellation with no grade." During the last two weeks before the beginning of final examinations, cancellation is not permitted except under most unusual circumstances.

Maximum and Minimum Credits per Quarter—Most students take about 15 credits of work each quarter. To take less than 12, you must secure permission from the Scholastic Committee.

The maximum number of credits for which you may register is ordinarily 17. After 2 quarters of residence you may register for 18 credits provided you have a scholarship average of 1.5 for the 2 quarters before registration, and no failure for the quarter immediately preceding registration. Registration for credits in excess of these limits must be approved by the Scholastic Committee.

Audited Courses—Auditing a course differs from taking it without credit in that the student may not normally participate in the activities of the class nor take the final examination, and no grade is recorded. Moreover, you may not later take for credit a course which you have audited. If you wish to audit you must, in addition to usual registration approvals, obtain permission from the course instructor (or an auditor's card from your college office) and the approval of the Scholastic Committee.

Special Notice—Any individual contemplating licensure in the field of funeral service should determine the qualifications for such licensure by writing either to the State Board of Health or to the State Board of Embalmers and Funeral Directors in the capital city of the state in question. Inasmuch as these regulations are in a constant state of flux, the most current information available should be obtained. If an individual is in doubt as to the procedure to be followed in determining qualifications for licensure, he may seek additional assistance from the office of the director of mortuary science, 155 Nicholson Hall, University of Minnesota, Minneapolis 14.

Repeating a Course—You may repeat without special permission a course which you have failed, and both the old and new grades will then stand on the record. You need not repeat the failed course, however, unless it is a prerequisite to other courses you wish to take or is required for

graduation. In such case, the department may at its discretion replace the first grade when calculating honor point ratios.

Canceling Out of College—If you should wish to cancel out of college during a quarter or plan not to return in the succeeding quarter, you should report to the department window in the Administration Building (window 20) to check on your financial status, cancel courses for the current or succeeding quarter, and generally clarify your relationship with the University. This always involves referral to the departmental office, since members of the department staff are interested in being of any assistance possible. You probably will want to discuss one or more of the following topics: academic standing and possibilities of return or transfer, grades to be awarded, wisdom of the decision to cancel, financial needs, job placement, and others.

If you are likely to enter the armed services upon leaving the University, you will find the discussion especially important. The department will prepare a summary of your academic and extracurricular background for your use in seeking proper placement in the services if you wish.

Fees

For complete information concerning fees, see the *Bulletin of General Information*.

Summer Session Work

The recent curriculum changes have made necessary the offering of certain courses during the regular terms of the University Summer Session. This schedule is expected to begin in terms I and II of the 1956 Summer Session. For further information regarding this schedule, you should contact the office of the director of mortuary science. These offerings will be of special interest to those individuals who have attended other institutions and will be transferring with advanced standing.

Department Regulations

Petition for Exemption from Department Regulations—The faculty has set up certain regulations to help students achieve a good education. These rules are believed wise for most students but occasionally they may work to the educational disadvantage of a particular person. In this event, he may ask for personal exemption through a petition to the Scholastic Committee. The committee is empowered to make exceptions to a requirement provided the exceptions are consistent with the spirit of the rule.

Regular petition blanks are available in the department office. An endorsement from the faculty adviser or instructor should be secured if appropriate. If desired, the student will be given an opportunity to present his case in person. When the committee has taken action, the reply will be mailed to the student or may be picked up in the department office.

Registration Regulations—Special rules pertaining to registration procedures are discussed in the preceding part of this section.

Classification of Students—A student with less than 39 credits is a freshman. A student with 39 or more credits is a sophomore until admitted to the junior year of the curriculum.

Credits—Amount of work is expressed in *credits*. Each credit demands, on the average, 3 hours a week of a student's time; that is, 1 recitation with 2 hours of preparation, or 3 hours of laboratory work.

For a complete discussion of the methods of grading used in the University and for the ways to calculate honor point ratio and quality credits, see the *Bulletin of General Information*.

Satisfactory Progress—A student in this department is expected to make satisfactory progress in the curriculum he has selected. For those who are candidates for the degree of associate in mortuary science, this is interpreted to mean a C average and the completion of each required course. The cases of students who are not reaching this standard are considered by the Scholastic Committee.

During the quarter, instructors report to the committee the names of students who are likely to fail. These students are referred to a special counselor to discuss their situation and to see what may be done to help them. It is always best for a student to see his class instructor or his faculty counselor as soon as he feels himself in difficulty rather than to wait until he actually has received a poor grade.

Scholastic Probation—When the grades at the end of a quarter indicate that a student is in serious scholastic difficulty, he is placed on probation. While on this status he is afforded special aid in discovering the reasons for his difficulty and in finding ways of overcoming it. He is given one quarter to show improvement. Usually the probation period will not be extended beyond two quarters unless the Scholastic Committee is convinced that the causes of the student's poor work are beyond his control and will soon disappear.

The probationary status indicates serious doubt whether the student will succeed in college. While poor grades are a primary factor in determining this status, a record of continuous cancellations and incompletes likewise indicates scholastic weakness.

In addition to the above general regulations, a student will always be placed on probation if the following conditions arise:

1. Failing grades in at least half his work for any quarter.
2. An honor point ratio under .50 at the end of 2 quarters.
3. An honor point ratio under .60 at the end of 3 quarters.
4. An honor point ratio under .70 at the end of 4 quarters.
5. An honor point ratio under .75 at the end of 5 quarters.
6. An honor point ratio under .80 at the end of 6 or more quarters.

A student will also be placed on probation if:

1. He is admitted from another institution with an average of less than 1 honor point per credit.
2. At the discretion of the department his initial admittance is based on qualifications below those ordinarily required.

When the student's work improves to a point where he is again making normal progress toward a degree, he will be notified of his removal from probationary status.

Exclusion from College—Students may be excluded from the department under one of the following headings:

1. *Dropped for Low Scholarship*—A student who fails to meet the terms of his probation may expect to be dropped.
2. *Hold for Committee Clearance*—Sometimes a student's scholastic difficulty indicates that he should not continue for the time being even though the record hardly requires official drop action. In such case his later return must be approved by the Scholastic Committee.
3. *Discontinued*—If a student is pursuing an appropriate course but is handicapped by conditions he cannot control (ill health, necessary outside work, etc.), he may be required to discontinue his registration until these conditions have improved. When discontinuance takes place at any time other than the end of the quarter, the courses for which he is registered may be recorded as canceled without grade.

Readmission to College—Students excluded from the department are allowed to return only with the permission of the Scholastic Committee. Students classified as discontinued must present evidence that the conditions which hindered their work have been remedied.

A student who has been dropped may petition for readmission after an interval of one year. The petition must present specific evidence that he is now likely to succeed with college work.

Students who return under the provision of the preceding paragraphs will be registered on strict probation. They may be dropped at any time that their work is unsatisfactory.

Class Attendance—Every student in the department has a responsibility for class attendance. All departments hold students responsible for work of the course but differ somewhat in their treatment of absences. The student must, therefore, learn the policy of his particular instructor and (if he has a legitimate excuse such as illness) arrange with him for making up the work. Either the instructor or student may consult with the Scholastic Committee concerning the validity of the excuse.

Final Examinations—The all-University final examination schedule is published each quarter in the *Class Schedule*. Students are required to take examinations at the scheduled time. However, if the student has a conflict in examinations or if he has three examinations in one day, he should report that fact to the department office in 155 Nicholson Hall for possible adjustment. Any other examination schedule problems should be presented to the Scholastic Committee.

If a student misses a final examination without being excused, a Y symbol is assigned if he was doing passing work, and a Z is assigned if he was failing. If he can show good reason for the absence, he may petition the Scholastic Committee for substitution of a grade of incomplete that can be made up. In this department Y grades are usually changed to Z if the student has a previous Y on his record.

Adult Special Students—Special facilities are available for those students who wish a special and limited program and who are not candidates for a degree. If you seek admission as an adult special student you should ask for an application blank at the Office of Admissions and Records. The application must receive the approval of the dean of that office and of the Scholastic Committee.

Ordinarily, to be accepted you must be 24 years of age or older or a person who has received a Bachelor's degree, and you must be seeking a special and limited course of study.

As an adult special student, you will proceed under the following regulations:

1. You may take any course for which you have the necessary prerequisites.
2. You cannot become a candidate for a Mortuary Science degree without the approval of this department. After completing one full year of work (45 credits) with a C average, you may apply to the Office of Admissions and Records for regular classification.
3. Credit obtained by work in other institutions or by special examination will not be recorded.
4. You may audit courses according to the procedure described in the previous section of this bulletin entitled "Audited Courses."
5. Your registration each quarter must be approved by a representative of the Scholastic Committee.

Examination for Advanced Standing Credit—If you believe yourself sufficiently prepared in some subjects to pass examinations in them upon entrance you may, with the approval of the Scholastic Committee, take such examinations without charge. Apply to the director in 155 Nicholson Hall within the first six weeks of residence.

Student Personnel Services

Faculty Advisers—As you go through college you may need help with such matters as getting registered, selecting courses, choosing your vocation, arranging finances, entering student activities, or solving other personal problems. Much of this assistance is provided by the department, though for some problems you may wish to take advantage also of the all-University personnel services. You will be assigned the services of a faculty adviser.

Scholastic Committee—Almost every student has occasion from time to time to consult the Committee on Student Scholastic Standing, usually called the Scholastic Committee. It is important, therefore, that its functions be clearly understood.

What is it? It is a committee of the faculty charged with the interpretation and enforcement of faculty regulations. It is empowered also to make exceptions to faculty regulations when those regulations work to the educational disadvantage of a particular student, provided the basic spirit of the regulation is maintained.

How can it help you? Often a student is in doubt about his obligations or some rule seems to stand in the way of his objective. The Scholastic Committee is designed to help with such problems. It has special counselors available for consultation, and often an adjustment can be worked out.

How does one use it? When help is needed, go to the department office in 156 Nicholson Hall. A representative of the committee will be glad to talk with you. To be exempted from a regulation, you must prepare a written petition which is turned in at the department office. Since this process takes time, allow a few days for the committee's decision. You should drop back later to pick up your copy of the petition, or request that it be mailed to you.

Who makes up the committee? The director of the department is the chairman. The assistant director for the department serves as secretary. The third member is appointed yearly from the faculty by the dean of the Extension Division.

Orientation Programs—The Department of Mortuary Science joins with other divisions of the University in helping new students, whether freshmen or those with advanced standing, to get acquainted with one another and with the department program. Usually this involves two days of testing, counseling, and group activities. You will profit from group discussion of the requirements and opportunities available. For questions that arise later, you can always consult your department office.

Department Placement Service—The department maintains a continuing placement service for its graduates and former students. Each graduate must complete certain prescribed forms which become a part of his permanent file. During the spring quarter of each academic year the department receives and files requests for personnel from funeral establishments in Minnesota and the surrounding area. The credentials of qualified students are then forwarded to these sources and personal contact is established between the graduate and the prospective employer. Licensed professional services are often requested and the department endeavors to service these requests from its files of former students. Graduates are given detailed information about the use of the placement service following graduation.

For information about the numerous all-University personnel services, consult the *Bulletin of General Information*.

Awards

Award of Merit—Each year the Minnesota Funeral Directors' Association will award at the commencement exercises a certificate of merit to the outstanding student in mortuary science. The student will be selected by a committee from the association, the Minnesota State Department of Health Committee of Examiners, and the faculty. The award is made on the basis of scholarship, citizenship, professional attitude, and personality.

DIF Award—*Diligentissime Incubuit Fortiterque* (he has applied himself with the greatest diligence and vigorously). This award was established by Mr. Hansen and Mr. Slater in 1951 and is given annually to a member of the graduating class in mortuary science. The student selected for this award will be the one who best exemplifies the qualities of perseverance, diligence, and co-operation, and who manifests the greatest rate of academic improvement, regardless of final honor point ratio. The award is a gold key appropriately inscribed and will be presented either at the commencement exercises or at class day festivities.

CURRICULA

Associate in Mortuary Science Degree—The requirements for graduation under Plan A are the completion of all the required courses or their equivalent and the completion of the practical work, with a total of 137 credits and 137 honor points—an average of 1 honor point per credit. The requirements for graduation under Plan B are the completion of all the required courses or their equivalent, the completion of all the practical work, with a total of 102 credits and 102 honor points—an average of 1 honor point per credit. Upon the satisfactory completion of the prescribed course of study, the degree of associate in mortuary science will be conferred by the Board of Regents.

Plan of Instruction—Plan A

(Credits and quarter offered shown in parentheses)

FIRST YEAR

Comp. 4-5-6—Freshman Composition (3f, 3w, 3s)	Pub.H. 3—Personal Health (2s)
G.C. 41—Psychology (5f)	Spch. 1-2—Fundamentals of Speech (3w, 3s)
In.Ch. 1-2—General Inorganic Chemistry (4w, 4s)	Mort. 8-9-10—Orientation in Funeral Service (1f, 1w, 1s)
P.E. 1A-B-C—Sports Education (1f, 1w, 1s)	Electives (5f, 3w)
	Total credits (15f, 15w, 14s)

SECOND YEAR

Pub.H. 51—Community Hygiene (3f)	Mort. 12—Introduction to Embalming (3s)
Phsl. 4—Human Physiology (4s)	Mort. 13-14—Mortuary Law (3f, 3w)
S.Sci. 1-2-3—Introduction to Social Science (4f, 4w, 4s)	Mort. 64—Psychology of Funeral Service (2f)
Zool. 14-15—General Zoology (3f, 3w)	Elective (6w)
Mort. 3—Introduction to Restorative Art (1s)	Total credits (15f, 16w, 14s)
Mort. 11—Introduction to Mortuary Management (2s)	

THIRD YEAR

Econ. 24—Principles of Accounting (3f)	Mort. 60-61-62—Mortuary Management (2f, 2w, 2s)
Mort. 4-5-6—Restorative Art (1f, 1w, 1s)	Mort. 63—Business Methods (2w)
Mort. 51-52—Anatomy for Embalmers (3w, 3s)	Mort. 70-71—Chemistry for Embalmers (3w, 3s)
Mort. 53-54—Pathology (2f, 2w)	Mort. 72—Bacteriology (4s)
Mort. 55—Medical Science Survey (2s)	Total credits (14f, 16w, 18s)
Mort. 56-57-58—Embalming Theory and Practice (3f, 3w, 3s)	
Mort. 59—Public Health, Minnesota Laws and Regulations (3f)	

Plan of Instruction—Plan B

(Credits and quarter offered shown in parentheses)

FIRST YEAR

Comp. 4-5-6—Freshman Composition (3f,3w,3s)	Phsl. 4—Human Physiology (4s)
G.C. 41—Psychology (5f)	Zool. 14-15—General Zoology (3f,3w)
In.Ch. 1-2—General Inorganic Chemistry (4w,4s)	Mort. 8-9-10—Orientation in Funeral Service (1f,1w,1s)
Pub.H. 3—Personal Health (2w)	Mort. 13-14—Mortuary Law (3f,3w,3s)
P.E. 1A-B-C—Sports Education (1f,1w,1s)	Elective (3s)
	Total credits (16f,17w,16s)

SECOND YEAR

Econ. 24—Principles of Accounting (3f)	Mort. 60-61-62—Mortuary Management (2f,2w,2s)
Mort. 4-5-6—Restorative Art (1f,1w,1s)	Mort. 63—Business Methods (2w)
Mort. 51-52—Anatomy for Embalmers (3w,3s)	Mort. 64—Psychology of Funeral Service (2f)
Mort. 53-54—Pathology (2f,2w)	Mort. 70-71—Chemistry for Embalmers (3w,3s)
Mort. 55—Medical Science Survey (2s)	Mort. 72—Bacteriology (4s)
Mort. 56-57-58—Embalming Theory and Practice (3f,3w,3s)	Elective (3w)
Mort. 59—Public Health, Minnesota Laws and Regulations (3f)	Total credits (16f,19w,18s)

DESCRIPTION OF COURSES

Explanations

Course Numbering—A course is designated by a number, a letter, and occasionally a prefix denoting the department offering the course. It has the same number in whatever quarter it is offered. The quarter is indicated by letter (f, fall; w, winter; s, spring; su, summer).

Examples:

- 1f-2w, a two-quarter course given in the fall and winter.
- 1w-2s, the same course given in the winter and spring.
- 3f,w,s, a one-quarter course given each quarter.

A course sequence separated by hyphens (1f-2w-3s) must be taken *in the order listed* unless there is a mark ‡ indicating that a student may enter any quarter.

Course Symbols—The following symbols used in course descriptions have been adopted for all University bulletins and will not carry a bottom-of-the-page footnote.

- † A dagger after a course number indicates that all quarters of the course preceding the dagger must be completed before credit will be granted for any quarter. (In 1f-2w†-3s, the first two quarters must be completed, while the third is optional.)
- ‡ A double dagger following a sequence course number indicates that students may enter any quarter.
- § A section mark means that credit will not be given for the course if the equivalent course listed after the section mark has been taken for credit.
- ¶ A paragraph mark preceding a course number means "concurrent registration," or that the course so indicated may be taken simultaneously.
- # A sharp mark means "consent of the instructor."
- △ A triangle mark means "consent of the department." (To be obtained at the appropriate office.)

Statement of Credits—The number of credits stated for two- and three-quarter courses is the number for the entire course, not the number for each quarter unless so stated.

MORTUARY SCIENCE

3. **Introduction to Restorative Art.** Aspects of general art as they apply to funeral service. (1 cred.; no prereq.) Gates
- 4f-5w-6s.† **Restorative Art.** Anatomical modeling; expression, familiarization with tools, materials, and techniques of rebuilding human face and body. Color in cosmetics and interior decoration; physical effect of colors upon forms, psychological effects of colors upon people. Design; good taste, proportion, colors, and relationship with environment. (3 cred.; prereq. soph.) Gates
- 8f-9w-10s. **Orientation in Funeral Service.** Designed for a better understanding of funeral service. Aptitudes, skills, and personal qualifications; field trips. (3 cred.; no prereq.) Slater
11. **Introduction to Mortuary Management.** Funeral service as a business-profession. Current statistics and studies. (2 cred.; prereq. Mort. 10) Slater

- 12. Introduction to Embalming.** Techniques; history; licensure and legal requirements. (3 cred.; prereq. Mort. 10) Slater
- 13f-14w. Mortuary Law.** Mortuary jurisprudence, probation of estates, administratorships, social security, life insurance forms, public and personal liability, business law. (6 cred.; no prereq.) Carney
- 51w-52s.† Anatomy for Embalmers.** Microscopic anatomy and gross dissection; principal systems of the body. Individual experience with gross dissection and raising different arteries; anatomy relating to practical embalming. (6 cred.; prereq. Zool. 1-2-3 or Zool. 14-15 and Phsl. 4) Lazarow and staff
- 53f-54w.† Pathology.** Causes of disease; etiological factors. Attendance at autopsies. (4 cred.; prereq. Zool. 1-2-3 or Zool. 14-15 and Phsl. 4) Dawson and staff
- 55s. Medical Science Survey.** Anatomy, bacteriology, and pathology and their relation to the embalmer. (2 cred.; prereq. Mort. 2, 7, and 19)
- 56f-57w-58s.† Embalming Theory and Practice.** Participation in actual embalming. Clinical calls made available through the courtesy of Twin Cities funeral directors, under direction of licensed embalmers on the full-time staff. Preparations and participation in such clinical calls is necessary for completion of requirements for a degree. (9 cred.; prereq. Mort. 10, Zool. 1-2-3 or Zool. 14-15 and Phsl. 4) Slater
- 59. Public Health, Minnesota Laws and Regulations.** Basic principles and practices of public health administration; organization and functions of agencies at federal, state, and local levels of government which are engaged in preservation and protection of public health. Role of mortician; regulatory procedures. Orientation in responsibilities; relationships with local boards of health and State Department of Health. (3 cred.; prereq. soph.) Brower
- 60f-61w-62s.† Funeral Management.** Best current practice. Opportunity to meet local directors of long experience and high standing; important aspects of operating a funeral establishment. Field trips. Clinical experience. (6 cred.; prereq. Mort. 10) Slater
- 63. Business Methods.** Records and statements for a funeral establishment. Student carries through typical records and statements. Cost data for a variety of priced cases demonstrated; income tax forms. (2 cred.; prereq. Econ. 24) Lund
- 64. Psychology of Funeral Service.** Principles helpful to a prospective funeral director in dealing with his clients, especially those under severe emotional stress. (2 cred.; prereq. G.C. 41) White
- 70w-71s.† Chemistry for Embalmers.** Fundamentals of inorganic and organic chemistry. Chemistry of the body; sanitation; toxicology, chemical changes in cadavers, disinfection, and embalming fluids. (6 cred.; prereq. In.Ch. 1-2) Pervier
- 72. Bacteriology.** Distribution, nutrition of bacteria, bacterial physiology; disinfection and sterilization, transmission of infection, post-mortem bacteriology, immunity, pathogenic bacteria, viruses, pathogenic fungi, and protozoa. (4 cred.; prereq. Zool. 1-2-3 or Zool. 14-15 and Phsl. 4) Syverton and staff

COMPOSITION

- 4f-5w-6s. Freshman Composition.** Practical training in reading and writing. (9 cred.; prereq. assignment to category 1, 2, or 3 on English

Classification Card, Part II; with permission of adviser, the student may meet this requirement by substituting G.C. 31A, B, and D in the General College)

ECONOMICS

- 24. Principles of Accounting.** Balance sheet, profit and loss statement, recording process, special journals, ledgers, adjustments, work sheets, closing entries, voucher system, partnership; corporation, departmental, branch, and manufacturing accounting. Statement analysis and interpretation. (9 cred., §B.A. 54-55; prereq. 3rd qtr. fr.) Nelson and staff

INORGANIC CHEMISTRY

- 1f.w-2w.s.† General Inorganic Chemistry.** Study of the general laws of chemistry and of the nonmetals and metals and their compounds. (4 cred. per qtr.; no prereq.)

PHYSICAL EDUCATION

- 1Af-Bw-Cs. Sports Education.** Orientation course in a variety of recreational sports. The objective is to provide instruction and competition in those sports in which men may participate now and in future years as a means of obtaining recreation, regular exercise, and social intercourse. (1 cred. per qtr.; no prereq.; with permission of adviser, student may substitute 2Af-2Bw-2Cs, or any combination of the two sequences)

Note: A towel and locker fee of \$2.50 per quarter is charged all students using physical education facilities for activity. Uniforms for class work or recreational activity are \$2 per quarter.

Note to women students: Arrangements for meeting this requirement for women students are made in co-operation with the Department of Physical Education for Women.

PSYCHOLOGY

- 41A. Psychology in Modern Society.** Science of human behavior. Research methods; origin and development of behavior; motives, emotion, and conflict in human adjustment; how man learns from his environment; how individuals differ. (5 cred.; with permission of adviser, student may substitute Psy. 1-2)

PUBLIC HEALTH

- 3Af.w.s. Personal Health.** Normal body function; causes and prevention of disease. (2 cred., §Pub.H. 3B or G.C. 10C; no prereq.) Thomson
- 51f.w. Community Hygiene.** Community programs for disease control. (3 cred., §Pub.H. 4, 50, 52, 53, or 100 or those excused from 3A on basis of military service; prereq. Pub.H. 3A or G.C. 10C) Cowan, Eichenlaub

PHYSIOLOGY

4f.s. Human Physiology. (4 cred.; will not count for credit for admission to the Medical School except by permission of the dean of that school; prereq. 1 qtr. zoology, 1 qtr. chemistry)

ROTC

The programs in Air Science (United States Air Force), Military Science and Tactics (U. S. Army Reserve), and Naval ROTC (Navy, Naval Reserve, Marine Corps or Marine Corps Reserve commissions) are open to qualified students of the department. For information concerning the requirements and the opportunities in Reserve Officer Training programs, consult the *Bulletin of Army-Navy-Air Force ROTC*. You may request this bulletin from the Office of Admissions and Records.

Credits earned in these ROTC programs may be allowed as elective credits toward the graduation requirements of both Plan A and Plan B.

SOCIAL SCIENCE

S.Sci.1f-2w-3s. Introduction to Social Science. Factors—historical, political, economic, social, psychological, and cultural—that influence and are influenced by man's conduct. Development of personality; work as a central aspect of modern life; the quest for community. (4 cred. per qtr.; may satisfy the social science requirement for admission to the Senior College of the College of Science, Literature, and the Arts, the College of Education, and the School of Business Administration; credit is given for each portion of the sequence completed; no prereq.) Nelson, Sibley, and staff

SPEECH

1f-2w.† Fundamentals of Speech. Development of basic skills in speech: voice and action, oral reading, discussion, extemporaneous speaking. (3 cred. per qtr., §Spch. 5-6; fr., no prereq.) Gilkinson, Smith, and staff

ZOOLOGY

14f-15w.† General Zoology. Structure, physiology, embryology, classification and evolution of animals. (3 cred. per qtr.; primarily for students in Mortuary Science, the College of Agriculture, Forestry, and Home Economics, and the School of Nursing; no prereq.) Olson

ELECTIVES

Each student is permitted to take some elective courses and is required to take enough elective credits to meet the graduation requirements. The exact number of elective credits is determined by the requirements of the plan selected by the student. Plan A allows for at least 17 elective credits and Plan B allows for at least 6 elective credits. These courses should be selected in keeping with the student's aptitudes and interests. Each student should try to choose his electives from specified areas of concentration. To those students who plan to go on working toward an advanced degree, it is important that they make careful selection of elective courses in order to facilitate the planning of their program for advanced degrees. All elective courses must be approved by the stu-

dent's adviser at the time of registration. The following subjects are recommended electives. For a full course description, the student should consult the appropriate college bulletin.

In the College of Science, Literature, and the Arts

(Credits shown in parentheses)

Economics

- 3—Elements of Money and Banking (5)
- 5—Elements of Statistics (5)
- 32—Beginning Typewriting (1)

Family Life

- 1—Preparation for Marriage (3)
- 15—The Home and Its Furnishing (3)

Humanities

- 1—Humanities in the Modern World I (5)
- 23—American Life III (3)

Art

- 1—Principles of Art (4)

Music

- 10—Introduction to Music (4)

Personal Orientation

- 1—How to Study (2)

History

- 3—Civilization of the Modern World (3)

Philosophy

- 1—Problems of Philosophy (5)
- 2—Logic (5)
- 3—Ethics (5)

Physiology

- 4—Human Physiology (4)

Political Science

- 25—World Politics (3)

Public Health

- 4—Health Problems of the Community (2)

Sociology

- 1—Introduction to Sociology (3)

Speech

- 1—Fundamentals of Speech (3)

Note: Must be followed by Spch. 2 (3 cred.) to receive credit.

In the General College

(Credits shown in parentheses)

- G.C. 1A—Individual Orientation (4)
- G.C. 3—Home Life Orientation (5)
- G.C. 4—Problems of Contemporary Society (5)
- G.C. 7EX—Sound in Music and Speech (3)
- G.C. 8—Applied Mathematics (5)
- G.C. 22X—Art in Business (3)
- G.C. 26A—Photography (3)
- G.C. 30A,B,C,D,E—Literature Today (3 each section)
- G.C. 31D—Business Writing (3)
- G.C. 32A—Basic Principles of Oral Communication (3)
- G.C. 37—Social Trends and Problems (5)
- G.C. 40A—Introduction to Philosophy (3)
- G.C. 40CX—Religions in Minnesota (3)

- G.C. 43A—Background of the Modern World (5)
- G.C. 43B—Historical Biography (3)
- G.C. 44B—Current History (2)
- G.C. 45A—The Growth of American Democracy (5)
- G.C. 45B—American Economic and Social Development (3)
- G.C. 45C—Minnesota and the Upper Midwest (5)
- G.C. 45D—Community Problems (3)
- G.C. 46B—The Functions and Problems of Government (3)
- G.C. 47A—Fundamentals of Typewriting (1)

Supplement to the

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Bulletin of the

UNIVERSITY OF MINNESOTA

College of Pharmacy 1955-1957

PROGRESS IN PHARMACEUTICAL EDUCATION

Beginning in 1892, the University of Minnesota awarded a Ph.G. degree for two years of professional pharmaceutical study. A minimum of three years with the degree Phm.C. was installed in 1915-16 but this was abolished in 1927-28 when a four-year course (B.S. in Pharmacy) began. Passage of time necessitated changes to meet professional and economic demands. The lengthening of pharmaceutical training was necessary to properly prepare graduates to take their places professionally and socially in their communities. By 1960, all colleges that are members of the American Association of Colleges of Pharmacy must extend their programs and the National Association of Boards of Pharmacy endorses such requirement for a B.S. in Pharmacy degree, a requirement for licensure.

Pharmaceutical education has progressed rapidly and soundly in keeping pace with advancements made in medicine, dentistry, veterinary medicine, etc. It could but resolve into an extended course of study.

The extended course of study in pharmacy has definite advantageous objectives: (1) augments the training and education program. The acquisition of so-called "broadening" courses contributes diversified knowledge and gives prestige to professional practice; (2) reduces to normal the scholastic clock hour load in the prescribed work which in the four-year curriculum was entirely too heavy; (3) allows the student to so implement himself by economic, political, and social studies that he may become an influence for better living in his community—this, to be accomplished by taking advantage of elective subjects offered by the University.

To sum up: (1) the professional practice of pharmacy will be at a higher level, and (2) the satisfaction of contributing to society not only professionally but also economically and socially will be immeasurably increased.

It should be remembered that in proportion as the educational structure of a profession gives stature, dignity, and prestige to it, it is essential that practitioner and layman alike be made conscious of its importance and value in the daily lives of the people.

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