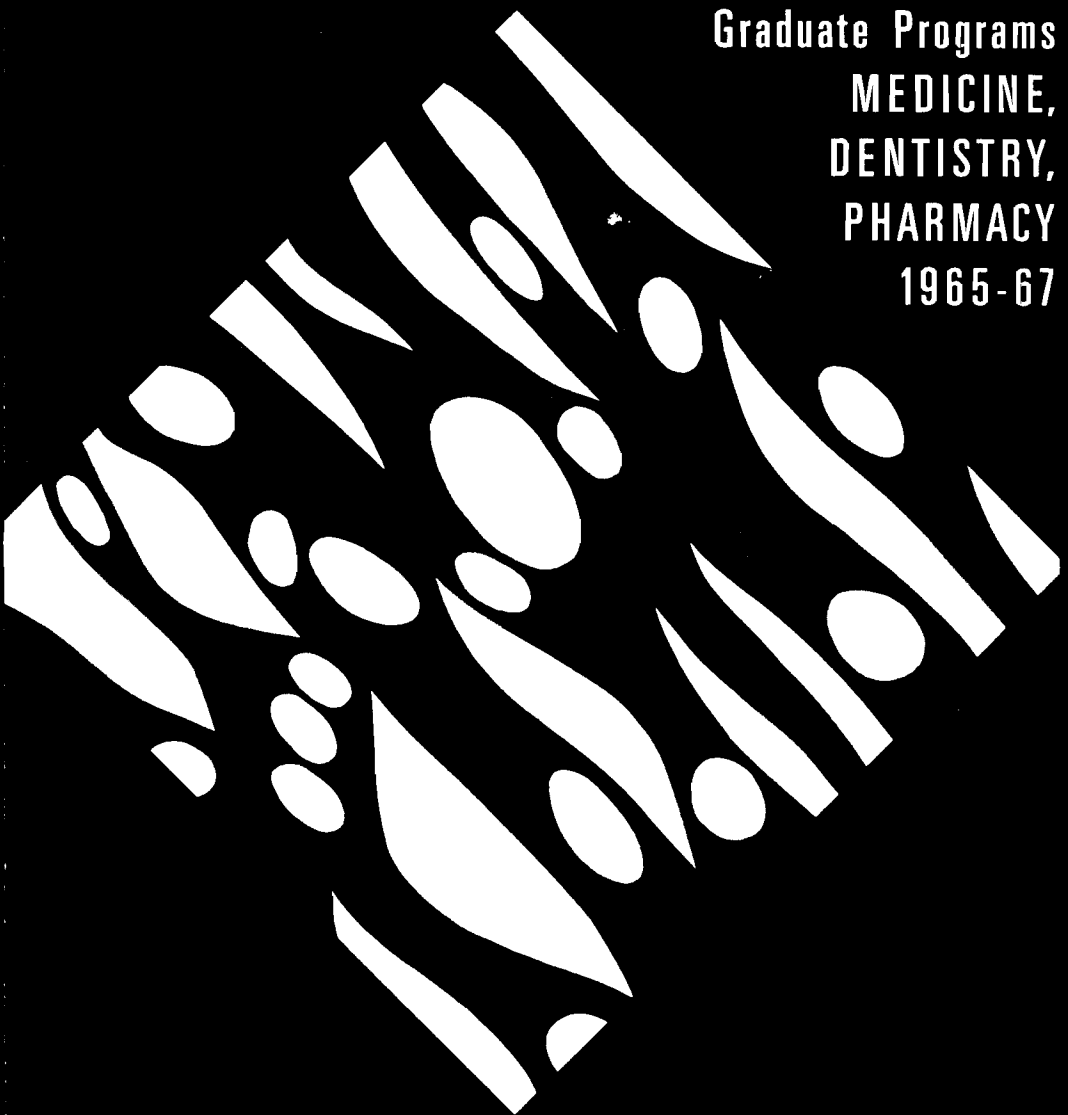


UNIVERSITY OF MINNESOTA BULLETIN

Graduate Programs
MEDICINE,
DENTISTRY,
PHARMACY
1965-67



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*. Suffix letters separated by commas (121f.w,s,ss) indicate the repetition of the course in corresponding quarters.

When no departmental abbreviation 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 cr" 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:

- ° Graduate students may prepare Plan B papers.
- † To receive credit, the student must complete all courses listed before dagger.
- ‡ A sequence course followed by a double dagger may be taken out of sequence.
- § No credit is given if credit has been received for equivalent course listed after section mark.
- * Means "concurrent registration in" (*i.e.*, course must be taken simultaneously)
- ♯ A sharp sign means "consent of instructor."
- ∇ A triangle means "consent of department or school offering course."
- × After a course number indicates course is offered more than 1 quarter.
- f,w,s,ss. These letters following a course number indicate fall, winter, spring, or summer quarter.

Courses numbered between 100 and 199 which are taught by members of the graduate faculty are open to both graduate and undergraduate students except in the School of 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 Graduate School of Medicine. The prefix M is added to courses offered at Rochester.

UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarne E. Grottum, Jackson; The Honorable Albert V. Hartl, Fergus Falls; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable George W. Rauenhorst, Olivia; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S. (Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

GRADUATE PROGRAMS IN MEDICINE, DENTISTRY, AND PHARMACY

Administration

Bryce Crawford, Jr., Ph.D., Dean of the Graduate School
Francis M. Boddy, Ph.D., Associate Dean of the Graduate School
Robert B. Howard, M.D., Ph.D., Dean of the College of Medical Sciences
Victor Johnson, Ph.D., M.D., Director of the Mayo Foundation
Erwin M. Schaffer, D.D.S., M.S.D., Dean of the School of Dentistry
George P. Hager, Ph.D., Dean of the College of Pharmacy

Committee on Graduate Medical Education

O. Meredith Wilson, Ph.D.
Bryce Crawford, Jr., Ph.D., *chairman*
Robert B. Howard, M.D., Ph.D.
Victor Johnson, Ph.D., M.D.
Cyrus P. Barnum, Jr., Ph.D., Medical School
Ellis S. Benson, M.D., Medical School
John E. Harris, Ph.D., M.D., Medical School
Robert J. Isaacson, D.D.S., Ph.D., School of Dentistry
Erwin M. Schaffer, D.D.S., M.S.D., School of Dentistry
Frederick E. Shideman, Ph.D., M.D., Medical School
John Spizzen, Ph.D., Medical School
Richard L. Varco, M.D., Ph.D., Medical School
Lee W. Wattenberg, M.D., Medical School
Leslie Zieve, M.D., Ph.D., Medical School
James W. DuShane, M.D., Mayo Graduate School of Medicine
Ward S. Fowler, M.D., Mayo Graduate School of Medicine
Joseph A. Gibilisco, D.D.S., M.S.D., Mayo Graduate School of Medicine
Victor Johnson, Ph.D., M.D., Mayo Graduate School of Medicine
R. Drew Miller, M.D., M.S., Mayo Graduate School of Medicine
Randall G. Sprague, M.D., Ph.D., Mayo Graduate School of Medicine
John S. Welch, M.D., M.S., Mayo Graduate School of Medicine

Graduate Programs in Medicine, Dentistry, and Pharmacy

GENERAL INFORMATION

Purpose—Opportunities for graduate study in the medical and allied sciences at the University of Minnesota are arranged to meet the educational needs of persons who are looking toward careers in research and teaching, or in the scientific practice of a special field of medicine, dentistry, or pharmacy. The Graduate School is not concerned with the short-term review or refresher courses which are made available to practitioners through the Center for Continuation Study and the Department of Continuation Medical Education of the Medical School. The Graduate School program is concerned with systematic studies in medicine and its allied fields as subjects of scientific inquiry and therefore offers to prospective clinicians opportunities to prepare themselves for study in their fields primarily as scientific disciplines rather than primarily as practical professional specialties. It also offers facilities for study in all of the sciences fundamental to clinical fields, both to students majoring in those fundamental sciences and to students majoring in applied and clinical fields.

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, i.e., he must have acquired clinical competence in the selected field and have made a contribution to knowledge related to or basic to his specialty. 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 have substantially advanced medical science through original investigation.

Although the Graduate School was not formally organized until 1905, graduate work in medical fields was being done and the first Ph.D. in a medical field was awarded in 1898. As a result of the concern of President George E. Vincent of the University, Dean Guy Stanton Ford of the Graduate School, and Drs. Will and Charles Mayo of the Mayo Clinic that the best possible program of medical graduate work be developed in the state of Minnesota, it was proposed that some type of affiliation be arranged between the facilities at Rochester and graduate medical education at the University. To enable this program to be realized, the Mayo Foundation for Medical Education and Research was organized as an independent entity but one closely related to the Mayo Clinic, and on May 6, 1915, the Board of Regents of the University voted to extend graduate work in the medical fields to include the work at the Mayo Foundation. In 1964, the Mayo Centennial Year, by act of the Board of Regents, the name of the Mayo Foundation for Medical Education and Research was changed to the Mayo Graduate School of Medicine, University of Minnesota. Members of the faculty at Rochester hold academic rank in the University of Minnesota and are also appointed to the Graduate School faculty. Currently approximately 600 students are registered annually in the Graduate School for advanced study of medicine at Rochester.

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.

In Rochester, laboratory facilities for research are available at St. Marys Hospital, Methodist Hospitals, the Medical Sciences Building, and the Mayo Clinic buildings.

Clinical Equipment—The University owns and controls Elliot Memorial Hospital, Cancer Institute, Todd Memorial Hospital, Psychopathic Hospital, Minnesota Hospital and Home for Crippled Children, Variety Club Heart Hospital, Child Psychiatry Hospital, Mayo Memorial, Masonic Memorial Hospital, Veterans of Foreign Wars Cancer Research Laboratory, and the University Health Service.

Hennepin County General Hospital, Veterans Hospital in Minneapolis, Ancker Hospital in St. Paul, Gillette State Hospital for Children in St. Paul, Shriners Hospital for Crippled Children in Minneapolis, as well as Mount Sinai Hospital and certain other private hospitals in Minneapolis and St. Paul, are also available for graduate work.

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

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

Libraries—The biomedical collections are housed in Diehl Hall, located adjacent to the hospitals. Also at the disposal of the student are the University Library, the departmental libraries, and the collections of the Hennepin County and Ramsey County Medical Societies. The medical library of the Mayo Graduate School of Medicine at Rochester occupies floors 11, 12, part of 14, 16, and 17 (tower floors) in the Mayo Clinic—Plummer Building. The collection consists of over 100,000 bound volumes, and the library receives some 2,000 medical journals. There are a general reading room, reading tables in the stacks, and special rooms for study. Current issues and complete files of the most important medical periodicals are available in both Minneapolis and Rochester.

Required Quality of Study—The student's work is graded quarterly by his immediate chief. For Master's programs credit will be given for work of A, B, and C quality. A grade point average of 2.80 is a minimum requirement, and individual departments and group committees may hold to a higher level of performance. The candidate for the Ph.D. is expected to maintain a standard of achievement superior to that of a Master's candidate. Students with unsatisfactory records will not be permitted to continue.

Course instructors may at their discretion place a time limit for removal of incomplete grades. In general it is recommended that grades of incomplete be removed within 1 calendar year.

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; and (d) 1 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 sciences (anatomy, biochemistry, biophysics, microbiology, 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 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, pa-

thology, physiology, etc.) through which they approach the specialty they wish to take as a major subject.

Note to Foreign Physicians—The foreign physician should check with the Immigration and Naturalization Service for current regulations as to permissible length of stay in the United States for individuals with exchange visitors' visas before planning his program of study.

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 Graduate School of Medicine. The number of graduate students registered for work is determined by the clinical opportunities and laboratory facilities available.

Students shall be registered in the Graduate School for the entire period they are receiving formal or clinical instruction. This registration shall include fall, winter, spring, and summer sessions. Registration for thesis only is permissible for students working on dissertations and not registered for any courses.

1. All teaching and research assistants, medical fellows, and medical fellow specialists shall be registered for full loads in the Graduate School for the full period of residence requirements of the master of science degree (3 calendar years of 4 quarters each for the M.S. with field named and 3 quarters for the degree without designation). All such persons who then elect to work toward the Ph.D. degree must register in the Graduate School *after* residence requirements are met, so long as they are taking any courses or working on a thesis for the degree.
2. All persons appointed under trainee programs shall be registered full time during the tenure of their appointments.
3. Postprofessional research fellows supported by agencies other than the Regents of the University employed by the University for 1 quarter or more shall be either (a) registered in the Graduate School or (b) appointed to an appropriate staff position. Any post-M.D. or post-D.D.S. fellow working toward a Graduate School degree shall be registered in the Graduate School as defined in 1. A person already holding the Ph.D. degree or its equivalent may be recommended for appointment as honorary fellow.
4. Persons on research fellowships, established investigatorships, or special research investigatorships who have fully completed their graduate training may be appointed to academic staff positions with or without salary supplementation, providing it is demonstrated that they will actually be performing important teaching and research functions.

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, medical fellow specialists, and members of the teaching staff enrolled in the Graduate School pay fees at the 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 and assistantships offer stipends ranging up to \$3,600 per year and higher in special cases. Holders of assistantships must be enrolled in or approved for admission to the Graduate School.

After the opening of the academic year the holder must be registered in the Graduate School during each quarter that he holds an appointment. For students holding assistantships during summer terms registration is not obligatory. *Medical fellows must be registered for each quarter and summer term while holding their appointments.*

Fellowships are available in the following clinical departments of the Medical School: anesthesiology, internal medicine, dermatology, psychiatry, neurology, obstetrics, ophthalmology, otolaryngology, pediatrics, physical medicine, radiology, surgery, neurosurgery, orthopedic surgery, proctology, and urologic surgery. In addition, there are several clinical fellowships at Hennepin County General Hospital and at Ancker Hospital (St. Paul). At the Hennepin County General Hospital fellowships are offered in medicine, ophthalmology and otolaryngology, pediatrics, surgery, pathology, urology, radiology, obstetrics and gynecology, psychiatry, neurology, and dermatology. At Ancker Hospital they include medicine, ophthalmology and otolaryngology, radiology, pediatrics, dermatology, pathology, and surgery. Medical fellows are required to devote their entire time to graduate work, including a small amount of teaching.

The University graduate training program in the clinical specialties of medicine includes residencies at the Minneapolis Veterans Hospital in medicine, dermatology, ophthalmology, otolaryngology, pathology, general surgery, urologic surgery, neurosurgery, orthopedic surgery, anesthesiology, neurology, psychiatry, and radiology.

Teaching assistantships have been established in the preclinical departments of the Medical School in anatomy (including embryology and histology), biochemistry, microbiology, physiology, physiological hygiene, and public health. There are fellowships in pathology which carry a stipend comparable to those for fellowships in the clinical departments. They require a small amount of teaching, the remainder of the time being devoted to graduate work leading to advanced degrees.

Funds are also available from United States Public Health Service training grants in many departments of the Medical School. Information concerning these may be obtained from department heads.

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

The Mayo Graduate School of Medicine carries laboratory science and clinical fellowships-residencies in anesthesiology, biochemistry, dermatology and syphilology, internal medicine, neurologic surgery, neurology and psychiatry, nutrition, obstetrics and gynecology, ophthalmology, orthopedic surgery, otolaryngology and rhinology, parasitology, pathology, pediatrics, physical medicine and rehabilitation, physiology, plastic surgery, proctology, radiology, surgery, urology, and dentistry. The fellowships carry stipends of \$3,600 first year, \$3,900 second year, \$4,200 third year, and \$4,500 fourth year with a 2-week vacation during first and second years, and 3-week vacation during the third and each succeeding year.

Nominations for fellowships at the Mayo Graduate School of Medicine are made throughout the year but primarily in the fall. 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 1 year and are renewable annually for a total period of 3 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 department concerned (for clinical fields), or (for basic sciences) to the Dean of the Graduate School, University of Minnesota, Minneapolis, Minnesota 55455. For fellowships at Rochester, requests should be sent to the Director of the Mayo Graduate School of Medicine, 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 Graduate School of Medicine, Rochester, Minnesota.

Fellows who have satisfactorily completed 3 years of residence at the Mayo Graduate School of Medicine may be awarded first assistantships in the Mayo Clinic at increased stipend.

Several of the departments in the Medical School and in related fields (anatomy, biochemistry, microbiology, pathology, pharmacology, physiology, public health, and biostatistics) 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 the College of Medical Sciences, University of Minnesota, Minneapolis, Minnesota 55455.

REQUIREMENTS FOR ADVANCED DEGREES IN MEDICINE

Licensure—Graduate students working in any field of clinical medicine at the Mayo Graduate School of Medicine must be licensed to practice in Minnesota within 6 months after beginning their work.

Academic Rank and Candidacy for Graduate Degree

A member of the staff of instruction above the rank of instructor or research fellow is not permitted to take a graduate degree at this University. He may register for graduate work, however, and credit thus obtained may be presented elsewhere.

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*, 2 or 3 years are required. For the *Master's degree with field named in clinical fields* (M.S. in pathology or radiology), 3 calendar years are required. This implies 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 2 years. For the Master's degree in the basic sciences a minimum of 1 year (3 quarters) is required.

Language Requirements—For the *Master's degree in the basic sciences*, a reading knowledge of one foreign language is required. The requirement can be satisfied either

- (1) by passing a proficiency examination or
- (2) by presenting to the appropriate language department certification of a grade of A in the third quarter of study of a language or a grade of B in the fourth quarter of study of a language, assuming: (a) that the course work was completed at the University of Minnesota; (b) that the course work was completed no longer than 5 years prior to the time the student applies for language certification; and (c) that any language department at Minnesota has the right to specify minimal course requirements in excess of those mentioned above. (Note: Courses taken in the Extension

Division for credit or in Correspondence Study may not be used in lieu of the proficiency examination.) or

- (3) by successful completion of the examination at the end of a course established in the Extension Division (by the Departments of German, French, and Spanish) to aid students in meeting the language requirement.

For further information, consult the Graduate School office and the major department. Forms for making application for the language examination may be obtained in the Graduate School office. The language department concerned will submit to the office of the dean of the Graduate School a certificate of proficiency in the designated language. The language requirement must be completed before the student may be admitted to the written or oral examinations required for this degree.

For regulations on transfer of language certificates from other institutions, see the *Bulletin of the Graduate School, 1964-66*.

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 and on the second Thursday of each term of the Summer Session. 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 basic sciences*: After completing 9 to 15 graduate credits, at least 3 of which must be in the major, and not later than opening of the quarter preceding the final quarter or final summer term, the student who expects to obtain a Master's degree shall present (for Plan A) his program and his thesis title or (for Plan B) his program for his adviser's signature. He shall then submit his signed program to the Graduate School for group committee action. Blanks for this purpose are provided by the Graduate School. A transcript of all graduate work the student has taken must accompany the program. Approval by the graduate group committee and the Graduate School indicates the student's admission to candidacy for the degree.

For the *Master's degree in the clinical branches*: Students are encouraged to submit their programs and thesis plans before the end of the second year of registration.

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

Transfer of Major Field—Admission to the Graduate School involves a specified major field. Any subsequent proposal for a change in major necessitates a formal request to the Graduate School.

Transfer of Major Fields at the Mayo Graduate School of Medicine—A fellow appointed in a given major field is expected to remain in that field for 1 year. Exceptions to the policy may be made when they are deemed desirable by the sections concerned and the administration at Rochester.

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 field which will serve as a basis for the proposed clinical specialization. This fundamental work should be concentrated in the first part of the course. Familiarity with those phases of the basic medical sciences essential to proficiency in the major specialty is required.

At the Mayo Graduate School of Medicine candidates must complete a minimum of 6 to 9 months of concentrated work in a related laboratory field for the minor.

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.

The subject of the thesis must be approved by the adviser and by the Medical Graduate Group Committee. The topic should be within the field of the major, or within the minor field but related to 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 certification 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 obtain approval through the Graduate School office.

The Master's thesis must be typewritten in quadruplicate, two copies on 20-pound linen stock of 75 per cent rag content, the others on 13-pound bond paper. 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. Multilith, multigraph, and Xerox methods of reproduction may be accepted, provided that 16- and 20-pound bond is used. A copy of the thesis, certified by the adviser as complete, must be registered in the dean's office at least 8 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 normally will include two representatives of the major field and one representative of the minor field. The committee must be unanimous in certifying that the thesis is ready for defense, and a record of this action 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 5 weeks before the commencement in which he wishes to take his degree*, the sum of \$5 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, the candidate for the Master's degree Plan A must pass a final written examination, a final oral examination, or both, at the discretion of his examining committee.

If only a final written examination is specified, it must be held not later than 5 weeks before the end of the quarter in which the student takes his degree. It will cover the major and minor fields and may include any work fundamental thereto.

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 graduate 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.

If only a final oral examination is specified, it also must be held not later than 5 weeks before the end of the quarter in which the student takes his degree. This examination, normally 1 hour and not more than 2 hours in length, will be conducted by the committee appointed to examine the thesis, with the adviser serving as chairman, and may cover both the major and minor fields, including any work fundamental thereto and will be a defense of the thesis. 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.

If both a written and an oral examination are specified, the written examination must precede the oral examination, and the time of completion of the oral examination indicated above must be adhered to. Committee certification of the thesis must precede the final oral examination.

Students eligible for the "preliminary examination" for the Doctor's degree may substitute this examination for the final oral examination for the Master's degree, if all other requirements for the preliminary examination have been met.

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 5 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.

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

Requirement	Under the Direction of	Date
Initial registration	Adviser and dean of the Graduate School or director of Mayo Graduate School ...	On entrance
Approval of degree program, language choice, thesis subject, and candidacy	Adviser, group committee, and dean	After completion of 9 to 15 credits for basic science majors or no later than opening of quarter preceding final quarter Before end of second year for majors in clinical fields
Language requirement (completion)	Adviser, group committee, and language department	Before admission to written and oral examinations
Licensure (Mayo Graduate School only)	State Board	6 months after beginning graduate work
Registering of thesis	Graduate School office	Consult Graduate School office for date
Certification of thesis	Thesis committee	Before admission to final oral examination

Requirement	Under the Direction of	Date
Final examinations, written or oral or both.....	Major adviser and committee	} Consult Graduate School office for date
Filing of thesis.....	Graduate School office.....	
Graduation fee and fee for binding thesis.....	Office of Admissions and Records.....	Not later than 5 weeks before commencement in which student takes his degree

Doctor of Philosophy Degree

Residence—For the Doctor's degree (Ph.D.) at least 3 full years of successful graduate study are required, including certain special requirements noted in the following pages. In the clinical fields the Ph.D. is always a degree with designation. In pathology the Ph.D. may be earned either with or without designation.

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.

Transfer of Major Field—Admission to the Graduate School involves a specified major field. Any subsequent proposal for a change in major necessitates a formal request to the Graduate School.

Transfer of Major Fields at the Mayo Graduate School of Medicine—A fellow appointed in a given major field is expected to remain in that field for 1 year. Exceptions to the policy may be made when they are deemed desirable by the sections concerned and the administration of the Mayo Graduate School of Medicine.

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 field, 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 preliminary oral examination will include the minor field.

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

Rochester candidates must complete a minimum of 9 months of concentrated work in a related laboratory field for the minor.

Supporting Program of Study—With the approval of his major adviser and the appropriate group committee, a student may include, in place of the minor, a *supporting program* of study in his over-all doctoral program. The traditional minor will continue to be available at the option either of the student or of his adviser.

This supporting program, like the minor, must include not less than one-sixth of the total work in the doctoral program in courses numbered 100 and above and must be completed before admission to the preliminary examinations. It must be a coherent pattern of studies, possibly embracing several disciplines, but clearly forming a purposeful part of the doctoral program with the same type of supporting relation to the major field as the traditional minor. The student's major will, of course, be the core that holds the entire program together.

A student electing to use the supporting program option will not be expected to take written preliminary examinations in the fields included in his supporting program, nor will he be expected to have competency in each of the fields in his supporting program comparable to that of a person with a traditional minor in the field concerned.

This type of individually tailored program will necessitate careful planning by the student in co-operation with faculty advisers. It is therefore essential that the Ph.D. program be submitted to the Graduate School office as soon as possible after completion of 1 academic year of course work to facilitate group committee action and approval before a student commits himself to work on a supporting program.

A student who wishes to use the supporting program should consult with his major adviser and at least one other full member of the graduate faculty concerning the coherency of his doctoral program. A student's completed Ph.D. program must have the approval of the major adviser and, with regard to the supporting program, the approval of one other full member of the graduate faculty.

Program of Study

Upon entrance to the Graduate School, the student shall select and be accepted by an adviser from the graduate faculty. The first year is devoted primarily to completion of courses in his program. Attention should also be given to meeting requirements pertaining to the foreign language, collateral field, and research technique (see discussion under Language Requirement).

After successful completion of the equivalent of a full academic year of course work, but at least 5 calendar months before the preliminary oral examination is to be scheduled, the student shall submit to the Graduate School office a language declaration form and doctoral program blank.

Language Declaration Form—On this form the student will indicate and justify the appropriateness of the foreign languages to be presented in fulfillment of the requirements for the Ph.D. When a collateral field of knowledge or a research technique is offered as a substitute for one of the foreign languages, he will indicate on the reverse side of the form the course work he has completed or proposes to complete to satisfy the requirement and will justify its appropriateness.

Doctoral Program Form—On the doctoral program blank the student will submit a complete statement of all work to be offered for the degree:

1. A list of all graduate courses completed and proposed in the major.
2. A list of all graduate courses completed and proposed in the minor.
3. Courses offered as a collateral field or special research technique when either is being proposed.
4. If the candidate wishes to present graduate courses taken elsewhere toward the Ph.D. degree from the University of Minnesota, these should be listed under 1, 2, and 3 on his Doctoral Program Form. For the student who transfers work from other graduate schools, the first 2 years or the last year must be spent in residence at the University of Minnesota. Whatever the amount of transferred credit, he must pay tuition fees appropriate to his residence or staff status for at least 3 quarters of graduate study in residence at the University of Minnesota. Transfer of credit from other institutions will be considered when the doctoral program is approved, and no petition for transfer of credits or residence is necessary.

A transcript of all completed graduate work the student lists on his program, whether taken here or elsewhere, must accompany the program.

Programs should be submitted to the Graduate School office in the first or fifth week of any quarter to insure action within the quarter by the appropriate graduate group committee. These committees are convened only twice each quarter, and some do not meet routinely during the summer.

Candidacy—Admission to candidacy for the Ph.D. degree will be determined by the dean of the Graduate School upon recommendation of the group committee and

can be defined as that point where the student has passed the preliminary oral examination.

Time Limit for Earning the Ph.D. Degree—Effective with the quarter immediately following admission to candidacy for the Ph.D. (or fall quarter 1962 for students who have been admitted to candidacy prior to fall quarter 1962) the student must:

1. Complete all requirements and receive the Ph.D. degree within 5 calendar years (in some areas an earlier deadline is established). Petitions for extension of this time limit must be submitted before expiration of the 5-year time limit. Violation of this time limit through failure to obtain Graduate School approval of extension may necessitate retaking the oral preliminary examination.
2. Register continuously and pay fees during the academic year (fall, winter, spring) until the Ph.D. is awarded. Failure to register continuously will automatically terminate candidacy for the doctorate. To reinstate candidacy, the student may be required to retake the preliminary oral examination and to pay fees past due. Course registration for the first or second summer term (or both) may be made in lieu of the respective fall or winter quarters (or both) immediately following, and will fulfill the continuous registration requirement. (However, students who hold University appointments which require registration in the Graduate School in the academic year must be registered in the Graduate School during the period of appointment.)

Registration by Mail—The student who has been admitted to candidacy for the Ph.D. degree (for definition of candidacy see above) and is not registering for course work may register by mail. Registration forms for this purpose will be mailed to the candidate prior to the opening of each academic quarter. He must return his registration form and check or money order for the appropriate amount to the Office of Admissions and Records, Morrill Hall, University of Minnesota, Minneapolis, Minnesota 55455.

Thesis Title Form—At the time of submission of the doctoral program, or not less than 5 months before the scheduling of the final oral examination, the student shall file with his adviser's approval the title of his doctoral dissertation. The thesis title form is obtained in the Graduate School office. To aid the Medical Graduate Group Committee in appointing the thesis reading committee, the student will submit, with his thesis title form, a 25-word summary of the thesis work he is proposing.

Language Requirements

The following regulations are effective for all Ph.D. candidates. In general, reading knowledge of two foreign languages is required. Where it is so stipulated, however, the requirement may be met with reading knowledge of one foreign language and the option of a *collateral field of knowledge* or a *research technique*.

Two-Language Option—The language requirement can be satisfied either

1. By passing the proficiency examinations or
2. By presenting to the appropriate language department certification of a grade of A in the third quarter of a language or a grade of B in the fourth quarter of a language, assuming (a) that the course work was completed at the University of Minnesota; (b) that the course work was completed no longer than 5 years prior to the time the student applies for language certification; and (c) that any language department at the University of Minnesota has the right to specify minimal course requirements in excess of those

mentioned above. **Note:** No course taken in the Extension Division for credit or in Correspondence Study may be used in lieu of the proficiency examination or

3. By successful completion of the examination at the end of a course established in the Extension Division (by the Departments of German, French, and Spanish) to aid students in meeting the language requirement.

The Ph.D. candidate shall submit the language declaration form no later than the time he submits his doctoral program.

The foreign languages selected for fulfilling this requirement should be relevant to the field of scholarly work of the candidate. The burden of proof of the relevance of proposed languages rests upon the candidate and his major adviser. In no case may English be submitted as a foreign language. The foreign language requirement must be completed before the student is admitted to the preliminary examinations for the Ph.D.

Repetition of any foreign language examination is considered a special examination for which a fee of \$5 is charged.

In meeting the foreign language requirement, certification achieved in another approved institution may be transferred to the University of Minnesota record if this certification was earned within a 3-year period immediately prior to entering this Graduate School.

Research Technique Option—A special research technique is defined as not less than 9 credits in approved Upper Division or graduate courses, completed with a grade not lower than C. The burden of proof of the significance or relevance of the proposed research technique 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 no case may the special research technique subject 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.

Course credits presented to fulfill the requirements of a special research technique shall be recorded on the student's permanent grade record. Any group committee may require a standard of performance higher than the minimum standard of C after appropriate consultation with the departments within its area. Course credits which are used as part of the major or minor may not be reused as a research technique. The special research technique requirements may be met by special proficiency examinations where such examinations are feasible and practical. This requirement must be met before admission to the preliminary examination.

To meet the requirements of a special research technique, credit earned or proficiency demonstrated in other approved institutions may be transferred to the University of Minnesota record if these have been completed within a 3-year period immediately prior to entering this Graduate School.

Collateral Field Option—A collateral field of knowledge is defined as not less than 15 credits of work in courses numbered 100 or above, completed with a grade not lower than C. For this purpose a maximum of 6 of the 15 credits may be transferred from the Extension Division, provided that the courses are taught by approved members of the graduate faculty. The collateral field of knowledge is expected to broaden the candidate's scholarly and scientific background by permitting exploration of knowledge in a field 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.

The burden of proof of the significance or relevance of the collateral field 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 no case may 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.

Where a collateral field of knowledge 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.

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.

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

Language Examinations—Examinations to meet the language requirement of the Graduate School, unless otherwise arranged with the language departments, shall be held on the second Thursday of each quarter and on the second Thursday of each term of the Summer Session.

A repetition of the language examination is considered a special examination for which a fee of \$5 is charged.

Examinations and Thesis

Written Examinations—The major department shall give a written qualifying examination prior to the oral preliminary examination for the Ph.D. degree. 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. The department may also give a written examination prior to the final oral examination.

A written qualifying examination in the minor field shall be required prior to the oral preliminary examination for the Ph.D. degree, and the results shall be reported to the dean of the Graduate School. This requirement may be waived in a specific case by the graduate faculty in the minor field, which shall notify the dean of such a waiver.

Preliminary Oral Examination—At least 1 full academic quarter before the Doctor's degree is conferred, an oral preliminary examination (not to exceed 3 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 4-to-1; if the committee consists of six members, a unanimous vote or a vote of 5-to-1 or 4-to-2 will pass the candidate; and if the committee consists of seven members, a unani-

mous vote or a vote of 6-to-1 or 5-to-2 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 1 full academic quarter has passed.

Preliminary oral examinations will not be scheduled during the period of final oral examinations for the June commencement—normally from about April 8 to May 6—or from the beginning of the second term of Summer Session to the opening of the fall quarter. Preliminary oral examinations must be scheduled *1 week in advance* in the office of the Graduate School by the prospective candidate or his adviser.

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. A candidate contemplating publication of any material that he expects to present for a thesis should therefore obtain such approval through the Graduate School office.

The thesis must be typewritten in quadruplicate to facilitate reading by the thesis committee. A copy must be registered in the dean's office and four copies distributed to the thesis committee at least 2 weeks before the final oral examination. (Students should consult the Graduate School office for dates when their theses must be registered.) Multilith, multigraph, and Xerox methods of reproduction are permitted. The thesis must be read by a committee of not less than three members. As a rule, the student's adviser will be chairman of this committee, and the field of the minor or the supporting program of study will be represented by at least one committee member. Unanimous certification of the thesis, as ready for defense, 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.

When he submits to the Graduate School office his *thesis report form*, *final oral examination report*, and *two bound copies of the thesis*, 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 \$25. 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 certification 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 3 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.

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 5 weeks before the commencement in which he expects to take the degree.*

Reports—Special forms 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 report on the written examination in the major before the preliminary oral examination can be scheduled, the thesis review report at the time the final oral examination is scheduled, and the final oral report form at least 5 weeks before graduation.

Office of Scientific Personnel Survey Form—Before the student's name can be included on the degree list, he is required to fill out a survey form for the Office of Scientific Personnel of the National Research Council. The completed form is submitted to the Graduate School office.

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

Requirements	Under the Direction of	Date
Initial registration	Adviser and dean of the Graduate School	
Doctoral program and language plan	Adviser, minor faculty, Medical Graduate Committee, and dean of Graduate School	After first year or at least 5 months before preliminary oral examination
Completion of minor or supporting program	Course instructors	} Before admission to preliminary examination
Language certification and/or research technique	Adviser, group committee, and language departments	

Requirements	Under the Direction of	Date
Written examinations	Graduate faculties of the major and minor fields	Prior to preliminary oral examination
Preliminary examination, oral	Committee	At least 1 academic quarter before degree is to be conferred
Thesis title and plan if required	Adviser, Medical Graduate Committee, and dean of Graduate School	After doctoral program is submitted and at least 5 months before final oral examination
Registering of completed thesis	Graduate School office	Consult Graduate School office for date
Certification 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 \$25 for micro-filming thesis	Graduate School office	} Not later than 5 weeks before commencement in which student takes his degree
Office of Scientific Personnel Survey Form	Graduate School office	
Release card	Graduate School office	
Graduation fee	Office of Admissions and Records	

FIELDS OF INSTRUCTION

See inside front cover 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.

Graduate degrees may be earned in the following major fields:

<i>Master's Degree</i>	<i>Ph.D. Degree</i>
Anatomy (including hematology, histology, and embryology)	Anatomy (including hematology, histology, and embryology)
Anesthesiology	Biochemistry
Biochemistry	Biophysics
Biophysics	Biostatistics
Biostatistics	
Dentistry	Dermatology
Dermatology	Environmental Health
Environmental Health	Epidemiology
Epidemiology	
Hospital Pharmacy	Medicine, Internal
Medical Technology	Microbiology
Medicine, Internal	Neurology
Microbiology	Neurosurgery
Neurology	Obstetrics and Gynecology
Neurosurgery	Ophthalmology
Obstetrics and Gynecology	Orthopedic Surgery
Ophthalmology	Otolaryngology (including otology, rhinology, and laryngology)
Orthopedic Surgery	Pathology
Otolaryngology (including otology, rhinology, and laryngology)	Pediatrics
Pathology	Pharmaceutical Chemistry
Pediatrics	Pharmaceutical Technology
Pharmaceutical Chemistry	Pharmacognosy
Pharmaceutical Technology	Pharmacology
Pharmacognosy	Physical Medicine and Rehabilitation
Pharmacology	
Physical Medicine and Rehabilitation	Physiological Chemistry
Physical Therapy	Physiological Hygiene
Physiological Chemistry	Physiology
Physiological Hygiene	
Physiology	Plastic Surgery
Plastic Surgery	Proctology (Colon and Rectal Surgery)
Proctology (Colon and Rectal Surgery)	Psychiatric Nursing
Psychiatric Nursing	Psychiatry
Psychiatry	
Public Health	Psychiatry
Radiology	Radiology
Surgery	Surgery
Urology	Urology

ANATOMY

OFFERED AT MINNEAPOLIS

Professor

Arnold Lazarow, M.D., Ph.D.
R. Dorothy Sundberg, Ph.D., M.D.
Lemen J. Wells, Ph.D.

Morris Smithberg, Ph.D.
Richard L. Wood, Ph.D.

Assistant Professor

Padmakar K. Dixit, Ph.D.
Arnold W. Lindall, M.D., Ph.D.

Associate Professor

Anna-Mary Carpenter, Ph.D., M.D.
William J. L. Felts, Ph.D.
Carl B. Heggstad, M.D., Ph.D.

Lecturer

Robert J. Isaacson, D.D.S., Ph.D.

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

Major and Minor, for the Ph.D.—Each major in anatomy must have had or must take the basic courses in anatomy—embryology, gross anatomy, histology, and human neuroanatomy. 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, reading knowledge of one foreign language—French, German, Italian, Spanish, or Russian. For the Ph.D. degree, either (a) two foreign languages (preferred) or (b) one foreign language and the option of a collateral field of knowledge. When two languages are offered, any combination of the languages listed above may be approved.

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. (14 cr for both qtrs; prereq #; enrollment limited) Lazarow, Heggstad, Smithberg, Wells
- 103f-104s.† Human Histology.** Microscopic structure, cytochemical and functional aspects of cells, tissues, and organs. (7 cr for both qtrs; enrollment limited; prereq #) Lazarow, Carpenter, Wood
- 105f. Microscopic Anatomy.** Minute structure of the tissues and organs of the body including the nervous system, emphasis on teeth and digestive tract. (8 cr; prereq 108 and 109) Isaacson, Lindall
- 107w. Human Embryology.** Development of the human body. (4 cr; enrollment limited; prereq #) Heggstad
- 108w. Gross Anatomy for Dental Students.** Lectures and dissection of extremities and abdomen and pelvis. (6 cr; enrollment limited; prereq #) Felts and staff
- 109s. Gross Human Anatomy for Dental Students.** Lectures and dissection of thorax and head and neck. (6 cr; enrollment limited; prereq #) Felts and staff
- 111s. Human Neuroanatomy.** Structure of the nervous system including the organs of special sense. (5 cr; enrollment limited; prereq 104 or Zool 150, #) Lindall, Smithberg
- 131. Biological Electron Microscopy.** (Cr and hrs ar; prereq #) Wood
- 132. Experimental Study of the Fetus.** (Cr and hrs ar; prereq #) Wells
- 140f. Skeletal Tissue Biology.** Gross and microscopical anatomy of the skeletal tissues, their origin and development. Student presentation of literature in their particular areas of interest. (2 cr; prereq #) Felts
- 149. Experimental Neuroanatomy.** Morphology of the central nervous system as determined by experimental methods. (Cr and hrs ar; prereq #)
- 153, 154, 155, 156.† Advanced Anatomy.** Cytochemistry, embryology, gross anatomy, hematology, histology, or neurology or experimental morphology. (Cr and hrs ar; prereq #) Staff

160. **Introduction to Histological and Morphologic-Histochemical Techniques.** Fixation, embedding, and staining of cytological components and enzymes. (2 cr; prereq 104, #) Carpenter
161. **Experimental Cytochemistry.** (Cr and hrs ar; prereq 104, MdBc 101, #) Lazarow
- 165f-166w. **Hematology.** Blood and blood-forming organs; blood and bone marrow from the standpoint of diagnosis and prognosis. (4 cr per qtr; prereq 103, or Zool 54 or #) Sundberg
- 167s. **Seminar: Hematology.** (1 cr; prereq 166) Sundberg
- 201, 202, 203, 204. **Research in Anatomy.** Cytochemistry, embryology, gross anatomy, histology, hematology, or neurology. Special facilities offered to graduate students in clinical departments for work upon problems in applied anatomy. (Cr and hrs ar; prereq #) Carpenter, Felts, Heggstad, Lazarow, Smithberg, Sundberg, Wells, Wood
- 205, 206, 207. **Seminar: Anatomy.** Reviews of current literature and discussion of research work being carried on in the department. (1 cr per qtr; prereq #) Lazarow and staff

OFFERED AT ROCHESTER****Professor**W. Henry Hollinshead, Ph.D., *head***Assistant Professor**

Frederick W. L. Kerr, M.D.

Associate ProfessorGertrude Loma Pease, M.D., M.S.
Richard K. Winkelmann, M.D., Ph.D.

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

- M 251f.s. **Anatomy for General Surgeons.** Fundamental anatomical facts and relations, especially of the neck and trunk, are reviewed; details of special surgical interest, not generally acquired in undergraduate anatomy, are studied in lectures, discussions, and by dissection. Hollinshead
- M 252s. **Anatomy of the Head and Neck.** Detailed laboratory study of the gross anatomy of the head and neck, designed especially for fellows majoring in otolaryngology, is supplemented by lectures and discussions. Hollinshead
- M 253f. **Anatomy and Neuroanatomy of the Orbit.** Lectures and laboratory work in detailed anatomy of the orbit and optic pathways. Hollinshead
- M 254f. **Neuroanatomy.** Review of fundamental structures and connections of the central and peripheral nervous systems. Hollinshead
- M 255s. **Orthopedic Anatomy.** Lectures and laboratory work on the limbs and back. Hollinshead

ANESTHESIOLOGY**OFFERED AT MINNEAPOLIS****Professor**Frederick H. Van Bergen, M.D., M.S., *head*
Joseph J. Buckley, M.D., M.S.**Assistant Professor**Earl A. Schultz, M.D., M.S.
Hugh D. Westgate, M.D., M.S.**Associate Professor**John R. Gordon, M.D., M.S.
James H. Matthews, M.D., M.S.**Instructor**

Charles E. Galway, M.D., M.S.

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.

** Enrollment in these courses is limited.

Master's Degree—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.** Instruction and experience in general anesthesia. (12 cr per qtr)
266f,w,s,su. Regional Anesthesia. Observation, instruction, and administration of all types of local, regional, and spinal anesthesia. (4 cr per qtr)
267f,w,s,su. Pre- and Postanesthetic Evaluation. Selection of proper anesthetic agent and technique, premedication, and observation of recovery from anesthesia. (2 cr per qtr)
268f,w,s,su. Seminar: Anesthesiology. Review of literature, report of case problems, and discussion of research work in progress within the department. (2 cr per qtr)
269f,w,s,su. Research in Anesthesia. Anesthesia problems in experimental laboratory or in hospital. (Cr and hrs ar)

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

- MdBc 100-101. Biochemistry**
MdBc 153. Problems in Biochemistry
MdBc 200. Seminar: Biochemistry
Med 202. Diseases of the Cardiovascular Apparatus
Phel 109. Pharmacological Problems
Phel 203. Research in Pharmacology
PubH 110. Biostatistics I
PubH 111f, 121w. Biostatistics Laboratory I, II
PubH 120. Biostatistics II

OFFERED AT ROCHESTER

Professor

Albert Faulconer, M.D., M.S., *head*
 Thomas H. Seldon, M.D., C.M., M.S.
 (Clinical)

Associate Professor

Richard A. Theye, M.D.

Assistant Professor

Emerson A. Moffitt, M.D.

Instructor

Edward F. Daw, M.D.
 Brian Dawson, M.B.
 Robert A. Devloo, M.D.
 Edward P. Didier, M.D.
 Allan B. Gould, Jr., M.D., M.S.
 Virginia B. Hartridge, M.D.
 Robert R. Jones, M.D.
 John T. Martin, M.D.
 John D. Michenfelder, M.D.
 John A. Paulson, M.D., M.S.
 Howard R. Terry, Jr., M.D.

Graduate training in anesthesiology at the Mayo Graduate School of Medicine combines opportunity for an advanced degree with realistic training in anesthesiology. Fellows in anesthesiology may work toward an M.S. degree with a minor in physiology. The usual 3-year program fulfills requirements for the American Board of Anesthesiology.

A fellow who is particularly interested in study in certain branches of anesthesiology may arrange to stress those phases. A limited number of opportunities is available to anesthesiologists who are board qualified for subspecialty training in cardiovascular anesthesiology and neuroanesthesiology.

Seminars, conferences, and informal discussions make it possible for the fellow to obtain theoretical as well as wide clinical training in all aspects of anesthesiology.

Master's Degree—Offered only under Plan A.

- M 251f,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. Faulconer and staff
M 252f,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; lumbar epidural anesthesia; bronchoscopic aspiration; regional anesthesia; extracorporeal circulation. Faulconer and staff

- M 253f,w,s,su. Anesthesiology as Applied to All Types of Oral Surgery.** Faulconer and staff
- M 254f,w,s,su. Neurosurgical Anesthesia.** Twelve months' observation and training in this field with graded responsibility increasing. In addition to intensive clinical experience, several months are devoted to lectures, demonstrations, and clinical work in related fields: neuro-anatomy, neuropathology, neurophysiology, electroencephalography, and electromyography. (Prereq 2 yrs general and special anesthesia)
- M 255f,w,s,su. Cardiovascular Anesthesia.** Twelve months devoted to anesthesia for patients undergoing surgery for cardiovascular disease. Increasing responsibility for patient care as experience increases. Several months devoted to studies in related fields: cardiac catheterization, pulmonary and cardiovascular physiology, association with clinical research problems in cardiovascular surgical field. Extensive experience in management of cardiopulmonary bypass patients. (Prereq 2 yrs general and special anesthesia training)

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)

BIOCHEMISTRY

OFFERED AT MINNEAPOLIS

Professor

Wallace D. Armstrong, M.D., Ph.D.
Joseph T. Anderson, Ph.D.
Cyrus P. Barnum, Jr., Ph.D.
Ellis S. Benson, M.D.
Ivan D. Frantz, M.D.
Helmut R. Gutmann, M.D.
Ralph T. Holman, Ph.D.
Joseph Larner, M.D., Ph.D.
Leon Singer, Ph.D.

Associate Professor

Robert W. Bernlohr, Ph.D.
Charles W. Carr, Ph.D.
Frank Ungar, Ph.D.
John F. Van Pilsun, Ph.D.
Richard W. Von Korff, Ph.D.
Donald B. Wetlaufer, Ph.D.
Leslie Zieve, M.D., Ph.D.

Assistant Professor

Curtis H. Carlson, M.D., Ph.D.
Ernest D. Gray, Ph.D.
James F. Koerner, Ph.D.

Prerequisites—For a doctoral major in biochemistry (or physiological chemistry) courses in analytical, organic, and physical chemistry comparable to those of a baccalaureate chemistry major are expected. The minimum requirements for candidates for the Ph.D. degree with a major in biochemistry (or physiological chemistry) are AnCh 101-102 or equivalent; OrCh 61-64 or equivalent; PCh 101-103 or in exceptional cases PCh 107-108. Candidates for the Master's degree with a major in biochemistry (or physiological chemistry) or those seeking a Ph.D. with a minor in biochemistry (or physiological chemistry) may be admitted with less rigorous courses in these fields of chemistry. Some admission deficiencies may be discharged in courses taken concurrently with graduate studies. One year's work in a biological science is desirable.

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

Master's Degree—Offered only under Plan A.

Doctor's Degree—Candidates for the Doctor's degree with a major in biochemistry (or physiological chemistry) will be required to present or to develop satisfactory competence in organic, analytical, and physical chemistry and in the

biological sciences. The following courses are usually included in the program of graduate study: MdBc 100-101 (or 141, 142, 144, 145, and 147), four of the nine biochemistry courses numbered 206, 207, 210, 211, 213, 214, 215, 217, or 218, and other courses in biochemistry or logically related fields. 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. The department will supply full information on admission and graduate study requirements on request.

If MdBc 141, 142, 144, 145, 147, 100-101 or their equivalents have been taken 5 years or more prior to the time the candidate is to appear for the preliminary oral examination, these courses must be retaken.

100f,su-101w,su. Biochemistry. (8 cr per qtr; prereq physics, physical and organic chemistry) Armstrong, Barnum, Carr, Ungar, Van Pilsum, Wetlaufer

141f. The Chemistry of Carbohydrates, Lipids, Proteins, and Nucleic Acids. (Same as BioC 141) (3 cr; prereq 1 yr organic chemistry, 2 qtrs physical chemistry [or concurrent registration], ¶145 or Δ) Liener, Wetlaufer

142w. Cellular and Intermediary Metabolism. (Same as BioC 142) (3 cr; prereq 141) Kirkwood, Von Korff

144s. Regulation of Cellular Metabolism. (3 cr; prereq 141-142 or 100-101) Staff

145f. Laboratory Course: The Isolation and Characterization of Natural Products. (2 cr; prereq ¶141; enrollment limited) Staff

147s. Laboratory Course: Applications of Physico-Chemical Methods of Analysis to Characterization of Biochemical Systems. (2 cr; prereq 142 and AnCh 212; biochemistry majors given priority) Staff

153f,w,s,su. Problems in Biochemistry. Special work arranged with qualified students. (Cr and hrs ar; may be taken 1 or more qtrs; prereq 144 or 101) Staff

200f,w,s,su. Seminar: Biochemistry. (1 cr) Staff

205f,w,s,su. Research in Biochemistry. (Cr and hrs ar) Staff

206f. Advanced Endocrinology and Steroid Chemistry. (3 cr; minimum of 8 students; prereq 144 or 101; offered 1965-66 and alt yrs) Ungar

207f. Radiotracers and Mineral Metabolism. (3 cr; minimum of 8 students; prereq 144 or 101; offered 1966-67 and alt yrs) Armstrong, Singer

210w. Metabolic Enzymology. (3 cr; minimum of 8 students; prereq 144 or 101; offered 1965-66 and alt yrs) Larner

211s. Nucleic Acid and Protein Metabolism. (3 cr; minimum of 8 students; prereq 144 or 101; offered 1966-67 and alt yrs) Barnum

213f,w,s. Clinical Biochemistry. (Cr and hrs ar)

214s. Kinetics and Mechanism of Enzymic Reactions. (3 cr, §PCh 214; minimum of 8 students; prereq 210, PCh 103 and #; offered 1965-66 and alt yrs) Lumry

215su. Topics in Lipid Metabolism. (3 cr; minimum of 8 students; prereq 144 or 101 or #; offered 1965 and alt yrs) Frantz

217w. Protein Chemistry. (3 cr; minimum of 8 students; prereq 144 or 101 or # and PCh 103 or #; offered 1966-67 and alt yrs) Wetlaufer

218s. Physical Methods in Biopolymer Research. (3 cr; minimum of 8 students; prereq 217; offered 1966-67 and alt yrs) Lumry, Wetlaufer

236f,w,s. Radioisotope Seminar. (1 cr, §Rad 236) Loken, Armstrong, and staff

OFFERED AT ROCHESTER

Professor

Vernon R. Mattox, Ph.D., *head*
Harold L. Mason, Ph.D.
Gerard A. Fleisher, Ph.D.
Eunice V. Flock, Ph.D.
Charles A. Owen, Jr., M.D., Ph.D.

Assistant Professor

Warren F. McGuckin, M.S., Ph.D.
John W. Rosevear, M.D., Ph.D.

Instructor

Ralph D. Ellefson, M.S., Ph.D.
James D. Jones, M.S., Ph.D.

Students pursuing graduate work in a clinical field may select biochemistry as the minor subject and prepare a laboratory thesis in the Department of Biochemistry or they may select physiology as the minor subject and prepare a thesis in the Department of Biochemistry.

M 251f,w,s,su. Biochemistry. Research work in problems related to metabolism, chemistry of the blood, steroid hormones, enzymes, proteins, lipids, and minerals; training in use of methods of organic and inorganic analysis. Mason, Flock, Owen, Fleisher, McCuckin, Rosevear, Jones, Ellefson

M 252f. Biochemistry Lecture. Introduction to structure; chemicals of the blood; electrolyte, water, acid-base metabolism; chemistry of organ function. Staff

M 253w. Biochemistry Lecture. Metabolism and endocrinology; lipids and carbohydrates; genetics and purine metabolism. Staff

M 254. Biochemistry Seminar. (1 cr) Staff

Biophysics—Electronic Computers. (See Department of Biophysics)

Nutrition. (See Division of Nutrition)

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

Students majoring in medicine may combine course work in physiology and biochemistry for a minor in biochemistry.

OFFERED AT ST. PAUL

Professor

La Vell M. Henderson, Ph.D.

David R. Briggs, Ph.D.

Robert Jenness, Ph.D.

Samuel Kirkwood, Ph.D.

Irvin E. Liener, Ph.D.

Walter O. Lundberg, Ph.D.

Hermann Schlenk, Ph.D.

Max O. Schultze, Ph.D.

Associate Professor

John E. Gander, Ph.D.

Robert L. Glass, Ph.D.

Assistant Professor

Rex E. Lovrien, Ph.D.

Hubert R. Warner, Ph.D.

Prerequisites—For major work, undergraduate courses satisfactory to the student's adviser are required in mathematics through integral calculus, general physics, inorganic chemistry, qualitative and quantitative analysis, organic chemistry, biochemistry, general biology (or botany or zoology), and general bacteriology. Physical chemistry is advised. For minor work the student must satisfy the department graduate faculty that he has an adequate background.

Major—Candidates for the Ph.D. degree must have completed 1 year of physical chemistry, 1 year of advanced organic chemistry, and have accumulated 6 credits in course 324. Candidates for the M.S. degree must have completed 3 credits in course 324. With the approval of the adviser, courses in mathematics, physics, chemistry, biology, agricultural and medical sciences may be included as part of the major course of study.

The thesis may be conducted on protein structure, function and immunological properties; metabolism of vitamins and amino acids; enzymology, including active site studies; polysaccharide structure; carbohydrate and lipid chemistry; and cereal chemistry.

Minor—Courses 141, 142, 143, 145, 146, 147, and 219 to 223 provide a basic training in biochemistry. A selection from these courses is particularly recommended to students registered for the Ph.D. degree.

Language Requirement—For the Ph.D. degree, a reading knowledge of two foreign languages, one of which must be German. For the M.S. degree, one foreign language, French, German, or Russian. In special cases some other language may be substituted by petition.

Master's Degree—In general, offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

108. **Chemistry of Cereal and Cereal Products.** Lecture course on chemistry and technology of cereals. (3 cr; prereq #) Glass
109. **Cereal Laboratory Methods.** (3-5 cr; prereq 108 or ¶108, AnCh 57 or equiv) Glass
- 118x. **Laboratory Problems in Biochemistry.** Preparation and isolation of pure compounds; methods of identification or determination of biochemical products. (3-5 cr per qtr; prereq #) Staff
119. **Physical Biochemistry.** Lectures and assigned reading on colloid chemistry, surface chemistry, molecular kinetics and their applications to biochemical materials and processes. (3 cr; prereq 141 or MdBc 141) Briggs
129. **Physical Biochemistry Laboratory.** Preparation, purification, and study of physicochemical properties of inorganic and biocolloid systems. (2 cr; prereq AnCh 57 or equiv, ¶119 or #)
- 141-142. **General Biochemistry.** (Same as MdBc 141-142) Integrated series of lectures on chemical nature, properties, and biochemical reactions of components of biological systems. (3 cr per qtr; prereq ¶145-146 except with Δ , 1 yr organic chemistry and cr in physical chemistry or ¶PCh 101 or other suitable course) Kirkwood, Liener, Von Korff, Wetlaufer
143. **Metabolic Reactions.** Biochemistry of intermediary metabolism. (3 cr; prereq 142 or #) Gander
- 145-146. **General Biochemistry Laboratory.** Laboratory work paralleling and required of all who are registered in BioC 141 and MdBc 141, 142 except with permission of department heads. (3 cr per qtr; prereq ¶141-142, 4 cr in analytical chemistry) Gander, Glass, Liener
147. **Advanced Biochemical Techniques.** Laboratory in modern methods for study of enzymatic and metabolic reactions. (3 cr; prereq 146 or MdBc 146, ¶BioC 143 and #) Warner
148. **General Biochemistry Laboratory.** (For students in chemistry and chemical engineering) (2 cr; prereq 142 or MdBc 142, 4 cr in analytical chemistry) Schultze
- 151-152. **Introduction to Biochemistry.** Fundamentals of composition, chemical properties, reactions and interactions of biological materials; one laboratory period per week. (4 cr per qtr; prereq OrCh 42 or 62) Henderson
153. **Dairy Biochemistry.** Biosynthesis and physical and chemical properties of milk constituents. (3 cr; prereq ¶163 except with #, 52 or 152) Jenness
163. **Dairy Biochemistry Laboratory.** Laboratory work paralleling and required of all registered in 153 except with permission. (2 cr; prereq ¶153, 52 or 152) Jenness
- 203x. **Research Problems.** (2-5 cr per qtr; prereq #) Staff
204. **Tracer Techniques.** Laboratory work on the application of radioisotopes to study of metabolic processes. (3 cr; prereq 143 or MdBc 144...MeAg 127 advised) Kirkwood
219. **Advanced Physical Biochemistry.** Lectures and assigned reading on selected topics in physical biochemistry. (2 cr; prereq 119, 143 or MdBc 144) Briggs
220. **Advanced Protein Chemistry.** Lectures and assigned reading on composition, structure, chemical and physical properties, and biochemical functions of proteins and amino acids. (2 cr; prereq 143 or MdBc 144; offered 1966-67 and alt yrs) Briggs
222. **Advanced Lipid Chemistry.** Lectures and assigned reading on composition, structure, chemical and physical properties, and biochemical functions of fats and fat-like compounds. (2 cr; prereq 143 or MdBc 144; offered 1965-66 and alt yrs) Lundberg
223. **Advanced Enzyme Chemistry.** Lectures and assigned reading on nature and function of enzymes. (2 cr; prereq 143 or MdBc 144; offered 1966-67 and alt yrs) Liener, Kirkwood
224. **Vitamins.** Lectures and reading on biochemistry of vitamins and their physiological action. (3 cr; prereq 143 or #) Schultze
- 308x. **Seminar: Cereal Chemistry.** (1 cr per qtr; prereq 108 and #) Glass
- 313x. **Seminar: Dairy Chemistry.** (1 cr; prereq 153 and #) Jenness
- 316x. **Seminar: Nutrition and Enzymes.** (1 cr; prereq 143 and #) Schultze, Liener
- 319x. **Seminar: Colloid Chemistry.** (1 cr; prereq 119 and #) Briggs
- 320x. **Seminar: Protein Chemistry.** (1 cr; prereq 143 and #) Briggs, Jenness
- 321x. **Seminar: Carbohydrate Chemistry.** (1 cr; prereq 143 and #) Kirkwood
- 322x. **Seminar: Chemistry of Lipids.** (1 cr; prereq 143 and #) Lundberg

324x. **General Seminar.** Reports on recent developments in biochemistry and on research work carried out in the department. (1 cr) Staff

BIOPHYSICS

OFFERED AT MINNEAPOLIS

Committee:

Professor

Rufus W. Lumry, Ph.D.,
chairman
Kenneth N. Ogle, Ph.D.
A. Glenn Richards, Ph.D.
Otto H. Schmitt, Ph.D.
Carlo A. Terzuolo, M.D.

Associate Professor

Robert M. Benolken, Ph.D.

Staff:

Professor

Kenneth N. Ogle, Ph.D.
Otto H. Schmitt, Ph.D.
Marvin M. D. Williams, Ph.D.

Associate Professor

Eugene Ackerman, Ph.D.
Robert M. Benolken, Ph.D.
Merle K. Loken, Ph.D., M.D.

Assistant Professor

Alan L. Orvis, Ph.D.

Additional staff for course work in biophysics is drawn from the Departments of Botany and Zoology, from the School of Physics, the School of Chemistry, the Medical School, and from the Mayo Graduate School of Medicine.

Prerequisites—Basic preparation in biological and physical sciences, and mathematics with an undergraduate major in one of these areas is required.

Language Requirement—For the Master's degree, either reading knowledge of one language (Russian or German recommended) or substitution of approved course work, choice of approved course work or language to be made by the student's adviser. For the Ph.D. degree, either Russian or German and an additional language chosen from Russian, German, or French. A collateral field may be substituted for the second language.

Master's Degree—Offered under Plan A and Plan B.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

Biophysics is a broad field including diverse biological and physical disciplines. Accordingly credit in biophysics is regularly granted for courses drawn from various departments. A wide diversity of appropriate courses is available in addition to those listed. The student's program should include a core of biophysics courses from the following list supplemented by other courses listed under their respective departmental headings. In consultation with his adviser the student should plan a program tailored to his individual needs. Because biophysics is highly interdisciplinary a minor field is not identified as such on the student's program.

105. **Review of Elementary Physics.** For medical students by arrangement with instructor. (1 cr) Loken

138x. **Seminar: Biophysics and General Physiology.** (Cr ar) Staff

Zool 153. **Molecular Biology.** (3 cr; offered 1965-66 and alt yrs) Benolken

155,* 156,* 157.* **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 mechanism. (3 cr per qtr; prereq 28 cr distributed between physics and biology, #..physical chemistry and physiology recommended; schedule ar) Schmitt

170, 171, 172. **Radiation Biophysics.** Theoretical and experimental aspects of radiological physics, medical physics, and radiobiology. Consideration of physical properties of various ionizing radiations, interaction of ionizing radiations with biological systems, and the use of radioactive isotopes as tracer elements. (3 cr per qtr; prereq #) Loken

204x.^o Research in Biophysics and Radiation Biology. (Cr ar) Loken

218x. Seminar: Radiobiology. Discussion of research problems and current literature on the biological effects of ionizing radiations. (1 cr; prereq #)

221x^o-222x^o-223x.^o Research in Biophysics. (Cr ar) Staff

Rad 236. Seminar: Radioisotope. (1 cr; prereq #) Loken

296^o-297^o-298.^o Seminar: Biophysics. (Cr ar) Schmitt, Benolken

OFFERED AT ROCHESTER

Professor

Kenneth N. Ogle, Ph.D., *head*
Marvin M. D. Williams, Ph.D.

Assistant Professor

Alan L. Orvis, Ph.D.

Associate Professor

Eugene Ackerman, Ph.D.

Advanced work in biophysics at the Mayo Graduate School of Medicine may include studies in bioelectric phenomena, shortwave diathermy, energy exchanges between the body and its environment, hemodynamics, mass spectrometry, microangiography, microscopy, osmotic pressure, ultrasound, etc. Investigations involving the use of X ray and radioisotopes are carried on both independently and in co-operation with other departments, especially the sections of radiology, the latter including some routine work. Facilities are available also for research in general biophysics, especially in molecular biology, and for studies of the acclimatization to simulated altitude, as well as to heat and cold. Excellent facilities are available for graduate study and research in optics and visual physiology, both basic and as allied to ophthalmology. A series of seminars and lectures is presented from time to time in optics with emphasis on ophthalmic optics and physiological optics. Fellows in ophthalmology may present this work for their minor study toward a Master's degree. There has been close association in the research program for the fellows in the Section of Physical Medicine and Rehabilitation, and it has been customary to give, on occasion, a number of lectures on physics as applied to physical medicine and rehabilitation. A series of lectures is given each year on various phases of radiological physics, radioisotopes, and reviews of the major areas of biophysics. Students in biophysics would also be encouraged to attend courses in biochemistry in the Section of Biochemistry and seminars in physiology in the Section of Physiology. The Section of Biophysics also co-operates with the Sections of Physiology and of Biochemistry in providing courses dealing with electronic computers, their technology, and their use in biology, medical research, and medical practice.

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.

M 251, M 252, M 253. Biophysical Science. Special sensory systems, tissue biophysics, cellular biophysics, thermodynamics and transport systems, and biophysical instrumentation. (3 cr per qtr; prereq calculus and 28 cr distributed between physics, biology, and physical chemistry) Ackerman

M 254, M 255, M 256. Optics and Visual Physiology. Optics as applied to ophthalmology; basic principles of visual physiology. (2 cr per qtr; prereq #) Ogle

M 257, M 258, M 259. Radiology and Radiologic Physics. Physical basis of radiology, radiologic equipment, dosimetry, radiation safety. Required for fellows in radiology. (3 cr per qtr [first qtr not available for biophysics credit]; prereq #) Williams

M 260. Electronic Computers. Seminar on biomedical uses of digital computers. (1 cr; prereq #) Bahn, Rome, Rosevear, Bickford, Ackerman

- M 261, M 262, M 263. Mathematics for Biology and Medicine.** Applications of advanced calculus, differential equations, and partial differential equations to biophysics, physiology, and biochemistry. FORTRAN programming. (3 cr per qtr; prereq calculus and 28 cr distributed between biology, physics, and physical chemistry) Ackerman
- M 264, M 265. Mathematical Basis of Tracer Methodology.** Principles of tracer method, compartmental systems, stochastic processes, circulatory studies, fitting models to data. (3 cr per qtr; prereq M 251, M 252, M 253 or #) Orvis
- M 266. Mathematics of Binocular Space Perception.** Quantitative approach to problems in binocular space perception and stereoscopic vision, the horopter, metric for specification of binocular space perception in terms of parameters associated with each perceiver; introduction to non-Euclidean geometry. (3 cr; prereq M 251, M 252, M 253, M 254, M 255, M 256 or equiv) Ogle
- M 267, M 268. Advanced Programming Techniques.** FORTRAN, ALGOL, COBOL, SPS, MAP, theory and operation of compilers, requirements for synthetic language. Course includes both lectures and computer programming. (3 cr per qtr; prereq knowledge of FORTRAN) Ackerman
- M 269, M 270. Biomedical Applications of Mathematical Transforms.** Fourier series, Fourier transforms, and Laplace transforms applied to problems in biology; computer techniques for handling these problems. (3 cr per qtr; prereq M 261, M 262, M 263 or equiv) Ackerman
- M 271, M 272. Advanced Optics and Visual Physiology and Research Problem.** Directed reading, individual seminars and research. Open only to fellows in ophthalmology desiring minor in biophysics. (12 cr per qtr; prereq M 254, M 255, M 256) Ogle
- M 273. Special Biophysical Research.** (Cr and hrs ar; prereq #) Ogle, Williams, Orvis, and Ackerman

BIostatISTICS

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF PUBLIC HEALTH

Professor

Jacob E. Bearman, Ph.D.
Joseph Berkson, M.D., D.Sc.
Richard B. McHugh, Ph.D.

Eugene A. Johnson, Ph.D.
Marion W. Thornton, Ph.D.
Constance van Eeden, Ph.D.

Assistant Professor

Associate Professor

Byron W. Brown, Jr., Ph.D.
Charles E. Gates, Ph.D.

James R. Boen, Ph.D.
Robert L. Evans, Ph.D.

Prerequisites—For major work, completion of the premedical curriculum. Acceptable alternatives include the equivalent of an undergraduate major in one of the following two categories:

1. The biological and/or behavioral sciences.
2. The physical sciences and/or mathematics

and the equivalent of a minor in the other category. If the major is in category 2, the candidate should be interested in application in category 1.

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. Acceptable languages are Chinese, French, German, Italian, Japanese, Russian, Scandinavian languages, and Spanish.

Master's Degree—Offered under both Plan A and Plan B.

Doctor's Degree—Work for the Ph.D. degree is offered in accordance with the general requirements of the Graduate School.

For students minoring in biostatistics the sequence PubH 110-111, 120-121, 130-131, or equivalent, is required. The remainder of the program should be planned with the minor adviser before any other courses in the minor are taken.

PubH 108. Introduction to Biostatistics and Statistical Decision. Variation, frequency distribution; probability; significance tests; estimation; trends. Statistical approach to rational administrative decision making. Lectures and laboratory exercises. (2 cr) Bearman, Weckwerth

- PubH 110. Biostatistics I.** Role of statistics in research; estimation; sampling distribution; tests of significance; power; regression; correlation; other measures of association; standard distributions including normal, t , χ^2 , F , binomial, Poisson; special distributions arising from non-parametric procedures. (3 cr; prereq ¶111, Math 10 or #) Bearman, Brown
- PubH 111f, 121w. Biostatistics Laboratory I, II.** Presentation of data; descriptive statistics; coding and short-cut computational procedures; use of desk calculators; practical application of principles and methods covered in 110 and 120. (2 cr per qtr; prereq ¶110 for 111, ¶120 for 121) Briese, Loewenson
- PubH 120. Biostatistics II.** Continuation of 110. (3 cr; prereq 110 with grade not lower than C, ¶121) Brown, Bearman
- PubH 124. Medical Statistics II.** Selected statistical techniques in continuation of 90, including analysis of data resulting from follow-up studies. (2 cr; prereq 90 or #; offered when demand warrants) Staff
- PubH 130s.* Biostatistics III.** Principles and methods of analysis of components of variance and effects in surveys and experiments; one-way, two-way, and higher nested, crossed, or mixed classifications; simple and multiple analysis of covariance. (3 cr; prereq 120 with grade not lower than C, ¶131) Bearman, Brown
- PubH 131s. Biostatistics Laboratory III.** Practical exercises associated with 130. (2 cr; prereq ¶130) Briese, Loewenson
- PubH 140f. Vital Statistics I.** Official sources; population changes; rates; trends; significant differences. (3 cr) Bearman, Thornton
- PubH 143x. Introductory Topics in Mathematical Biology.** Physico-, chemico-mathematical biology (analytical methods) of mechanical and electrochemical problems of colloids, cells, and tissues, and of kinetics of simple reactions and transports. (3 cr; prereq 1-yr sequences in mathematics [incl calculus], physics, chemistry, and a basic biological science with lab work in at least one of them or #) Evans
- PubH 144w. History of Biostatistics.** Development of probability theory and systems for collection of vital statistics; early applications to life tables, medical, and biological problems; biographies of men important in development. (2 cr; prereq 3 cr in statistics) Thornton
- PubH 150.* Vital Statistics II.** Life table techniques and follow-up studies; survivorship curves; problem of bias and selection connected with retrospective studies. (3 cr; prereq #) Staff
- PubH 180. Introduction to Biostatistics.** Variation; frequency distribution; probability; estimation; significance tests; binomial, normal, Poisson distributions; serial dilutions; most probable number. (6 cr; prereq environmental health students only, others #) Staff
- PubH 197f°-198w°†-199s.*† Elements of Mathematical Biology.** Physico-, chemico-mathematical biology; analytical methods; mechanical (static and dynamic) and electrochemical problems of colloids, cells, and tissues; kinetics of reactions, transport, and their combinations; computers in bio-medicine, analog and digital. (5 cr per qtr; prereq mathematics, incl differential equations, and 1-yr sequences in physics, chemistry, and a basic biological science, with lab work in at least one of them or #) Evans
- PubH 200x.* Research.** Opportunities are offered by the School of Public Health and by various co-operating organizations for qualified students to pursue research work. (Cr ar) Graduate staff
- PubH 201x.* Topics in Biometry.** Studies in special topics for advanced students. (Cr ar; prereq 120, 130 and #) Bearman and staff
- PubH 201A. Topics in Biometry (Advanced Topics Vital Statistics).** (3 cr; prereq 140 with grade B) Thornton, Bearman
- PubH 203f°-205w°-207s.* Research Design in Biometry.** Methodology of design of experiments and sample surveys in behavioral and biological sciences; randomized blocks, Latin-squares, factorials, incomplete blocks, long-term experiments and analysis of groups of experiments; simple random, stratified, multistage, and multiphase sampling design. (3 cr per qtr; prereq 130 or #) McHugh
- PubH 204f°-206w°-208s.* Theory of Research Design in Biometry.** Theory of linear estimation and general linear hypothesis; analysis of multiple classifications; components of variance; randomization theory of designs. (2 cr per qtr; prereq calculus and ¶203-205-207) McHugh
- PubH 211x.* Seminar: Biometry.** (Cr ar) Graduate staff
- PubH 216f°-218w° Biomedical Measurement Problems, Assays.** Qualitative and quantitative response surface assays, density determination by plate counts and serial dilution, source and magnitude of variation associated with advanced measurement techniques. (3 cr per qtr; prereq 120 or #) Johnson
- PubH 217f°-219w° Theory of Biomedical Measurement Problems, Assays.** (2 cr per qtr; prereq ¶216-218 and #) Johnson

PubH 250f°-251w°-252s.° Foundations of Biometry. Measurement models, theories of probability, logic of induction, alternative theories of inference. (2 cr per qtr; prereq 208, 219 or #) Staff

OFFERED AT ROCHESTER

Professor

Leonard T. Kurland, M.D., *head*

Graduate work in biometry and medical studies at the Mayo Graduate School of Medicine is offered in the Division of Biometry and Medical Statistics at the Mayo Clinic. This may include statistical studies of data derived in clinical or laboratory programs and investigations of a genetic or epidemiologic nature.

M 251f,w,s,u. Research Problems in Biometry.

DENTISTRY

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF DENTISTRY

Professor

Erwin M. Schaffer, D.D.S., M.S.D., *dean*
 Mellor R. Holland, D.D.S., M.S.D., *assistant dean*
 Wallace D. Armstrong, Ph.D., M.D.
 Henry B. Clark, Jr., M.D., D.D.S.
 Robert J. Gorlin, D.D.S., M.S.
 Ambert B. Hall, D.D.S.
 Norman O. Holte, D.D.S., M.S.D.
 James R. Jensen, D.D.S., M.S.
 Andrew T. Morstad, D.D.S., M.S.
 Leon Singer, Ph.D.
 Harold C. Wittich, D.D.S.
 George M. Yamane, D.D.S., Ph.D.
 Douglas H. Yock, D.D.S., M.S.

Clinical Professor

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

Associate Professor

Robert J. Isaacson, D.D.S., M.S.D., Ph.D.
 Edmund S. Olsen, D.D.S., M.S.D.
 Richard E. Stallard, D.D.S., M.S.D., Ph.D.

Clinical Associate Professor

Charles D. Simpson, D.D.S., M.S.D.

Assistant Professor

Dwight L. Anderson, M.S., Ph.D.

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 2 academic years in residence is required, though most students probably will need 3 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, biochemistry, microbiology, pharmacology, and physiology. A program leading to the Ph.D. degree with a major in one of the above-mentioned basic sciences and a minor in dentistry is offered to qualified dental graduates.

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. Oral pathology, however, requires German.

Master of Science Degree—Offered only under Plan A.

Oral Medicine

- 230f,w,s,su. **Advanced Oral Diagnosis.** 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 assigned for collateral reading. (Cr and hrs ar) Yamane
- 231f,w,s,su. **Advanced Clinical Oral Diagnosis.** Application of the basic principles of oral diagnosis; recording of clinical data and organizing and implementing a detailed treatment plan. (Cr and hrs ar) Yamane
- 232f,w,s,su. **Research Problems in Oral Medicine.** (Cr and hrs ar) Yamane and staff
- 261f,w,s,su. **Advanced Dental Roentgenology.** Systematic consideration of basic factors governing X-radiation, emphasizing recent advances in biophysics with special reference to technique and material used. Demonstration and practice. (Cr and hrs ar) Petersen, Yamane

Oral Pathology

- 260w,s. **Oral Pathology and Histology.** Lectures and laboratory on histology of teeth and related oral tissues, including embryologic considerations. Special pathology of the oral region as well as relation of local pathologic findings to systemic conditions and to general pathology. Graduate students participate as laboratory assistants and meet some further requirements. (4 cr) Gorlin, Vickers
- 262f,w,s,su. **Research in Oral Pathology.** (Cr and hrs ar) Gorlin, Vickers
- 264f,w,s. **Clinical Oral Pathology Conference.** (1 cr) Gorlin
- 265f,w,s,su. **Histopathology Slide Seminar.** (1 cr) Vickers
- 266s. **Advanced Oral Pathology.** Salivary gland development and pathology; dental organ pathology; bone physiology and pathology; radiation pathology; dermatology; lymph node and/or reticuloendothelial pathology; soft tissue pathology pertaining to the head and neck. (1-3 cr; limited to 8 students) Vickers, Gorlin
- 267f,w,s. **Human Genetics Seminar.** (1 cr) Gorlin
- 268f,w,s. **Current Literature Review.** (1 cr) Gorlin, Vickers

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 regular periods in the Dental School. (Cr and hrs ar) Clark and staff
- 251f,w,s,su. **Oral Surgery Seminar.** (1 cr) Clark and staff
- 252f,w,s,su. **Research in Oral Surgery.** (Cr and hrs ar) Clark and staff
- 253f,w,s,su. **Problems in Oral Surgery.** (Cr and hrs ar) Clark and staff

Orthodontics

- 200f,w,s,su. **Advanced Orthodontic Techniques.** (Cr and hrs ar) Steadman, Simpson, and staff
- 201f,w,s,su. **Treatment Procedures in Orthodontics.** (Cr and hrs ar) Simpson and staff
- 202f,w,s,su. **Case Analysis.** (Cr and hrs ar) Steadman, Simpson
- 203f,w,s,su. **Treatment Planning.** (Cr and hrs ar) Simpson and staff
- 204f,w,s,su. **Advanced Clinical Orthodontics.** (Cr and hrs ar) Steadman, Simpson, and staff
- 205f,w,s,su. **Osteology and Myology of the Head.** (Cr and hrs ar) Steadman
- 206f,w,s,su. **Growth of the Head.** (Cr and hrs ar) Steadman
- 207f,w,s,su. **Comparative Odontology.** (Cr and hrs ar) Steadman
- 208f,w,s,su. **Seminar in Orthodontics.** (Cr and hrs ar) Steadman, Simpson, Isaacson, and staff
- 209f,w,s,su. **Problems and Research in Orthodontics.** (Cr and hrs ar) Steadman, Isaacson
210. **Principles of Orthodontic Retention.** (1 cr) Steadman, Simpson
211. **Advanced Clinical Orthodontic Retention.** (2 cr) Simpson and staff
212. **Principles of Orthodontic Prognosis.** (1 cr) Steadman, Simpson

213. **Advanced Clinical Orthodontic Prognosis.** (1 cr) Steadman, Simpson, and staff
 214. **Advanced Orthodontic Seminar.** (1 cr) Steadman, Simpson, Isaacson, and staff

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. Practice of curettage, gingival resection, splinting of teeth, and balancing the occlusion. (Cr and hrs ar) Stallard and staff
 281f,w,s. **Advanced Periodontics Lectures.** Consideration of tissues involved in periodontal disease. Etiology and treatment of periodontal disease. (3 cr) Stallard and staff
 282f,w,s,su. **Research in Periodontics.** Opportunity to take part in the many phases of periodontal research under way in the laboratory for periodontal research. (Cr and hrs ar) Stallard and staff
 283f,w,s,su. **Seminar: Periodontics.** Etiology of periodontal disease, histopathology of periodontal symptoms, treatment of periodontal disease, research in periodontics. (2 cr) Stallard and staff
 284f,w,s. **Supporting Structures of the Teeth.** Histology, pathology, and physiology of the gingival tissues, the cementum, the periodontal membrane, and the alveolar bone discussed in lectures. Associated problems studied on a set of microscopic slides. (3 cr) Stallard and staff
 285w,su. **Histochemistry of the Normal and Pathologic Periodontium.** (2 cr) Stallard
 286s. **Bacteriology of Periodontal Diseases.** (1 cr) Korn and staff

Restorative Dentistry

- 220f,w,s,su. **Advanced Dental Anatomy.** Under supervision, student assists in teaching and participates in activities of the Division of Dental Anatomy. He also is assigned special problems. (Cr and hrs ar) Hall
 240f,w,s,su. **Advanced Technical Restorative Dentistry.** Teaching experience is integrated with technical solution of problems involving application of theories of indeterminate stresses to more complex problems of tooth morphology. (Cr and hrs ar) Jensen, Wittich, Yock, Morstad
 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. (Cr and hrs ar) Jensen, Wittich, Yock, Morstad
 245f,w,s. **Seminar: Prosthodontics.** Current concepts and practices related to treatment of the partially edentulous patient. (Cr and hrs ar; prereq #) Morstad, Olsen, and staff
 246f,w,s. **Seminar: Prosthodontics.** Consideration of the tissues involved and treatment of the completely edentulous patient. (Cr and hrs ar; prereq #) Morstad, Olsen, and staff
 247f,w,s,su. **Research Problems in Restorative Dentistry.** Arranged with individual students upon application after a critical review of current and historical literature pertaining to the problem. (Cr and hrs ar) Jensen, Wittich, Yock, Morstad
 248f,w,s. **Advanced Prosthodontics.** Treatment planning for the partially edentulous patient. (Cr and hrs ar; prereq 245, #) Morstad, Olsen, and staff
 249f,w,s. **Advanced Prosthodontics.** Treatment planning for the completely edentulous patient. (Cr and hrs ar; prereq 246, #) Morstad, Olsen, and staff

OFFERED AT ROCHESTER

Associate Professor

Joseph A. Gibilisco, D.D.S., M.S.D., *head*
 Stanley A. Lovestedt, D.D.S., M.S.

Instructor

William R. Laney, D.M.D., M.S.
 Charles M. Reeve, D.D.S., M.S.
 A. Howard Sather, D.D.S., M.S.D.

Assistant Professor

Daniel E. Waite, D.D.S., M.S.

The Section of Dentistry is composed of five closely integrated dental disciplines, oral diagnosis, oral surgery, orthodontics, prosthodontics, and periodontics. The close association of all other medical sections in the graduate dental training programs provides a unique opportunity for advanced education. The degree, master of science

in dentistry, is available to all qualified fellows in oral surgery, orthodontics, periodontics, prosthodontics, and will be at the direction of the Mayo Graduate School of Medicine and the staff of the Section of Dentistry. A minimum of 3 calendar years is required in each program. While the major requirement for the degree is taken in a clinical field the minor requirement must be completed in one of the basic sciences. In each specialty area, the educational experience is arranged to satisfy the requirements for American Board Certification.

Oral Surgery

Fellowship appointments in oral surgery are made quarterly and one year in advance. Facilities are available to accept four applicants in oral surgery annually.

The oral surgery training program is approved by the Council on Dental Education of the American Dental Association.

To supplement training in the clinical care of patients, conferences, lectures, and seminars are scheduled regularly within the section. Joint seminars and conferences are arranged with other sections of the Mayo Graduate School of Medicine. All fellows are expected to attend the clinical conferences, clinicopathologic conferences, and staff meetings. Usually, pathology constitutes the minor for the Master's degree. (Additional basic science work may be arranged at the direction of the staff.)

The clinical aspects of the program constitute the major emphasis of training in oral surgery. Clinical quarters are devoted to oral surgery, plastic surgery, otorhinolaryngology, hematology, oral diagnosis, oral roentgenology, and anesthesiology. Fellowship in oral surgery involves quarterly assignments to the Rochester State Hospital in Rochester, Minnesota, and off-campus assignment to the Detroit Receiving Hospital in Detroit, Michigan.

Facilities for teaching oral surgery are located in the Mayo Clinic, Rochester State Hospital, Rochester Methodist and Methodist-Worrall Hospitals, and St. Marys Hospital.

A fellow and staff consultant work together providing the diagnostic and surgical care of all patients.

Training in anesthesiology is under the supervision of the Section of Anesthesiology. During the period of 6 months' assignment in this section, fellows are taught techniques such as endotracheal intubation, venipunctures, and procedures in the postanesthesia room. Considerable experience in both endotracheal and intravenous anesthesia is obtained. Instruction is given in the selection and administration of the preanesthetic and postanesthetic drugs and also in the management of pain.

- M 250f,w,s,su. **Oral Surgery.** Includes first assistant on all oral surgery problems, in oral surgery Out-Patient Clinic, and hospitals. Three quarters. (Cr ar) Waite
- M 251f,w,s,su. **Dental Roentgenology.** Includes X-ray diagnosis and techniques. One quarter. (Cr ar) Lovstedt, Gibilisco, and staff
- M 252f,w,s,su. **Oral Diagnosis.** Clinical diagnosis relating to dental and oral surgery problems. One quarter. (Cr ar) Lovstedt, Gibilisco, and staff
- M 253f,w,s,su. **Current Literature Seminar.** Weekly literature review from current journals relating to oral surgery. (1 cr) Waite
- M 254f,w,s,su. **Oral Surgery Seminar.** Weekly review of case histories, academic presentation, discussion of oral surgery subjects, and related areas. (1 cr) Lovstedt, Waite
- M 256f,w,s,su. **Advanced Oral Surgery.** Includes assignment to Detroit Receiving Hospital, Rochester State Hospital, and Senior Fellowship. Three quarters. (Cr ar) Lovstedt, Waite
- M 257f,w,s. **Research on Selected Problems.** (Cr ar) Gibilisco and staff
- M 258f,w,s. **Seminar: Dentistry.** Relationship to other disciplines of dentistry and medicine. (1 cr) Staff
- M 259f. **Principles of Oral Surgery.** Lecture presentation of the principles involved in basic oral surgery. One quarter. (1 cr) Waite
- M 262f,w,s,su. **Oral Pathology.** Special pathology of the oral region; histopathology of oral lesions. One hour biweekly. (Cr ar) Dockerty, Dahlin, Reeve

- Anat M 252s. *Anatomy of the Head and Neck.* (See Department of Anatomy) (Cr ar) Hollinshead
- Anes M 253w,s,su. *Anesthesiology.* (See Department of Anesthesiology) Faulconer and staff
- Ent M 251f,w,s,su. *Otolaryngology and Rhinology.* (See Department of Otolaryngology and Rhinology) Simonton and staff
- Med M 253f,w,s,su. *Medical Diagnosis in Hospital Service.* One quarter. Staff
- Path M 255f,w,s,su. *Surgical and Fresh Tissue Pathology.* (See Department of Pathology) (Cr ar) Dockerty and staff
- PlSurg M 253w,s,su. *Plastic Surgery.* (See Department of Plastic Surgery). One quarter. Erich and staff

Orthodontics

The fellowship program in orthodontics is 3 years. One or two appointments per year are made to qualified graduates of approved dental schools.

The clinical training is primarily in the edgewise technique, with a review of other major techniques, and is integrated with services providing experiences in oral roentgenology, oral diagnosis, plastic surgery, speech pathology, and pediatrics. A 2-quarter, off-campus assignment at the Minneapolis Campus is utilized to provide human histology, human embryology, biostatistics, genetics, and available orthodontic seminars and lectures.

Co-ordinated treatment care with other dental areas (oral surgery, prosthodontics, periodontics) as well as medical specialties is stressed.

The clinical facilities at the Mayo Clinic may be supplemented by selected patient care at St. Marys, Methodist, Methodist-Worrall, and the Rochester State Hospitals.

The usual arrangement is a minor in anatomy. However, with special interest, the minor may be arranged in other basic sciences.

- M 200f,w,s,su. *Advanced Orthodontic Techniques.* Initial technical procedures in preparation for clinical patient care. Technical procedures on the tyodont, model preparation, photography, metallurgy, and cephalometrics. (Cr ar) Sather
- M 202f,w,s,su. *Orthodontic Case Analysis.* The first phase of case analysis involves complete review of previously treated cases. The second phase is application of basic analytic principles to clinical patients. (Cr ar) Sather
- M 203f,w,s,su. *Orthodontic Treatment Planning.* Mechanical principles co-ordinated with case analyses to provide the treatment plan. Force analysis and biomechanics of tooth movement. (Cr ar) Sather
- M 204f,w,s,su. *Advanced Clinical Orthodontics.* Individual treatment care and clinical observation. Treatment care co-ordinated with other services in selected instances in the hospital. (Cr ar) Sather
- M 255f,w,s,su. *Dental Specialties.* Rotation through the adjunctive services of various dental specialties (oral surgery, periodontics, and prosthodontics). (Cr ar) Staff
- Anat M 252f,w,s,su. *Anatomy of the Head and Neck.* (See Department of Anatomy) Hollinshead
- M 257f,w,s,su. *Research in Selected Problem.* Arrangements for research in selected areas related to minor. (Cr ar) Staff
- M 258f,w,s,su. *Oral Diagnosis.* A clinical course in diagnosis related to dental problems. (Cr ar) Gibilisco, Lovestedt, and staff
- M 261f,w,s,su. *Speech Pathology.* (Cr and hrs ar) Darley, Aronson, and staff
- M 262f,w,s,su. *Oral Pathology and Histology.* Special pathology of the oral region; histopathology of oral lesions. (Cr ar) Dockerty, Dahlin, Reeve

Prosthodontics

Fellowship appointments to qualified graduates of approved dental schools are made once a year, beginning in the summer quarter. Services include clinical and laboratory prosthodontics, maxillofacial prosthetics, oral diagnosis and roentgenographic interpretation, surgical pathology, anatomy and physiology, speech pathology, hospital procedure and clinical practice, and related dental specialties.

Under staff supervision, fellows care for patients at Methodist, St. Marys, and Rochester State Hospitals. Assignments on the Minneapolis Campus are made to provide additional didactic courses, clinical experience, and practice teaching. Seminars and conferences in the specialty field are held regularly, and, in addition, fellows attend seminars relating to their quarterly assignments.

- M 240f,w,s,su. Clinical Prosthodontics.** Clinical practice and laboratory exercises related to prosthodontic treatment and techniques. Patient treatment and care in hospital and clinical facilities. Four quarters. (Cr ar) Laney, Gonzalez
- M 241f,w,s,su. Prosthodontic Seminar.** Literature review and discussions related to historical and current prosthodontic practices and techniques. (Cr ar) Laney, Gonzalez
- M 242f,w,s,su. Maxillofacial Prosthetics.** Lectures on principles and practice of maxillofacial prosthetics. Review of procedures in fabrication of extra-oral prostheses. (1 cr) Bulbulian and staff
- 243w. Advanced Clinical Restorative Dentistry.** (At Minneapolis Campus) (Cr and hrs ar) Morstad, Yock, and staff
- M 251f,w,s,su. Dental Roentgenology.** X-ray diagnosis and technique. (Cr ar) Lovstedt, Gibilisco, and staff
- M 252f,w,s,su. Oral Diagnosis.** Clinical diagnosis related to dental problems. (Cr ar) Lovstedt, Gibilisco, and staff
- M 255f,w,s,su. Dental Specialties.** Rotation through the adjunctive services of various dental specialties (oral surgery, periodontics, and orthodontics). (Cr ar) Staff
- M 258f,w,s. Seminar in Dentistry.** Relationship to other disciplines of dentistry and medicine. (1 cr) Staff
- M 262f,w,s,su. Oral Pathology.** Special pathology of the oral region, histopathology of oral lesions. One hour biweekly. (Cr ar) Dockerty, Dahlin, Reeve
- Anat M 252s. Anatomy of Head and Neck.** (See Department of Anatomy) (Cr ar) Hollinshead
- Anat M 257f,w,s,su. Research on Selected Problems.** (Cr ar) Gibilisco and staff
- Anat M 261f,w,s,su. Speech Pathology.** (Cr ar) Darley, Aronson, and staff
- Path M 255f,w,s,su. Surgical and Fresh Tissue Pathology.** (See Department of Pathology) (Cr ar) Dockerty and staff
- PlSurg M 253f,w,s,su. Plastic Surgery.** (See Department of Surgery) (Cr ar) Erich and staff
- Rad M 253f,w,s,su. Therapeutic Radiology.** (See Department of Radiology) (Cr ar) Childs and staff

Periodontics

The Mayo Graduate School of Medicine fellowship in periodontics is a 3-year program. All phases of clinical periodontics are included and facilities are available for research.

The program is designed to permit close liaison with various medical and dental specialties. Hospital service experience is available at St. Marys, Methodist, Methodist-Worrall, and Rochester State Hospitals. Seminars and lectures are held in various nonclinical fields, *viz.*, pathology, anatomy, histology, and microbiology. One quarter is spent at the Minneapolis Campus for additional clinical and didactic training.

- M 251f,w,s,su. Dental Roentgenology.** X-ray diagnosis and technique. (Cr ar) Lovstedt, Gibilisco, and staff
- M 252f,w,s,su. Oral Diagnosis.** Clinical diagnosis related to dental problems. (Cr ar) Lovstedt, Gibilisco, and staff
- M 255f,w,s,su. Dental Specialties.** Rotation through the adjunctive services of various dental specialties (oral surgery, orthodontics, prosthodontics). (Cr ar) Staff
- M 257f,w,s,u. Research in Periodontics.** (Cr ar) Reeve
- M 258f,w,s. Seminar in Dentistry.** Relationship to other disciplines of dentistry and medicine. (1 cr) Staff
- M 262f,w,s,su. Oral Pathology.** Special pathology of the oral region; histopathology of oral lesions. (Cr ar) Dockerty, Dahlin, Reeve

- M 280f,w,s,su.** Clinical Periodontics. Etiology, diagnosis, and treatment of periodontal disease. (Cr ar) Reeve
- M 283f,w,s,su.** Periodontic Seminar. Literature review and discussion. (1 cr) Reeve
- M 284f,w,s,su.** Pathology of Periodontal Disease. Histopathology of periodontal disease. The oral mucous membrane as well as the calcified tissues are studied. (Cr ar) Reeve
- Anat M 252s.** Anatomy of the Head and Neck. (See Department of Anatomy) (Cr ar) Hollinshead
- MicB M 251f,w,s,su.** Diagnostic Microbiology. (See Department of Microbiology) (Cr ar) Weed and staff
- Path M 253f,w,s,su.** Medical Diagnosis and Hospital Service. (Cr ar) Staff
- Path M 255f,w,s,su.** Surgical and Fresh Tissue Pathology. (See Department of Pathology) (Cr ar) Dockerty and staff

ENVIRONMENTAL HEALTH

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF PUBLIC HEALTH

Professor

Richard G. Bond, M.S., M.P.H.
George S. Michaelsen, M.S.
Theodore A. Olson, M.A., Ph.D.

Associate Professor

John O. Buxell, M.S., M.P.H.
Harry Foreman, M.D., Ph.D.
Velvl W. Greene, M.S., Ph.D.
Harold J. Paulus, M.S., Ph.D.

Language Requirement—For the Master's degree, knowledge of a foreign language may be waived on recommendation of the adviser. For the Ph.D. degree, reading knowledge of two foreign languages or one foreign language and option of a special research technique or a collateral field of knowledge. Acceptable languages are Finnish, French, German, Japanese, Norwegian, Russian, Spanish, or Swedish.

Minor—For the Master's degree, 9 credits selected by the minor adviser on the basis of the candidate's field of study.

For the Ph.D. degree, PubH 100A, B, and C and 20 additional credits selected on the basis of the candidate's field of major study.

Master's Degree—Offered under both Plan A and Plan B. All candidates for this degree must take PubH 100A, B, and C.

Doctor's Degree—Applicants for the degree in environmental health will present a Bachelor's degree in a physical or biological science or some field of engineering and will minor in a fundamental discipline appropriate to their previous training.

For descriptions of the following courses, see under Public Health.

- 102.** Environmental Sanitation. (3 cr; prereq 100A or ¶100A and §) Bond, Buxell, Olson
- 112.*** Public Health Engineering—Plan Examinations. (1 cr per qtr, §114; prereq engineering degree and 102, and §) Bond, Buxell
- 113.*** Public Health Engineering—Field Investigations. (2 cr per qtr, §114; prereq engineering degree and § and 102) Bond, Buxell
- 115.*** Food Sanitation. (3 cr; prereq 100A and §) Olson
- 115A.** Institutional Food Protection Programs. (2 cr; prereq §) Bond, Stauffer
- 116.*** Public Health Engineering Administration. (2 cr, §114; prereq §) Bond
- 117-118-119.*** Sanitary Biology. (3 cr per qtr; prereq 100A or ¶100A or §) Olson
- 123.*** Topics in Public Health. (Cr ar; prereq §) Staff
- 145.** Low Level Radioactivity and Radiation Measurements. (3 cr; prereq §) Foreman
- 146.** Radiological Health II. (3 cr; prereq §) Foreman
- 147.*** Environmental Radioactivity. (3 cr; prereq §) Foreman
- 149.** Public Health Aspects of Housing and the Residential Environment. (3 cr; prereq §) Buxell
- 151.** Health Aspects of Air Control in Hospitals. (2 cr; prereq §) Michaelsen

- 152.° **Industrial Hygiene Engineering.** (3 cr; prereq #) Michaelsen
- 154.° **Radiological Health I.** (Cr ar; prereq #) Foreman
- 155.° **Introduction to Air Pollution Problems.** (3 cr; prereq #) Paulus
- 156.° **Air Pollution Surveys.** (2 cr; prereq 155 and #) Paulus
157. **Radiation Protection Criteria for Hospital Design and Operation.** (2 cr; prereq #) Michaelsen
158. **Hospital Safety.** (3 cr; prereq #) Michaelsen, Scheffler
159. **Chemical Laboratory Safety.** (1 cr; prereq #) Scheffler
186. **Problems of Air Pollution Control.** Special supervised studies involving laboratory and field investigation procedures; pertinent literature review. (Cr ar; prereq 155, #) Paulus
200. **Research.** (Cr ar) Staff
210. **Seminar: Public Health.** (Cr ar)
- 212.° **Seminar: Public Health Engineering and Sanitation.** (Cr ar; prereq #) Bond
230. **Field Practice in Environmental Sanitation.** (Cr ar; prereq #) Bond
- 231.° **Ground Water Development.** Development of ground water sources for public water supplies. Includes exploration through well design and construction. Public Health problems involved. (Cr ar; prereq graduate engineer and #) Bond, Singer, staff, and visiting lecturers
- 232.° **Field Work in Ground Water Development.** Construction of wells, field tests, and public health problems involved. (Cr ar; prereq graduate engineer, 231) Bond, Singer, staff, and visiting lecturers
233. **Water Quality Investigation and Research Techniques.** Introduction to field techniques and special research methods applicable to public health problems of water quality control. Procedures for establishing pollution base lines; appraisal and recognition of advancing eutrophication in surface and underground waters. (6 cr; prereq #) Olson

EPIDEMIOLOGY

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF PUBLIC HEALTH

Professor

Gaylord W. Anderson, M.D., Dr.P.H.
Leonard M. Schuman, M.D., M.S.

Language Requirement—For the Master's degree, knowledge of a foreign language may be waived on recommendation of the adviser. For the Ph.D. degree, reading knowledge of two foreign languages or of one foreign language and option of a special research technique or a collateral field of knowledge. Acceptable languages are: Danish, French, German, Japanese, Norwegian, Russian, Spanish, or Swedish.

Minor—For the Master's degree, 9 credits selected by the minor adviser on the basis of the candidate's field of study.

For the Ph.D. degree, PubH 100A, B, and C, and 20 additional credits selected by the minor adviser on the basis of the candidate's field of major study.

Master's Degree—Offered under both Plan A and Plan B. All candidates for this degree must take PubH 100A, B, and C.

Doctor's Degree—Applicants for the degree in epidemiology will usually present a degree in medicine, dentistry, or veterinary medicine; others with adequate background in the biological or physical sciences or with demonstrated competence in investigative work may be accepted. Students majoring in epidemiology will offer a minor in a related field.

For descriptions of the following courses, see under Public Health.

- 100A. **Elements of Public Health I.** (3 cr; prereq 3, 3A or 50 and a course in bacteriology) G Anderson, Thomson, Schuman
- 100B. **Elements of Public Health II.** (1 cr; prereq 100A) Staff
- 100C. **Elements of Public Health III.** (1 cr; prereq 100B) Staff

103. **Public Health Bacteriology.** (Cr ar; prereq MicB 102, 116, #) Bauer
- 104.* **Epidemiology I.** Basic epidemiologic principles applicable to infectious and noninfectious disease; host-agent-environment complex; factors underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods. (3 cr; prereq 100A, 140 or 110-111) Schuman
- 105.* **Epidemiology II.** Extension of epidemiologic principles to detailed study of selected diseases. (3 cr; prereq 104) Schuman
110. **Biostatistics I.** (3 cr; prereq ¶111, Math 10 or #) Brown
111. **Biostatistics Laboratory I.** (2 cr per qtr; prereq ¶110)
- 123.* **Topics in Public Health.** (Cr ar; prereq #) Staff
140. **Vital Statistics I.** (3 cr) Bearman, Thornton
- 191.* **Science of Human Nutrition.** (3 cr; prereq #) J Anderson, Keys
195. **Public Health Aspects of Cardiovascular Disease.** (3 cr; prereq #) Keys, Grande, and staff
200. **Research.** (Cr ar)
213. **Seminar: Epidemiology.** (Cr ar; prereq #) Schuman
- 241.* **Epidemiology of Noncommunicable Diseases.** Application of basic epidemiologic principles to noncommunicable diseases and to trauma; selected disease examples. (3 cr; prereq 104) Schuman

HOSPITAL ADMINISTRATION**

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF PUBLIC HEALTH

Professor

James A. Hamilton, M.C.S.
E. Gartly Jaco, Ph.D.
James W. Stephan, M.B.A.

Assistant Professor

Theodor J. Litman, Ph.D.
Vernon E. Weckwerth, Ph.D.

Prerequisites—Ordinarily the attainment of the professional degree master of hospital administration is an initial step toward acquiring the Ph.D. Students lacking the basic public health courses will be required to complete such courses concurrently with their doctoral program. Graduate work satisfactorily completed prior to entering the doctoral program may be applied where appropriate and in accordance with the regulations of the Graduate School.

Ph.D. Degree—Each student's program of study will be arranged individually with the guidance of his advisers and in accordance with Graduate School requirements. Each program will cover subject matter of the major field in the following three areas: (1) Organization and Administration of Hospitals and Related Health Services; (2) Social, Psychological, Economic, and Political Aspects of Health Services; and (3) Methodology of Hospital and Related Health Services Research. In addition, the student will achieve competency in social science fields particularly related to the major field. Especially recommended are economics, political science, psychology, and sociology. With the approval of his advisers, the student will complete one of the following requirements: (1) at least 24 credits in a coherent program of courses selected from the related social science fields; (2) all of the minor field requirements in one of the related social science fields or in two fields as a split minor in social science; or (3) a second major in one of the related social science fields. All candidates also will complete a minimum of 9 credits in courses in statistics numbered 100 or higher with the approval of his advisers.

For a more complete statement of admission requirements and related information, see the special bulletin published by the Program in Hospital Administration at the School of Public Health.

** Inquiries concerning courses of study leading to the degree of master of hospital administration should be addressed to the School of Public Health, 1325 Mayo Memorial Building, University of Minnesota, Minneapolis, Minnesota 55455.

Language Requirement—A reading knowledge of two foreign languages or of one foreign language with the option of a research technique or a collateral field of knowledge.

Thesis—The dissertation shall deal with a significant problem concerning health care services as they relate to the role and function of the hospital.

- PubH 160. Principles of Administration in Hospitals.** Lectures, seminars, and field trips in hospital administrative principles; top management and board of trustees, personnel policy formation, human relations. (6 cr) Hamilton, Stephan
- PubH 162-163. Principles of Organization and Management of Hospitals.** Departmental structures and functions; organizational principles and practice. (3 cr fall, 6 cr winter) Stephan, Hamilton, Bieter
- PubH 164. Principles of Organization and Management of Hospitals.** Personnel department; legal liability; fiscal management, hospital insurance, research in administration. (6 cr; prereq 162, 163) Stephan, Hamilton, Bieter
- PubH 261-262-263. Alternative Patterns for Meeting Health Care Needs.** Future role of hospitals and related health services in light of patient needs and community services. (3 cr per qtr; prereq #) Hamilton, Stephan, Jaco, Litman, and staff
- PubH 264. Seminar: Medical Care Patterns Abroad.** Readings, discussion, guest lecturers on relations between health services and other social institutions in different societies. (3 cr; prereq #) Litman
- PubH 265. Seminar: Research Studies on Health Services.** Appraisal of design, instruments, field work procedures, and findings of contemporary studies. (3 cr; prereq #) Jaco, Litman, Weckwerth, and staff
- PubH 266. Hospital Administration Topics.** Independent study under tutorial guidance on selected problems, current issues. (Cr ar; prereq #) Hamilton, Stephan
- PubH 267. Health and Human Behavior.** Social ecology of health; social and personal components of illness; health and the community; social and cultural aspects of health care services. (3 cr; prereq #) Jaco
- PubH 269. Political Aspects of Health Services.** Analysis of interrelationships between government, politics, and health services; the political-social bases of health legislation and community decision making in provision and modification of health services. (3 cr; prereq #) Litman
- PubH 273. Contemporary Problems of Hospital and Related Health Services.** Current concepts, problems, principles, and future developments in hospital and related health services. (Cr ar; prereq #) Hamilton, Stephan, Jaco, and staff
- PubH 274. Readings in Theory and Principles of Hospital Administration.** (Cr ar; prereq #) Hamilton, Stephan, and staff

MEDICAL TECHNOLOGY

For description of work leading to the Master's degree in medical technology, see the *Bulletin of the Graduate School*.

LABORATORY MEDICINE

OFFERED AT MINNEAPOLIS

Professor

Gerald T. Evans, M.D.C.M., Ph.D., *director*
 Ellis S. Benson, M.D.
 Ruth F. Hovde, M.S.
 R. Dorothy Sundberg, Ph.D., M.D.

Associate Professor

Robert A. Bridges, M.D.
 Esther F. Freier, M.S.
 Paul H. Lober, M.D.
 Edmond Y. Yunis, M.D.

Assistant Professor

Patricia M. H. Bordewich, M.S.
 Grace Mary Ederer, M.P.H.
 Lorraine M. Gonyea, M.S.
 Kathryn R. Hammer, M.S.
 Herbert F. Polesky, M.D.
 Verna L. Rausch, M.S.
 Joseph W. St. Geme, M.D.
 Jorge J. Yunis, M.D.

The clinical laboratories include clinical chemistry, diagnostic microbiology and serology, hematology and blood coagulation, blood bank, medical genetics, surgical pathology and cytology, electrocardiography, basic metabolism, and cardiac catheterization. While the laboratories are administratively integrated, each division or special field is under individual direction.

A 3-year program in clinical pathology is offered to qualified medical graduates. Medical fellows rotate through three major areas: (1) clinical chemistry, including radioisotopes; (2) hematology, including general and morphologic hematology, blood coagulation, and blood banking; and (3) microbiology, including diagnostic bacteriology, mycology, parasitology, and immunology. Experience is provided in laboratory techniques and applied research in each of the three major areas. Original investigative work in one major area is required with recourse to the basic sciences as well as investigative clinical medicine.

Qualified graduate students from other areas or departments, with the consent of their advisers, are eligible to register for courses offered by this department.

One-year renewable fellowships are open to suitably prepared persons.

- 160. **Human Cytogenetics.** Genetic and clinical problems associated with study of human chromosomes. (2 cr; prereq #; offered spring 1967 and alt yrs) Evans, J Yunis, and staff
- 161. **Human Cytogenetics Laboratory.** Techniques for study of human chromosomes, including cell culture and autoradiography. (2 cr; prereq #; offered spring 1967 and alt yrs) Evans, J Yunis, and staff
- 162. **Human Biochemical Genetics.** Selected topics on biochemical and clinical aspects of human genetic traits. (2 cr; prereq #; offered spring 1966 and alt yrs) Evans, J Yunis, and staff
- 163. **Human Biochemical Genetics Laboratory.** Biochemical techniques used in study of human genetic traits. (2 cr; prereq #; offered spring 1966 and alt yrs) Evans, J Yunis, and staff
- 172. **Basic Principles of Blood Group Genetics.** (Same as Anth 172) (3 cr; prereq general biology, zoology, or Δ) E Yunis, Novak
- 176. **Topics: Interpretation of Laboratory Data.** Topics include normal values, quality control methods, sources of error, and instrumental problems related to interpretation. (1 cr; prereq #) Benson, Polesky, Freier
- 180. **Problems in Fluid and Electrolyte Metabolism.** (Cr ar; prereq regis Med) Evans, Benson, and staff
- 181. **Problems in Clinical Laboratory Medicine.** (Cr ar; prereq regis Med) Evans, Benson, and staff
- 182. **Topics in Hematology.** (Cr ar; prereq Anat 166) Sundberg
- 183. **Topics in Immunology.** (Cr ar; prereq regis Med) Evans, Bridges
- 235. **Advanced Clinical Laboratory Medicine.** General rotation as above described. (Cr ar; prereq Anat 166) Evans, Benson, and staff
- 236. **Research on Clinical Laboratory Problems.** (Cr ar) Evans, Benson, and staff

MEDICINE

(Including Divisions of Internal Medicine and Dermatology)

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, anatomy, biochemistry, microbiology, pathology, pharmacology, and physiology 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 MINNEAPOLIS

Professor

Cecil J. Watson, M.D., Ph.D., *head*
 Ivan D. Frantz, M.D.
 Wendell H. Hall, M.D., Ph.D.
 James F. Hammarsten, M.D., M.S.
 Frederick W. Hoffbauer, M.D., M.S.
 Robert B. Howard, M.D., Ph.D.
 Samuel Schwartz, M.D.
 Wesley W. Spink, M.D.
 Louis Tobian, Jr., M.D.
 Leslie Zieve, M.D., Ph.D.

Clinical Professor

Thomas Lowry, M.D.
 Ragnvald S. Ylvisaker, M.D.

Associate Professor

J. B. Carey, Jr., M.D., Ph.D.
 Frederick C. Goetz, M.D.
 Byrl J. Kennedy, M.D., M.Sc.

Frank M. MacDonald, M.D.
 Harold G. Muchmore, M.D., M.S.
 Murray J. Murray, M.D.
 Alvin L. Schultz, M.D., M.S.
 Naip Tuna, M.D., Ph.D.
 Yang Wang, M.D.
 C. Paul Winchell, M.D.
 Horace H. Zinneman, M.D.

Clinical Associate Professor

Reuben Berman, M.D.
 Howard L. Horns, M.D.
 Arthur C. Kerkhof, M.D., Ph.D.

Assistant Professor

Carl S. Alexander, M.D., Ph.D.
 Ralph C. Williams, M.D.

Clinical Assistant Professor

William F. Mazzitello, M.D., M.S.

A wide range of clinical material for graduate work in internal medicine is available in the wards and outpatient departments of University of Minnesota Hospitals, Hennepin County General Hospital, Ancker Hospital in St. Paul, and Veterans Hospital in Minneapolis. There are opportunities for research in the laboratories open to members of the Department of Medicine in all of the hospitals.

Anatomy, biochemistry, immunology, microbiology, 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 outpatient departments are used as necessary for training the fellow for later practice.

In general, fellowships are planned for 4-year periods, of which from 1 to 1½ years are devoted to basic science and research and 2½ to 3 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. Routinely acceptable languages are German, French, Italian, Russian, and Spanish.

Master's Degree—Offered only under Plan A.

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

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.** General diagnosis and methods of investigation; recording of clinical data. Emphasis on methods of treatment. (Cr ar) Watson and staff
- 202f,w,s,su. **Diseases of the Cardiovascular Apparatus.** (Cr ar) Frantz, Tobian, Winchell, Wang, and staff
- 203f,w,s,su. **Research in Medicine.** Study of a clinical or fundamental problem related to internal medicine. (Cr ar) Watson, Spink, Frantz, Hoffbauer, Hall, and staff
- 205f,w,s,su. **Diseases of the Chest.** Opportunities to study problems relating to tuberculosis from both the clinical and laboratory standpoint. (Cr ar) Hall, Hammarsten, Lillehei, and staff
- 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 cr) Watson and staff
- 207f,w,s,su. **Clinical Pathological Conference.** Presentation of clinical features, necropsy findings, and discussion. Medical and surgical cases. (1 cr) 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 cr) Peterson, Watson, and staff
- 210f,w,s,su. **Infectious Disease Seminar.** (1 cr) Spink, Hall, and staff
- 211f,w,s,su. **Electrocardiographic Conference.** (1 cr) Tuna
- 212w,s. **Pigment Metabolism.** (1 cr) Schwartz, Watson, and staff
- 213w,s. **Psychosomatic Medicine Seminar.** (1 cr) Magraw
- 214f,w,s,su. **Cardiovascular Seminar.** Weekly conference on clinical cardiovascular problems, held jointly by Departments of Medicine, Surgery, and Radiology. (1 cr) Wang and staff

OFFERED AT ROCHESTER

Professor

Howard B. Burchell, M.D., Ph.D.
 Hugh R. Butt, M.D., M.S.
 James C. Cain, M.D., M.S. (Clinical)
 David T. Carr, M.D., M.S. (Clinical)
 William H. Dearing, M.D., M.A., Ph.D.
 Earl E. Gambill, M.D., M.S.
 Malcolm M. Hargraves, M.D.
 Corrin H. Hodgson, M.D., M.S. (Clinical)
 F. Raymond Keating, Jr., M.D., M.S.
 Walter F. Kvale, M.D., M.S.
 Carl G. Morlock, M.D., M.S. (Clinical)
 Arthur M. Olsen, M.D., M.S.
 Charles A. Owen, Jr., M.D., Ph.D.
 Howard F. Polley, M.D., M.S.
 Edward H. Rynearson, M.D., M.S.
 Charles H. Slocumb, M.D., M.S.
 Randall G. Sprague, M.D., Ph.D.
 J. Minott Stickney, M.D., M.S. (Clinical)
 Eric E. Wollaeger, M.D., M.S.

Donald R. Nichols, M.D., M.S.
 Robert L. Parker, M.D., M.S.
 Gustavus A. Peters, M.D., M.A., M.S.
 (Clinical)
 Raymond V. Randall, M.D., M.S.
 Robert M. Salassa, M.D., M.S.
 William G. Sauer, M.D., M.S.
 Harold H. Scudamore, M.D., Ph.D.
 Richard M. Shick, M.D., M.S.
 Lucian A. Smith, M.D., M.S.
 Maurice H. Stauffer, M.D., M.S. (Clinical)
 Charles F. Stroebel, M.D., M.S. (Clinical)
 William H. J. Summerskill, M.D., M.A.
 Jan H. Tillisch, M.D., M.S.
 L. O. Underdahl, M.D., M.S. (Clinical)
 L. Emmerson Ward, M.D., M.S.
 William E. Wellman, M.D., M.S. (Clinical)

Assistant Professor

Kenneth G. Berge, M.D., M.S.
 Charles M. Blackburn, M.D., M.S.
 James C. Broadbent, M.D., M.S.
 John A. Callahan, M.D., M.S.
 Earl T. Carter, M.D., Ph.D.
 Daniel C. Connolly, M.D., Ph.D.
 John F. Fairbairn II, M.D.
 William T. Foulk, Jr, M.D., M.S.
 Paul A. Green, M.D., M.S.
 David G. Hanlon, M.D., M.S.
 Lowell L. Henderson, M.D., M.S.
 Norman G. G. Hepper, M.D., M.S.
 John A. Higgins, M.D., M.S.
 Harry N. Hoffman II, M.D., M.S.
 Llewelyn P. Howell, M.D., M.S.
 Kenneth A. Huizenga, M.D., M.S.
 James C. Hunt, M.D., M.S.
 John L. Juergens, M.D., M.S.
 Joseph M. Kiely, M.D., M.S.
 Charles G. Moertel, M.D., M.S.
 George D. Molnar, M.D., Ph.D.
 Jaime Paris, M.D., M.S.

Associate Professor

Howard A. Andersen, M.D., M.S. (Clinical)
 Milton W. Anderson, M.D., M.S. (Clinical)
 Lloyd G. Bartholomew, M.D., M.S.
 Edwin D. Bayrd, M.D., M.S.
 Robert O. Brandenburg, M.D., M.S.
 Donald C. Campbell, M.D., M.S. (Clinical)
 Haddon M. Carryer, M.D., Ph.D. (Clinical)
 Norman A. Christensen, M.D., M.S.
 (Clinical)
 Talbert Cooper, M.D., M.S. (Clinical)
 Guy W. Daugherty, M.D., M.S. (Clinical)
 Clifford F. Gastineau, M.D., Ph.D.
 Joseph E. Geraci, M.D., M.S.
 John B. Gross, M.D., M.S.
 Albert B. Hagedorn, M.D., M.S.
 Giles A. Koelsche, M.D., Ph.D. (Clinical)
 William J. Martin, M.D., M.S.
 William M. McConahay, M.D., M.S.
 R. Drew Miller, M.D., M.S.

Thomas W. Parkin, M.D., M.S.
 Richard J. Reitemeier, M.D., M.S.
 Randolph A. Rovelstad, M.D., Ph.D.
 Alexander Schirger, M.D., M.S.
 Donald A. Scholz, M.D., M.S.
 Ralph E. Smith, M.D.
 John A. Spittell, Jr., M.D., M.S.

Instructors

E. J. Walter Bowie, M.B., B.Ch., M.S.
 G. Roy Diessner, M.D., M.S.
 Matthew B. Divertie, M.D., M.S.
 F. Edmund Donoghue, M.D., M.S.
 Bruce E. Douglass, M.D., M.S.
 Richard H. Ferguson, M.D.
 Robert S. Fontana, M.D., M.S.
 Allen A. Frethem, M.D., M.S.
 Robert L. Frye, M.D.
 Stafford W. Gedge, M.D.
 Emilio R. Giuliani, M.D.
 Norbert O. Hanson, M.D.
 Carlos E. Harrison, M.D., M.S.
 Paul E. Hermans, M.S.
 Richard W. Hill, M.D., M.S.
 David L. Hoffman, M.D.
 Horace K. Ivy, M.D., M.S.
 William J. Johnson, M.D.
 Gerald J. Kavanaugh, M.D., M.S.

Venard R. Kinney, M.D.
 Bruce A. Kottke, M.D., Ph.D.
 Robert A. Kyle, M.D., M.S.
 Harold T. Mankin, M.D., M.S.
 William E. Mayberry, M.D., M.S.
 John G. Mayne, M.D., M.S.
 Douglass B. McGill, M.D., M.S.
 James R. McPherson, M.D., M.S.
 Wallace A. Merritt, M.D., M.S.
 George W. Morrow, M.D., M.S.
 Stuart L. Nunn, M.D., M.S.
 Philip J. Osmundson, M.D., M.S.
 Pasquale J. Palumbo, M.D., M.S.
 Don C. Purnell, M.D., M.S.
 Donald E. Ralston, M.D., M.S.
 B. Lawrence Riggs, M.D., M.S.
 James V. Ross, Jr., M.D., M.S.
 Leslie J. Schoenfeld, M.D., Ph.D.
 Richard E. Sedlack, M.D., M.S.
 Sheldon G. Sheps, M.D.
 Murray N. Silverstein, M.D.
 Donald A. Sones, M.D., M.S.
 Ralph E. Spiekerman, M.D., M.S.
 Harry A. Swedlund, M.D., M.S.
 Deloran L. Thurber, M.D., M.S.
 Louis D. Vaughn, M.D., M.S.
 Richard E. Weeks, M.D., M.S.
 J. W. Worthington, Jr., M.D., M.S.

A major responsibility of the field of internal medicine lies in diagnosis. Patients receive a comprehensive diagnostic evaluation in 1 of 21 general diagnostic sections. The fellow in medicine is charged with the initial independent diagnostic opinion, and he plans for special diagnostic procedures in consultation with a member of the faculty. Clinical work in the first year in the Clinic and hospitals is scheduled to provide time for reading and library work in preparation for advanced assignments and for research work, which is usually started the second or third year. Each of the general diagnostic sections also has a special field of interest including allergy, infectious diseases, rheumatology, cardiovascular and renal diseases, diseases of the chest, metabolic diseases, endocrinology, hematology, or gastroenterology. Each of these sections of medicine has a hospital service in which the subspecialty is of prime concern. In the hospital, patients are grouped on a subspecialty service when their condition requires intensive treatment or continuing observation. More than 500 hospital beds are allotted to medical patients. Fellows are assigned quarterly to most of the subspecialty services through the 3-year fellowship. This allows for intensive study in a specialty each quarter. Care of patients is a co-operative responsibility of fellows under faculty supervision.

Didactic lectures play a minor though significant role in graduate medical education. Daily ward rounds, teaching seminars, and direct collaborative work with a member of the faculty provide the most important learning media. Knowledge of appropriate current medical literature augments the learning value of these seminars, be they large or small, in the hospital, clinic, or laboratories.

Full-time assignments for at least 6 or 9 months in one of the basic sciences is required for the minor field for degree candidates. Microbiology, hematology, pathology, biochemistry, or physiology laboratories offer opportunities for those seeking careers in research or academic medicine but enriches the graduate study in internal medicine for any talented physician. It is at this time that all or most of the original work is done, forming the basis for the graduate thesis. Those seeking academic careers are advised to use the basic sciences as major fields for the degree even though the fellowships are primarily in medicine.

Fellows showing academic promise are urged to avail themselves of these research opportunities to add depth to their broad exposure to abundant clinical problems. Those fellows also showing special clinical promise are offered the first assistantships near or at the end of the 3-year period of study.

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—This department offers work leading to the Ph.D. degree.

M 251f,w,s,su. General Medical and Surgical Diagnosis. Research. Seminar. Staff

M 252f,w,s,su. Medical Hospital Residence. Research. Seminar. Staff

M 253f,w,s,su. Medical Diagnosis and Hospital Service. Staff

Psych M 256f,w,s,su. Clinical Psychiatry. Diagnostic and hospital services. Staff

Neur M 257f. Clinical Neurology. Diagnostic and hospital services. Staff

Hospital Residence in Neurology. (See Section on Neurology)

Hospital Residence in Psychiatry. (See Section on Psychiatry)

Necropsy Service. (See Department of Pathology)

Hematology. (See Department of Pathology)

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

Biochemistry. (See Department of Biochemistry)

Microbiology. (See Department of Microbiology)

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

Dermatology

OFFERED AT MINNEAPOLIS

Professor

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

Clinical Assistant Professor

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

Clinical Professor

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

Research Associate

Dorothy B. Windhorst, M.D.

Clinical Associate Professor

Robert W. Goltz, M.D.

John G. Rukavina, M.A., M.D.

Master's and Doctor's Degrees—Instruction in dermatology and syphilology leading to the M.S. or Ph.D. degree is offered at University Hospitals, Hennepin County General Hospital, Veterans Hospital in Minneapolis, and 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. Lynch and the head of the department or division in which they wish to do special research.

A 3-year program emphasizes clinical training in dermatology with the minor subject usually in a basic science field. A 5-year program aims additionally at greater competence in the major field and at increased knowledge, experience, and research in physiological chemistry as the minor field. The Ph.D. degree can be earned in this 5-year program.

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. French and German are routinely acceptable.

225f,w,s,su. Clinical Dermatology. Wards and outpatient departments of University Hospitals, Veterans Hospital, Hennepin County General Hospital, and Ancker Hospital. (Cr ar) Lynch and staff

- 226f,w,s,su. Dermatology.** Conference twice weekly on diagnosis and treatment of skin conditions. Hennepin County General Hospital. (Cr ar) Lynch and staff
- 227f,w,s,su. Histopathology of the Skin.** (Cr ar) Lynch, Goltz, and staff
- 228f,w,s,su. Research in Dermatology.** (Cr ar) Lynch, Goltz, Rukavina, and staff
- 229f,w,s. Experimental Methods in Dermatology.** (Cr ar) Goltz and staff
- 230f,w,s. Functional Biology of the Skin.** (Cr ar) Rukavina and staff

OFFERED AT ROCHESTER

Professor

Robert R. Kierland, M.D., M.S., *head*
Louis A. Brunsting, M.D., M.S.

Assistant Professor

Sigfrid A. Muller, M.D., M.S.

Associate Professor

Harold O. Perry, M.D., M.S.
Richard K. Winkelmann, M.D., Ph.D.

The Department of Dermatology of the Mayo Graduate School of Medicine 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 more than 1,500 biopsy specimens each year. General laboratories of the clinic and foundation are available for routine and investigative work, and a 6 months' service in the hospital (45 beds) is part of the 3-year training offered.

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

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—Work leading to the Ph.D. degree is offered in this department.

- M 251f,w,s,su. Diagnosis with Special Reference to Dermatology and Syphilology.** Daily seminar. Clinical conference. Brunsting, Kierland, Perry, Winkelmann, Muller
- M 252f,w,s,su. Hospital Residence.** Care of hospitalized patients. Seminar. Brunsting, Kierland, Perry, Winkelmann

Basic Dermatologic Science

Basic dermatologic science may serve as a minor for the degree in dermatology and includes assignments to the basic science courses listed below.

- M 251. Microscopic Anatomy and Histochemistry of the Skin.** Lecture and seminar. (1 cr) Winkelmann
- M 252. Histochemistry.** Principles and practice. (2 cr) Winkelmann, Muller
- M 253f,w,s. Experimental Anatomy and Physiology of the Skin.** (1 cr) Winkelmann
- M 254f,w,s,su. Experimental Anatomy and Physiology of the Skin.** (3 cr) Staff
- M 255f,w,s,su. Experimental Pathologic Anatomy of the Skin.** (1 cr) Winkelmann, Perry, Muller
- M 256f,w,s,su. Experimental and Pathologic Anatomy of the Skin.** (14 cr) Winkelmann, Perry, Muller
- M 257. Special Topics in Experimental and Anatomic Pathology.** (2 cr) Winkelmann, Perry, Muller
- M 258f,w. Cytology.** (1 cr) Winkelmann
- M 259f,w,s,su. Surface Microscopy of the Skin.** (1 cr) Staff

- M 260su,f. *Gross and Clinical Anatomy of the Skin*. (1 cr) Winkelmann, Perry, Muller
 M 261w,s. *Investigative Dermatology*. (1 cr) Staff
 M 262f,w,s,su. *Research in Experimental Anatomy*. Full time. Staff
 M 263. *Investigations in Clinical Physiology and Biochemistry*. One quarter. Winkelmann and staff
 M 264. *Biochemical Problems of the Skin*. Mason, Decker, and Biochemistry staff
 M 265. *Microbiology*. Weed, Ulrich, and Microbiology staff

MICROBIOLOGY

OFFERED AT MINNEAPOLIS

Professor

Dennis W. Watson, Ph.D., *head*
 S. Gaylen Bradley, Ph.D.
 Gerhard K. Brand, M.D.
 Robert A. Good, M.D., Ph.D.
 Wendell H. Hall, M.D., Ph.D.
 James J. Jezeski, Ph.D.
 Louis H. Muschel, Ph.D.
 Joseph C. Olson, Ph.D.
 Edwin L. Schmidt, Ph.D.
 Lewis W. Wannamaker, M.D.

Associate Professor

Robert W. Bernlohr, Ph.D.
 Brooks D. Church, Ph.D.
 Martin Dworkin, Ph.D.
 Robert K. Lindorfer, Ph.D.
 Gerald M. Needham, M.D.
 Palmer Rogers, Ph.D.
 Joseph W. St. Geme, Jr., M.D.

Assistant Professor

Dwight L. Anderson, Ph.D.
 Russell C. Johnson, Ph.D.
 John A. Ulrich, 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. Acceptable languages are French, German, and Russian.

Master's Degree—Offered under Plan A.

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

- 100s.** **Microbiology for Dental Students**. Morphology; methods of staining; culture media; methods of identification; principles of sterilization and disinfection; antibiotics; bacteria and disease; fundamentals of immunology; oral flora; bacteriology of oral infections, dental caries, alveolar abscess, and periodontal infection; relationship of oral infections to other focal and general infections. (6 cr) Anderson
- 102s.** **Medical Microbiology**. Pathogenic bacteria, fungi and viruses, especially in their relationship to disease; principles of infection, pathogenesis, and immunity; microbiological techniques for laboratory diagnosis and antibiotic determinations. (4 cr; for other than med students; prereq 116) Johnson
- 103s. **Soil Microbiology**. Methods for enumeration and study of microflora and microfauna. Biochemical activities of soil population. (4 cr; prereq 53, 8 cr in organic chemistry and #; offered 1965-66) Schmidt
- 105f-106w.** **Principles of Infectious Disease**. Medical bacteriology, immunology, mycology, and virology inclusive of factors that produce an infectious process. Principles and techniques that make possible diagnosis, treatment, and prevention of specific infectious disease. (6 cr per qtr; prereq Anat 103, MdBc 100 or 101, or BioC 120) Watson, Brand, and staff
- 110s. **Microbial Genetics**. Genetic mechanisms in the bacteria, bacteriophages, fungi, protozoa, and algae. Mutagenesis; selection; adaptation; cytoplasmic inheritance; patterns of genic recombination; fine structure of genetic material. (3 cr; prereq 53 or #; offered 1966-67 and alt yrs) Bradley
- 111s. **Experimental Microbiology**. Advanced laboratory study in comparative morphology, taxonomy, and physiology of bacteria. For microbiology majors and others interested chiefly in biological and chemical aspects of microbes. Stress enrichment, isolation, identification, cultivation, structure, and function of microorganisms. (5 cr; prereq 53, 121 and #) Church

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

- 112s. General Mycology.** Physiology; genetics; development; ecology; evolution; taxonomy; economic importance of the yeasts, molds, actinomycetes, and other fungi. (3 cr; prereq 53 or #; offered 1965-66 and alt yrs) Bradley
- 116w. Immunology.** Host-parasite interactions; nature of antigens and antibodies; chemical basis of serologic specificity; qualitative and quantitative aspects of antigen-antibody reactions; theories of antibody production; cellular antigens and blood grouping; nature of complement and its role in immunologic phenomena; mechanisms of hypersensitivity; hypersensitivity-like states and immunologic diseases; homotransplantation and tumor immunity; mechanisms of natural and acquired immunity. (3 cr; prereq 53) Muschel
- 116Aw. Immunology Laboratory.** (2 cr; prereq ¶116)
- 121w. Physiology of Bacteria.** Chemical and physical organization of bacteria as related to function; growth; energy metabolism including oxidations and fermentations; nutritional requirements; antimicrobial agents; autotrophic mechanisms; and microbial differentiation. (3 cr; required of all microbiology majors; prereq 53, 8 cr in organic chemistry or biochemistry) Rogers
- 124f. Principles of Virology and Animal Cell Culture.** Lectures on biology of animal cell cultures; nature of viruses and rickettsia; etiology, epidemiology, and laboratory diagnosis of viral and rickettsial infections. (3 cr; prereq 102 or 105 and 116) Staff
- 152f,w,s. Special Problems.** (Cr ar; prereq #)
- 153f. Biology of Microorganisms.** Lectures, demonstrations, and laboratory exercises in taxonomy, anatomy, physiology, biochemistry, and ecology of microbes. Fundamental properties of bacteria. (5 cr, §53; prereq 5 cr in biological sciences, OrCh 61, 62 or #) Dworkin
- 201f,w,s. Research in Microbiology.** Graduate students with the requisite preliminary training may elect research, either as majors or minors. (Cr and hrs ar) Staff
- 202f,w,s. Diagnostic Microbiology.** Laboratory procedures for isolation and identification of microorganisms from patients. Work is carried out in the diagnostic microbiology laboratories of the hospital. (Cr ar; prereq grad student in microbiology, #) St Geme, staff
- 203f,w,s. Seminar.** (1 cr) Dworkin
- 205f,w,s. Advances in Immunology.** Research reports; evolution and mechanisms of immune response, cellular and humoral aspects of hypersensitivity, immunological tolerance, autoimmunity and its relation to disease, and other topics. (1 cr per qtr) Watson, Good, Muschel, and staff
- 206s.** Laboratory Methods, Applied Animal Cell Culture and Virology.** Laboratory exercises on preparation of animal cell cultures; study and laboratory diagnosis of viral and rickettsial infections. (3 cr; prereq 124 or ¶124, #; offered 1966-67 and alt yrs) Staff
- 207w. Advanced Medical Microbiology.** (2 cr; prereq #) Brand
- 222. Physiology of Bacteria Laboratory.** Techniques employed in study of bacterial physiology and metabolism. (3 cr; prereq 121, grad in microbiology, others by consent; offered 1st term SS only) Rogers
- 223f. Bacterial Metabolism.** Advanced treatment of metabolism: enzymes; biological energy; fermentation; respiration; nitrogen metabolism. (3 cr; required of all Ph.D. candidates in microbiology, open to others by consent; prereq 121 or equiv, introductory biochemistry; offered 1966-67) Bernlohr

OFFERED AT ROCHESTER

Professor

Lyle A. Weed, M.D., Ph.D., *head*
 Alfred G. Karlson, D.V.M., M.S., Ph.D.

Associate Professor

Gerald M. Needham, Ph.D.

Assistant Professor

Ernest C. Herrmann, Ph.D.
 Harold Markowitz, Ph.D., M.D.
 John A. Ulrich, Ph.D.

Opportunities are offered for advanced work in microbiology (bacteriology, mycology, virology, immunology, parasitology) in connection with routine clinical examinations and special research. These may be in conjunction with minor programs offered to fellows in the Mayo Graduate School of Medicine who are majoring in clinical fields or may be taken separately.

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

- M 251f,w,s,su. Diagnostic Microbiology.** Experience in a diagnostic laboratory including special procedures and research. Weed, Needham, Ulrich, Karlson, Markowitz, Herrmann, J H Thompson, Jr.
- M 252f,w,s,su. Experimental Microbiology.** Graduate research in any of the various phases of microbiology (immunology, virology, mycology, bacteriology, and parasitology). Weed, Needham, Ulrich, Karlson, Markowitz, Herrmann, J H Thompson Jr.
- M 253f,w,s,su. Lectures in Microbiology.** Medical bacteriology, mycology, parasitology, virology, and immunology. Weed, Needham, Ulrich, Karlson, Markowitz, Herrmann, J H Thompson, Jr., Stilwell

NUTRITION

OFFERED AT ROCHESTER AND AT ST. PAUL, BY THE SCHOOL OF HOME ECONOMICS

Professor

Charles F. Code, M.D., Ph.D., *head*
Randall G. Sprague, M.D., Ph.D.

Assistant Professor

Sister Mary Victor, M.S.

Mayo Graduate School of Medicine, a division of the Graduate School of the University of Minnesota, annually offers fellowships for study in nutrition and dietetics which may lead to a Master's degree. The fellowships are offered to provide opportunities that will qualify dietitians for positions in metabolic research, clinical dietetics, and teaching. Supervision is by the faculty of the Mayo Graduate School in medicine, physiology, and biochemistry. The clinical, laboratory, and research facilities of the Mayo Graduate School, the Mayo Clinic, and St. Marys Hospital are available for training and research.

The fellow's 1-year program at Rochester has considerable flexibility and is planned individually with the candidate. It usually includes the majority of the courses listed below.

Following the fellowship program at Rochester, the candidate for an advanced degree registers for further study in the School of Home Economics of the University of Minnesota. For the Master's degree the fellow takes additional courses to complete a minimum of 18 quarter credits in the major field and 9 in the minor. The minor subject usually chosen is in some related field such as education, biochemistry, physiology, or economics. If research or teaching assistantships from the University are not available for this period of study on the Minneapolis-St. Paul Campuses, the Mayo Graduate School of Medicine fellowship will be continued, providing the fellow's progress in the program is satisfactory.

Prerequisites—A B.S. degree and a completed dietetic internship approved by the American Dietetic Association.

- M HE 174f. Nutrition Topics.** (1 cr; prereq 170) Victor, Jones
- M HE 178w. Clinical Problems in Nutrition.** Lectures in diseases with emphasis on nutrition problems. (2 cr; prereq HE 170 or equiv; offered at St. Marys Hospital, Rochester) Gastineau, Victor
- M HE 272f,w,s,su. Human Metabolic Studies in Health and Disease.** Three months in a metabolic unit affords opportunity to learn principles, procedures, and dietary techniques employed in conducting research studies of a metabolic nature; experience and responsibility in planning and executing such studies. Work is supervised by the Departments of Medicine and Physiology. Conferences and group discussions. (4 cr; prereq HE 173 or equiv, #; offered at Rochester) Code
- M HE 273f,w,s,su. Advanced Diet Therapy with Clinical Experience.** Three months in clinical dietetics; daily hospital rounds with the medical staff, planning of therapeutic diets for various diseases, and responsibility for providing dietetic treatment for patients on one clinical service. Work is under supervision of a section of medicine and the Department of Dietetics, St. Marys Hospital. Lectures and conferences. (4 cr; prereq HE 173 or equiv, #; offered at St. Marys Hospital, Rochester) Victor

M 251f,w,s,su. Research in Basic Nutrition or Metabolism. Research project concerned with a problem in human or animal nutrition or with physiologic or biochemical nutritional problems. The investigation usually forms the basis of a thesis offered in partial fulfillment for the degree of master of science. Code, Sprague

OBSTETRICS AND GYNECOLOGY

OFFERED AT MINNEAPOLIS

Professor

John L. McKelvey, M.D.C.M., *head*

Clinical Associate Professor

Mancel T. Mitchell, M.D.

Associate Professor

Konald A. Prem, M.D.

Clinical Assistant Professor

Erick Y. Hakanson, M.S.
Leonard A. Lang, 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. Routinely acceptable languages are French, German, and Spanish.

Master's Degree—Offered only under Plan A.

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

- 201f-202w-203s-204su. Advanced Obstetrics and Gynecology, I.** Includes service in the University Hospitals or Hennepin County 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. (Cr ar; required of 1st-yr 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. (Cr ar; required of 2nd-yr fellows) McKelvey and staff
- 209f-210w-211s-212su. Advanced Obstetrics and Gynecology, III.** Similar to 201-204 and 205-208, but more advanced. (Cr ar; required of 3rd-yr fellows) McKelvey and staff
- 213f-214w-215s. Staff Conference Seminar.** Presentation and discussion of original work and reports upon current literature in obstetrics and gynecology. (Cr ar; for fellows and grad students) McKelvey and staff
- 216f-217w-218s-219su. Research.** Clinical and laboratory research upon problems in obstetrics and gynecology. (Cr ar; required of 3rd-yr fellows, who must complete a satisfactory thesis during yr; elective for 2nd-yr fellows or other properly qualified grad students) McKelvey and staff
- 221f-222w-223s-224su. Clinical Obstetrics and Gynecology.** Diagnosis and treatment, with special study of selected cases. Clinic in the Outpatient Department of University Hospitals. (Cr ar; required of teaching fellows) McKelvey and staff

OFFERED AT ROCHESTER

Professor

Robert B. Wilson, M.D., M.S. (Clinical), *head*
Arthur B. Hunt, M.D., M.S.
Joseph H. Pratt, M.D., M.S. (Clinical)

Richard E. Symmonds, M.D., M.S.

John S. Welch, M.D., M.S.
Tiffany J. Williams, M.D.

Associate Professor

Edward A. Banner, M.D., M.S. (Clinical)

Instructor

Leonard A. Aaro, M.D., M.S.
John E. Faber, M.D., M.S.
Carl E. Johnson, M.D., M.S.
Roger D. Kempers, M.D., M.S.
George D. Malkasian, M.D.
Reginald A. Smith, M.D., M.S.

Assistant Professor

David G. Decker, M.D., M.S.
M. Elizabeth Mussey, M.D., M.S.

Opportunity is available for extensive experience in diagnosis and treatment of gynecologic diseases and obstetrics. Studies in basic sciences are incorporated during the period of clinical training. Experience in operative surgery is obtained in gynecologic surgical sections. Seminars and conferences are held regularly.

Through special arrangements each fellow is assigned for a period of 6 months to the Cook County Hospital in Chicago, Illinois, where he receives special training in obstetrics.

Language Requirement—For the Ph.D. degree, either (a) two foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A.

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

M 251f,w,s,su. Diagnosis, principally in relation to obstetrics and gynecologic conditions. Research. Seminar. Wilson, Hunt, Faber, Mussey, Banner, Decker, Johnson, Smith, Aaro, Kempers, Malkasian

M 252f,w,s,su. **Clinical Obstetrics and Gynecology.** Diagnosis and treatment with special study of selected obstetric and gynecologic cases. Residence. Seminar. Wilson, Hunt, Faber, Mussey, Banner, Decker, Johnson, Smith, Aaro, Kempers, Malkasian

M 253f,w,s,su. **Operative Surgery.** Pratt, Welch, Symmonds, Williams

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 MINNEAPOLIS

Professor

John E. Harris, Ph.D., M.D., *head*

Clinical Professor

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

Clinical Associate Professor

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

Robert H. Monahan, M.D.

Karl E. Sandt, M.D.

Assistant Professor

William L. Fowles, Ph.D.

William H. Knobloch, M.D.

Clinical Assistant Professor

Llewellyn E. Christensen, M.D.

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

Bourne Jerome, M.D.

Bruce L. Kantar, M.D., M.S.

George T. Tani, M.D., M.S.

Graduate work in the field of ophthalmology is available to qualified physicians who wish to prepare themselves for the private practice of this specialty or to gear their training toward a career of teaching or research in the basic science or clinical aspects of ophthalmology. The wide variety of ophthalmologic problems presented at the University Hospitals, Hennepin County General Hospital, Ancker Hospital in St. Paul, and the Veterans Hospital in Minneapolis provides an excellent core for clinical training and insures adequate surgical experience for each individual fellow. The department's laboratory facilities and its staff are available to all for research in basic or clinical studies of the specialty. Regardless of his ultimate aim, each fellow spends a period of time in the laboratory familiarizing himself with the research problems of ophthalmology. Those wishing to prepare themselves for teaching and research in ophthalmology are provided additional opportunities for training along these lines.

Master's Degree—Work toward the Master's degree is provided in the department. Individuals who desire such a degree are encouraged but not required to take an additional year of training. Minor fields for the Master's degree are taken in one of the basic science disciplines by special arrangement with the department involved. Particular emphasis is given to such fields as physiology, biophysics, physiological chemistry, microbiology, etc. The Master's degree is offered only under Plan A.

Doctor's Degree—A Ph.D. degree is *not* offered in ophthalmology. Rather, the individual desiring the Ph.D. is encouraged to take this in one of the basic sciences, doing his research on some ophthalmologic problem appropriate to his major subject.

The listed course work is required of all graduate students whether they are working toward a degree or not. Opth 200, 201, 202, and 203 are offered on a continuing basis throughout the 3-year program. Opth 203 covers the basic subjects of physiology, biophysics, physiological chemistry, pharmacology, etc., as they apply to the practice of ophthalmology. The remainder of the courses (with the exception of Opth 204 and 215) are presented once during the 3-year program.

- 200f,w,s,su. **Clinical Ophthalmology.** (6 cr per qtr) Harris and staff
 201f,w,s,su. **Practical Ocular Surgery.** (3 cr per qtr) Harris and staff
 202f,w,s. **Ocular Pathology Conference.** (1 cr per qtr) Monahan and staff
 203f,w,s,su. **Basic and Applied Ophthalmology.** (2 cr per qtr) Harris and staff
 204. **Seminar: Ophthalmology.** (Cr ar) Harris and staff
 205f,w,s. **Neuroophthalmology.** (1 cr per qtr) Wendland, Baker, and staff
 206f. **Refraction.** (1 cr) Tani
 207w,s. **Ocular Muscles.** (1 cr per qtr) Fink, Horns, and staff
 208f,w. **Didactic Ocular Surgery.** (1 cr per qtr) Burch and staff
 209f,w. **Pathology of the Eye.** (1 cr per qtr) Monahan and staff
 210s. **Radiology of the Eye, Orbit, and Head.** (1 cr) Peterson
 211s,f. **External Diseases.** (1 cr per qtr) Wendland and staff
 212f,w,s. **Medical Ophthalmology.** (1 cr per qtr) Kantar and staff
 213w,s. **Physiologic Optics.** (1 cr per qtr) Jerome
 214. **Ophthalmology Laboratory.** (9 cr) Harris and staff
 215. **Research in Ophthalmology.** (Cr ar) Harris and staff

OFFERED AT ROCHESTER

Professor

John W. Henderson, M.D., M.S., *head*
 Robert W. Hollenhorst, M.D., M.S.
 C. Wilbur Rucker, M.D., M.S.

Associate Professor

Hugo L. Bair, M.D.

Assistant Professor

John A. Dyer, M.D., M.S.
 Thomas P. Kearns, M.D., M.S.
 Thomas J. Kirby, Jr., M.D., M.S.
 Theodore G. Martens, M.D., M.S.

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.

Master's Degree—Offered only under Plan A.

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

- M 251f,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, Dyer
 M 252f,w,s,su. **Clinical Ophthalmology.** Diagnosis and treatment of diseases of the eye and its adnexa. Bair, Henderson, Kirby
 M 253f,w,s,su. **Medical and Neurologic Ophthalmology.** Ophthalmology and ophthalmoscopy as they pertain to the fields of internal medicine and neurology. Rucker, Hollenhorst, Kearns

M 254f,w,s,su. **Ophthalmic Surgery.** A 6-months' hospital service. Bair, Henderson, Hollenhorst, Martens, Kirby, Dyer

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 MINNEAPOLIS

Professor

Lawrence R. Boies, M.A., M.D., *head*
Frank M. Lassman, Ph.D.
Henry L. Williams, Jr., M.D., M.S.

Clinical Professor

Jerome A. Hilger, M.D., M.S.
Robert E. Priest, M.D., M.S.

Associate Professor

W. Dixon Ward, Ph.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. Routinely acceptable are German and Spanish.

Master's Degree—Offered only under Plan A.

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

230f,w,s. **Clinical Otology.** (3 cr per qtr) Staff

231. **Clinical Rhinology and Laryngology.** (3 cr) Staff

232f,w,s. **Surgery of the Ear, Nose, and Throat.** (3 cr per qtr) Staff

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

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

235. **Roentgenology of the Head.** (½ cr) Staff

236. **Functional Ear Tests.** (1 cr) Staff

237. **Endoscopy.** Lectures and demonstrations. (2 cr) Staff

238. **Pathology of the Ear, Nose, and Throat.** (1 cr) Staff

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

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

241. **Seminar on Current Literature.** (1 cr) Staff

242. **Applied Physiology in Otolaryngology.** (½ cr)

243. **Applied Pharmacology in Otolaryngology.** (½ cr)

244. **Speech Pathology.** (½ cr) Lassman

245. **Allergy.** (1 cr) Staff

246. **Practical Audiology.** (1 cr) Lassman

247. **Reconstructive Nasal Surgery.** (1 cr) Staff

248. **Research.** (Cr ar) Boies

Otolaryngology and Rhinology

OFFERED AT ROCHESTER

Professor

Kinsey M. Simonton, M.D., M.S., *head*

Associate Professor

Kenneth D. Devine, M.D.
Olav E. Hallberg, M.D., M.S. (Clinical)
LeRoy D. Hedgecock, Ph.D.

Assistant Professor

Henry A. Brown, M.D., M.S.
Clifford F. Lake, M.D., M.S.

Instructor

Douglas T. Cody, M.D.C.M.
John C. Lillie, M.D., M.S.
James B. McBean, M.D.

The fellowship in otolaryngology and rhinology at the Mayo Graduate School of Medicine offers practical experience in diagnosis and treatment of diseases comprising the broad field of ear, nose, and throat.

Diagnostic experience includes medical and surgical diagnosis, otoneurologic diagnosis, and audiologic practice and its application to otologic and neurologic diagnosis. The relationship of diseases of the ear, nose, and throat to the field of general medicine is demonstrated by consultation on patients undergoing general medical examination. Therapeutic experience includes care of patients in office, home, and hospital, giving a well-rounded preparation for practice of the specialty. Surgery of the ear, including operations for restoration of function, surgery of the paranasal sinuses, reconstructive surgery of the nasal septum and pyramid, and surgery of the pharynx and larynx, is offered. Plastic, reconstructive, and tumor operations of the head and neck are done by the fellows during affiliation with the Section on Plastic Surgery. Training in peroral endoscopy, including diagnosis of diseases of the chest, is given in affiliation with the Section on Diseases of the Chest, Department of Internal Medicine.

Courses in surgical pathology and anatomy are offered in the Departments of Pathology and Anatomy. Microsurgical procedures of the ear, using fresh tissue specimens, and surgical procedures of the ear, nose, and throat, using cadavers, are performed under direction of the staff. Opportunity is available for original research in co-operation with the department dealing with the basic sciences.

The full 4-year program, including 1 year of general surgery as required for certification by the American Board of Otolaryngology, is offered. A 3½-year program is available for candidates who have 1 year of experience in an approved surgical residency program. Candidates are encouraged to take their year in general surgery at the Mayo Graduate School of Medicine, where the general surgery experience is directed to those areas most related to the practice of otolaryngology.

During the final year, 6 months are spent in an affiliated hospital which offers a large service affording varied experience.

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—Work leading to the Ph.D. degree is offered in this department.

M 251f,w,s,su. Clinical Otolaryngology and Rhinology. Theory and practice with differential diagnosis and treatment of diseases of the ear, nose, paranasal sinuses, pharynx, and larynx, and their relation to general diagnosis. Simonton, Hallberg, Brown, Lake, McBean, Cody, Pulec

M 252f,w,s,su. Preoperative and Postoperative Care of Patients. Treatment of complications. Simonton, Hallberg, Brown, Lake, McBean, Cody, Pulec

M 253f,w,s,su. Operative Otolaryngology and Rhinology. Hospital residence, second assistantship in operating service. Cadaver surgery, microsurgery of the ear on fresh anatomic material. Simonton, Hallberg, Brown, Lake, McBean, Cody, Pulec

M 254f,w,s,su. Operative Otolaryngology and Rhinology. First assistantship in operative service. Simonton, Hallberg, Brown, Lake, McBean, Cody, Pulec

M 255f,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

Plastic Surgery. (See Department of Plastic Surgery)

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 microbiology or biophysics. For details, see these departments.

PATHOLOGY

OFFERED AT MINNEAPOLIS

Professor

James R. Dawson, Jr., M.D., *head*
A. B. Baker, M.D., Ph.D.
Ellis S. Benson, M.D.
Jesse E. Edwards, M.D.
Robert Hebbel, M.D., Ph.D.

Associate Professor

John J. Coe, M.D.
Paul H. Lober, M.D., Ph.D.
Nathaniel A. Lufkin, M.D.
Lee W. Wattenberg, M.D.

Clinical Instructor

Frederick A. Fox, M.D.

Prerequisites—Graduate students who desire to take their major work in pathology must present credits for the equivalent of the first 2 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. French, German, and Russian are acceptable languages.

Master's Degree—Offered only under Plan A.

Master's Degree with Designation in Pathology—Given only after 3 years of work.

Doctor's Degree—The Ph.D. degree with designation in pathology may be awarded after completion of 3 or more years in graduate work and presentation of a thesis of high quality.

- 101. Pathology. General pathology. (8 cr; prereq completion of 1st yr in Med School or equiv) Dawson, Hebbel, and staff
- 102. Pathology. Special pathology. (8 cr; prereq 101) Dawson, Hebbel, and staff
- 104x. Autopsies. (Cr ar; prereq 102) Dawson, Hebbel
- 105. Diseases of the Kidney. (3 cr; prereq 102) Hebbel
- 106. Diseases of the Heart. (1 cr; prereq 102) Edwards
- 110x. Seminar: Pathology. (1 cr per qtr; prereq 102) Dawson
- 111x. Conference on Autopsies. (1 cr per qtr; prereq 102) Dawson
- 112. Diagnosis of Tumors. (Cr ar; prereq 102) Hebbel
- 113x. Surgical Pathology. (Cr ar; prereq 102) Hebbel
- 114. Diseases of the Liver. (1 cr; prereq 102) Staff
- 115. Advanced Neuropathology. (Cr ar, §NPsy 150, §NPsy 210; hrs ar) Baker
- 116. Problems in Neuropathology. (Cr ar, §NPsy 143; prereq 102; hrs ar) Baker
- 117. Neuropathology. (Cr ar, §NPsy 143; hrs ar) Baker
- 119. Survey of Neuropathology. Examination of specimens from current autopsies. (Cr ar, §NPsy 151 and §NPsy 212; hrs ar)
- 120. Diseases of the Lungs. (1 cr; prereq 102) Dawson
- 121. Diseases of the Alimentary Tract. (1 cr; prereq 102) Hebbel
- 122. Basic Science of Cancer. (4 cr; prereq MdBc 100 or equiv) Wattenberg
- 140f,w,s. Seminar: Experimental Pathology. (Formerly CBio 140) (1 cr) Halberg
- 141f,w,s. Problems in Experimental Pathology. (Formerly CBio 141) (Cr and hrs ar) Staff

150x. **Problems in Pathology.** (Cr and hrs ar; prereq 102, Δ) Staff

201x. **Research.** (Cr and hrs ar; grad students with necessary preliminary training may elect research, either as majors or minors in pathology)

207f,w,s. **Research in Experimental Pathology.** (Formerly CBio 207) (Cr and hrs ar) Staff

OFFERED AT ROCHESTER

Professor

Archie H. Baggenstoss, M.D., M.S., *head*,
Anatomic Pathology

Malcolm B. Dockerty, M.D., C.M., M.S., *head*,
Surgical Pathology

David C. Dahlin, M.D., M.S.

Alfred G. Karlson, D.V.M., M.S., Ph.D.

Lewis B. Woolner, M.D., M.S.

George P. Sayre, M.D., M.S.

Edward H. Soule, M.D.

Assistant Professor

Arnold L. Brown, Jr., M.D.

Edgar G. Harrison, Jr., M.D., M.S.

Roy G. Shorter, M.D.

Jack L. Titus, M.D., Ph.D.

Associate Professor

Robert C. Bahn, M.D., Ph.D.

Edith M. Parkhill, M.D., M.S.

Opportunities for advanced work in anatomic pathology are offered in two different sections of the Mayo Graduate School of Medicine. In each section the work may be part of a program leading to eligibility for examination and certification by the American Board of Pathology.

1. Experimental and Anatomic Pathology—Within this section active research programs utilizing the techniques of histochemistry, electron microscopy, tissue culture, radioautography, and tissue transplantation are under way, in addition to the performance of necropsies. Post-mortem examinations are made in sufficient numbers to permit approximately 12 fellows being assigned to the section.

The service permits the laying of a thorough foundation in general principles of pathologic anatomy. Each fellow serves as junior assistant 3 months and senior assistant 3 months, during which time he takes part in the routine of postmortem examinations and studies the microscopic sections of these postmortems 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. First assistants are provided with an additional 6 months' service with increased responsibilities and opportunities for more extensive investigation. Available for study is a large collection of operative and postmortem 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.

2. 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 6-month period. First assistants are provided with an additional 6 months' training with increased responsibilities. Material from some 50,000 cytologic smears (annually) also are available for study.

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 multigraphed for future reference.

- M 254f,w,s,su. Necropsy Service.** Junior assistant 3 months; senior assistant 3 months; demonstrations in clinicopathologic conferences; microscopic examination of fixed tissues removed at necropsy. Microbiology and necropsy material. Research problems. Weekly seminars. Baggenstoss, Sayre, Bahn, Brown, Shorter, Titus
- M 255f,w,s,su. 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, Parkhill, Dahlin, Woolner, Soule, Harrison
- M 256f,w,s,su. Research Work on Selected Problems in Experimental Pathology.** Owen, Hallenbeck, Bahn, Shorter, Brown, Titus
- M 257f,w,s,su. Research Work on Selected Problems in Comparative Pathology.** Karlson
- M 258f,w,s,su. Cytology of Body Secretions.** Dahlin, Woolner
- M 259f,w,s,su. Pathology of the Eye.** Open to ophthalmology majors who have adequate preparation in general pathology. Parkhill
- M 260f,w,s,su. Neuropathology.** Open to majors in neurology and psychiatry or neurologic surgery who have adequate preparation in general pathology. Sayre
- M 261f,w,s,su. Electron Microscopy.** Brown

Clinical Pathology

Professor

Charles A. Owen, Jr., M.D., Ph.D., *head*

Associate Professor

Frank T. Maher, M.D., M.S., Ph.D.
Don R. Mathieson, M.D., M.S.
Gertrude L. Pease, M.D., M.S.

Assistant Professor

Welby N. Tauxe, M.D., M.S.
John H. Thompson, Jr., Ph.D.

Instructor

George G. Stilwell, M.D.
Howard F. Taswell, M.D.

A 2-year program in clinical pathology is offered as part of a 4-year program in pathology leading to eligibility for examination and certification by the American Board of Pathology and Clinical Pathology. This program consists of lectures, demonstrations, and actual performance of tests in the laboratories of microbiology, chemistry, parasitology, blood coagulation, blood grouping, urinalyses, gastric analyses, radioactive isotopes, and hematology where over 1.5 million tests are performed yearly.

Graduate students may be assigned to one or all of these laboratories to learn the methods used as aids in clinical diagnoses. They may, also, conduct original investigative work in any of the laboratories.

- M 251Af,w,s,su. Diagnostic Microbiology.** Experience in a diagnostic laboratory; special procedures and research. Weed, Needham, Ulrich, Karlson, Markowitz, Herrmann
- M 251Bf,w,s,su. Biochemistry.** Research work in problems related to metabolism and the chemistry of the blood; training in use of methods of organic and inorganic analysis. Owen, Mason, Flock, Fleischer, Mattox, McGuckin, Rosevear, Jones
- M 251Cf,w,s,su. Clinical Pathology.**
- Serology. Mathieson, Stilwell
 - Blood Banking. Mathieson, Stilwell, Taswell
 - Analyses of Gastric Contents, Urine, and Cerebrospinal Fluid. Mathieson
 - Tests for Liver, Pancreas, Adrenal and Renal Function. Maher, Stilwell
 - Radioactive Isotope Diagnostic Tests. Tauxe
 - Problems in Blood Coagulation. Owen, Thompson
- M 252f,w,s,su. Parasitology.** Routine clinical and special research in parasitology, examination of stools, study of internal parasites. Thompson

M 253f,w,s,su. **Hematology.** Blood smears, bone marrow examination, L.E. clot test, as well as common hematologic technique. Pease

PEDIATRICS

OFFERED AT MINNEAPOLIS

Professor

John A. Anderson, M.D., Ph.D., *head*
 Robert A. Good, M.D., Ph.D.
 Reynold A. Jensen, M.D.
 William Krivit, M.D., Ph.D.
 Lewis W. Wannamaker, M.D.

Clinical Professor

Albert V. Stoesser, M.D., Ph.D.

Associate Professor

Paul Adams, M.D.
 Ray C. Anderson, M.D., Ph.D.
 Richard B. Raile, M.D.

Clinical Associate Professor

Paul F. Dwan, M.D.
 Robert L. Wilder, M.D.

Assistant Professor

Elia M. Ayoub, M.D.
 Robert O. Fisch, M.D.
 Arthur R. Page, M.D.
 Raymond D. A. Peterson, M.D.
 Paul G. Quie, M.D.
 John W. Reynolds, M.D.
 Joseph W. St. Geme, M.D.
 Kenneth F. Swaiman, M.D.
 Homer D. Venters, M.D.
 Warren J. Warwick, M.D.
 James G. White, M.D.

Clinical Assistant Professor

Edward N. Nelson, M.D.

The Department of Pediatrics offers broad opportunities for graduate training in the general field of pediatrics as well as in the subspecialties related to the field of pediatrics. The graduate training program permits the candidate to complete the requirements for the specialty of pediatrics established by the American Board of Pediatrics. Highly qualified candidates desiring to pursue a full-time career in teaching and research in the field of pediatrics or to pursue further graduate work in certain subspecialties of pediatrics may extend their clinical training program to include further training in the basic fields of medicine appropriately related to the field of pediatrics.

In general fellowships are planned for a 3- to 4-year period following completion of an internship. Two years of clinical work satisfies the requirements for certification by the Specialty Board in Pediatrics. An additional 1 to 2 years are required to complete work for the M.S. or Ph.D. degree. The graduate work includes clinical training in all of the practical aspects of pediatrics. The candidate may participate in clinical or laboratory research programs while preparing a thesis on such work and qualifying for examination for the M.S. degree. Candidates desiring advanced basic science training programs may fulfill their minor and major requirements for a Ph.D. degree. Research opportunities will be provided in either the basic science departments or in the laboratories of the Department of Pediatrics. Considerable flexibility in the graduate training program pursued by the candidate is permitted. The 2-year clinical training program may be interrupted in favor of an opportunity for further orientation in the basic fields of medicine. Following completion of minor basic science requirements for the Ph.D. degree, the candidate may then return to the clinical department to complete his specialty requirements.

Following completion of 2 years of clinical training, qualified candidates may extend their clinical program 1 or more years by securing additional training in the fields of pediatric cardiology, endocrinology, neurology, allergy, psychiatry, and pathology.

The clinical experience in pediatrics is obtained in the outpatient and inpatient services of the University of Minnesota Hospitals and affiliated hospitals. The affiliated hospitals are the Hennepin County General Hospital, the Ancker Hospital of St. Paul, the Children's Hospital of St. Paul, and the Variety Club Heart Hospital. Extensive clinical experience in premature and newborn care, communicable and in-

fectious diseases, heart disease, allergy, pathology, neurology, child psychiatry, and endocrinology and metabolism is provided.

Prerequisites—General understanding of bacteriology, immunology, pathology, physiology, and biochemistry 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.

200f,w,s,su. Graduate Seminar in Pediatrics. (1½ cr) J A Anderson and staff

202f,w,s,su. Pediatric Clinics. (Cr and hrs ar; prereq #) J A Anderson and staff

204f,w,s,su. Residency in Pediatrics. Two- to 4-month rotations on the inpatient, outpatient, and special pediatric services of the University Hospitals, Hennepin County General Hospital, Children's Hospital of St. Paul, and Ancker Hospital. (Cr and hrs ar; prereq #) Pediatric staff

206f,w,s,su. Pediatric Special Interest. Pediatric graduate students who have completed at least 1½ years of their general graduate pediatric training may obtain advanced clinical and basic training in one or more of the following special fields: allergy, neurology, cardiology, pathology, endocrinology and metabolism, hematology. Clinical training in these areas is obtained in the inpatient and outpatient services of the University Hospitals and the affiliated hospitals. Training in the basic sciences related to these fields of special interest may be obtained in the preclinical divisions of the Medical School. (Cr and hrs ar; prereq #) Pediatric staff

208f,w,s,su. Pediatric Research. (Cr ar; prereq #) J A Anderson, Good, Adams, R C Anderson, Raile, Wannamaker, Krivit

OFFERED AT ROCHESTER

Professor

James W. DuShane, M.D., *head*
George B. Logan, M.D., M.S.

Associate Professor

Edmund C. Burke, M.D., M.S. (Clinical)
Lloyd E. Harris, M.D.
Alvin B. Hayles, M.D., M.S.
Stephen D. Mills, M.D., M.S. (Clinical)
Patrick A. Ongley, M.D.

Assistant Professor

Gunnar B. Stickler, M.D., Ph.D.
William H. Weidman, M.D., M.S.

Instructor

E. Omer Burgert, Jr., M.D., M.S.

The Section of Pediatrics of the Mayo Clinic and Mayo Graduate School of Medicine provides opportunities for graduate training in all aspects of pediatrics. Clinical fellowships are offered for 2 years of training as a broad educational background for general pediatrics, fulfilling the requirements of the American Board of Pediatrics for certification in the specialty and equipping the candidate for medical practice in this field.

The program includes experience in the care of acute and chronic diseases of the usual type as well as complex diagnostic problems in hospitalized children. Outpatient clinic services include children with acute illnesses and those with unusual problems referred to the Mayo Clinic. Clinical experience with newborn and premature infants as well as all aspects of preventive pediatrics is afforded through the Well Child Clinics. Three months are devoted to child psychiatry under the direction of the faculty in child psychiatry where experience is gained in evaluating children with emotional and psychosomatic disorders and application of the various techniques of psychotherapy.

Advanced training in clinical subspecialties such as pediatric allergy, pediatric cardiology, pediatric endocrinology and metabolism, pediatric neurology, pediatric nephrology, pediatric hematology, and child psychiatry is available to qualified individuals for one or more additional years. Opportunity for participation in laboratory programs in pathology, hematology, chemistry, and physiology leading to the M.S. degree is offered in the third year for those desiring to pursue such research opportunities. In addition, selected individuals may fulfill the requirements for the Ph.D. degree.

Fellows participate in seminars and conferences covering growth and development, fluid balance and renal function, metabolism, hematology, cardiology, allergy, roentgenology, neurology, and case presentations of ambulatory and hospitalized patients.

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—This department offers work leading to the Ph.D. degree.

M 251f,w,s,su. Diagnosis of Medical and Surgical Diseases of Infants and Children. Seminar. Staff

M 252f,w,s,su. Hospital Residence. Diagnosis and care of sick infants and children. Staff

M 253f,w,s,su. Child Health. Diagnosis and care of sick infants and children of the community under direction of consultants.

M 254f,w,s,su. Care of Newborn and Well Infants. St. Marys Hospital newborn nursery and Mayo well-baby clinic.

M 255f,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.

M 256f,w,s,su. Pediatric Cardiology. Staff

M 257f,w,s,su. Pediatric Allergy. Staff

M 258f,w,s,su. Pediatric Hematology.

Child Psychiatry. (See Department of Psychiatry and Neurology)

Pediatric Neurology. Staff

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

PHARMACEUTICAL CHEMISTRY

OFFERED AT MINNEAPOLIS IN THE COLLEGE OF PHARMACY

Professor

Ole Gisvold, Ph.D., *head*
Frank E. DiGangi, Ph.D.
George P. Hager, Ph.D.
Taito O. Soine, Ph.D.

Associate Professor

Philip S. Portoghesi, Ph.D.

Pharmaceutical chemistry involves the applications of the principles and processes of the various areas of chemical science to inorganic and organic medicinal agents. The synthesis of compounds in accordance with molecular structure-biological activity concepts or as congeners of medicinal agents that are often of natural origin constitute the medicinal chemistry phase of pharmaceutical chemistry, which also is concerned with the phytochemistry of natural products used for medicinal purposes.

Prerequisites—Graduate work leading to the M.S. and Ph.D. degrees with a major in pharmaceutical chemistry 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 qualify them to do graduate work successfully with a major in pharmaceutical chemistry.

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

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.

161-162-163. Organic Medicinal Agents. Sources, production, properties, reactions, structure-activity relationships, and uses of natural and synthetic organic compounds—both simple organic compounds (hydrocarbons, alcohols, amines, etc.) and vitamins, hormones, alkaloids, organo-metallics, etc. (3 cr per qtr; prereq OrCh 62) Gisvold and staff

164-165-166. Special Analytical Methods. Food, Drug, and Cosmetic Act and many of the official analytical methods of the U.S.P., N.F., and A.O.A.C. Analytical procedures involving instrumental methods. (3 cr per qtr; prereq 55, OrCh 63) Portuguese and staff

173. Special Problems in Pharmaceutical Chemistry. Elementary investigation of the analysis, synthesis, and phytochemistry of medicinal agents. (Cr ar; prereq #) Staff

201-202-203.* Seminar: Pharmaceutical Chemistry. (1 cr per qtr; required of majors in pharmaceutical chemistry) Staff

205-206-207.* Advanced Medicinal Chemistry. Natural and synthetic sources of medicinal agents. Theoretical bases of biological responses to applied agents. Correlation of molecular structure with biological activity. (3-5 cr per qtr; prereq 163 and OrCh 63 or #; offered 1965-66 and alt yrs) Staff

208.* Carbohydrates and Glycosides. Origin, isolation, characterization, and chemistry. (3-5 cr; prereq OrCh 63 or #; offered 1966-67 and alt yrs) Gisvold

209.* Alkaloids. Isolation, purification, and characterization. (3-5 cr; prereq OrCh 63 or #; offered 1966-67 and alt yrs) Soine

211.* Terpenes and Plant Pigments. Discussion of their chemistry; experimental investigation of methods of isolation and characterization. (3-5 cr; prereq OrCh 63 or #; offered 1966-67 and alt yrs) DiGangi

212.* Fats, Waxes, Steroids, and Related Compounds. Origin, isolation, characterization, and chemistry. (3-5 cr; prereq OrCh 63 or #; offered 1966-67 and alt yrs) Gisvold

213x. Pharmaceutical Chemistry Laboratory Techniques. (Cr ar; prereq OrCh 63 or #) Portuguese

214x. Research in Pharmaceutical Chemistry. Study and experimental investigation of topics in the area of natural products and synthetic organic medicinal agents. (Cr ar; prereq OrCh 63 or #) Staff

PHARMACEUTICAL TECHNOLOGY

OFFERED AT MINNEAPOLIS IN THE COLLEGE OF PHARMACY

Professor

Charles V. Netz, Ph.D., *head*
Willard J. Hadley, Ph.D.

Assistant Professor

John D. McRae, Ph.D.

Associate Professor

Hugh F. Kabat, Ph.D.
Robert H. Miller, Ph.D.
Edward G. Rippie, Ph.D.

Pharmaceutical technology offers a selection of courses in physical pharmacy and hospital pharmacy. The pharmaceutical technology program with emphasis in physical pharmacy is designed for the student who desires to prepare himself for

a career in education, industry, or research. The hospital pharmacy program, leading to a master of science degree in hospital pharmacy, is designed for the student who desires a responsible supervisory and managerial position in the hospital pharmacy.

Program in Hospital Pharmacy

Prerequisites—A degree from a college of pharmacy and an exceptional scholarship record. Evidence of personal capability and fitness for work in the hospital field is likewise necessary in each case and will be considered an essential requirement for admission.

Language Requirement—Knowledge of a foreign language may be waived upon petition to the Graduate School.

Minor Fields—The choice of minor fields of study may vary considerably depending on the research interest of the student. The selection of courses will be made after consultation with the student's adviser.

Master's Degree—Either Plan A or Plan B is acceptable.

Program in Pharmaceutical Technology

Prerequisites—A degree from a college of pharmacy and an exceptional scholarship record. Consideration will also be given to applicants who are graduates of institutions other than colleges of pharmacy provided their undergraduate courses satisfy the prerequisites for the graduate courses in pharmaceutical technology. The record must show completion of mathematics courses through differential equations and statistics. These courses can be completed after admission to the Graduate School. In addition, 1 year of physical chemistry is prerequisite to a number of required courses in the department.

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

Minor—The choice of the particular courses to be presented in fulfillment of a minor in graduate work will be made after consultation with the student's adviser.

Master's Degree—Offered under both Plan A and Plan B.

Doctor's Degree—Graduate work toward the Ph.D. degree is offered.

- 165.* **Cosmetics and Dermatological Preparations.** Pharmaceutical aspects of cosmetics and dermatological preparations. (3 cr; prereq 56) Miller
- 166-167.* **Pharmaceutical Manufacturing.** Production and control of pharmaceutical preparations on a pilot plant scale. Formula development and product stabilization. (3-5 cr per qtr; prereq PhmC 163, PhmT 56 or #) Miller
- 168.* **Preparation of Parenteral Products.** Principles and procedures involved in manufacture of parenteral products. (3 cr; prereq #) Kabat
- 170. **Hospital Pharmacy Administration I.** The history, classification, organization, and functions of the departments in a hospital in relation to the pharmacy service. (2 cr; prereq 69 or #) Kabat
- 171. **Hospital Pharmacy Administration II.** The development, organization, responsibility, and administration of pharmacy services in a hospital. (3 cr; prereq 170 and #) Kabat
- 172. **Hospital Pharmacy Survey.** (1 cr; prereq 171 and #) Kabat
- 173.* **Special Problems in Pharmaceutical Technology.** Problems in formulation, production, and evaluation of pharmaceutical products. (Cr ar; prereq #) Staff
- 201x.* **Seminar: Pharmaceutical Technology.** (1 cr; required of majors in pharmaceutical technology) Staff

- 202-203-204.* **Advanced Analytical Methods.** Special procedures for control of foods, drugs, and cosmetics, e.g., sampling techniques and design of experiments for control of shelf-life, storage conditions, loss of potency, etc. (3-5 cr per qtr; prereq PhmC 165, PCh 103, or #; offered when demand warrants) Rippie, McRae
- 213x.* **Research Problems.** Experimental investigation of problems in pharmaceutical technology. (Cr ar; prereq PhmC 163 or #) Staff
- 215-216. **Pharmaceutical Development.** Theoretical and practical problems involved in new product development including F.D.A. regulations, new drug application procedures, patents, and production and control on a pilot plant scale. (5 cr per qtr; prereq 167 or #; offered when demand warrants) Miller
- 218-219. **Extraction, Distribution, and Partition Systems.** Theory and practice of extraction of liquids and solids, countercurrent distribution, solvent and solute effects and chromatography. (3-5 cr per qtr; prereq PhmC 163 or #; offered when demand warrants) Miller
- 221.* **Homogeneous Systems in Pharmacy.** Application of physicochemical principles and processes to preparation, standardization, and therapeutic application of homogeneous dosage forms. (3-5 cr; prereq PhmC 163, PCh 103 or #; offered when demand warrants) Hadley
- 222.* **Heterogeneous Systems in Pharmacy.** Application of physicochemical principles of processes to preparation, standardization, and therapeutic application of heterogeneous dosage forms. (3-5 cr; prereq 221; offered when demand warrants) Hadley

PHARMACOGNOSY

OFFERED AT MINNEAPOLIS IN THE COLLEGE OF PHARMACY

Associate Professor

Herbert Jonas, Ph.D., *head*

Assistant Professor

Lee C. Schramm, Ph.D.

Prerequisites—A degree from an accredited college of pharmacy and an exceptional scholastic record. Consideration will also be given to applicants who are graduates of institutions other than colleges of pharmacy provided their undergraduate courses satisfy the prerequisites for the graduate courses in pharmacognosy.

Language Requirement—For the Master's degree, one foreign language, German or French. For the Ph.D. degree, (a) two foreign languages, one of which must be German (and as the second French or Spanish would be acceptable) or (b) with consent of adviser, one foreign language and the option of a collateral field of knowledge.

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

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

151. **Pesticides and Plant Growth Regulators.** Their use in cultivation and preservation of medicinal plants and their products. (3 cr; prereq 3, Phcl 57 or #) Staff
- 152-153. **Metabolism.** Biochemistry and physiology of drug-producing organisms. Chemical and physical methods for production and analysis of their medicinal constituents. (3 cr per qtr; prereq 3 or #) Schramm and staff
- 154-155. **Microscopy and Microchemical Methods.** Their use in study of drug-producing organisms and their constituents. (3 cr per qtr; prereq 3 or #) Schramm and staff
160. **Intermediate Pharmacognosy.** Enzymes, biological and fermentation products, insecticides, fungicides, and herbicides. (3 cr; prereq 3 or #) Jonas and staff
165. **Basic Application of Radionuclides.** Properties and utilization of radioactive substances of importance in biology, pharmacy, public health, and civil defense. (3 cr; prereq #) Jonas and staff
166. **Extra Laboratory Course in Radionuclide Techniques.** Demonstration and participation experiments in fundamental isotope techniques and applications. (2 cr; prereq 165 or ¶165) Jonas and staff
167. **Advanced Course in Radionuclides.** An advanced lecture course. (3 cr; prereq 165 or #) Jonas and staff

168. **Laboratory Course in Advanced Radionuclide Techniques.** (2 cr; prereq 167 or #) Jonas and staff
173. **Special Problems in Pharmacognosy.** Problems dealing with the botany, biochemistry, and physiology of medicinal plants and microorganisms and their products. Problems of radioisotope applications. (Cr ar; prereq #) Staff
- 201-202-203.* **Advanced Pharmacognosy.** Advanced studies in pharmacognosy of living organisms producing medicinally important substances. (3-5 cr per qtr; prereq 162 or 163, and #) Staff
- 204x. **Research in Pharmacognosy.** (Cr ar; prereq #) Staff

PHARMACOLOGY

OFFERED AT MINNEAPOLIS

Professor

Frederick E. Shideman, M.D., Ph.D., *head*
 Raymond N. Bieter, M.D., Ph.D.
 Norman O. Holte, D.D.S.
 Gilbert J. Mannering, Ph.D.
 Amedeo S. Marrazzi, M.D.

Associate Professor

Frank T. Maher, M.D., Ph.D.
 Jack W. Miller, Ph.D.

Assistant Professor

Michael F. Halasz, Ph.D.
 Akira E. Takemori, Ph.D.
 Travis I. Thompson, Ph.D.
 Ben George Zimmerman, Ph.D.

Instructor

Nelson D. Goldberg, Ph.D.

Pharmacology is a broad science which considers the interactions between chemical substances or drugs and living organisms or life processes at all levels of organization. Facilities are available for most types of training and research in this field. For those primarily interested in toxicology or psychopharmacology appropriate programs are provided. Excellent opportunities exist for co-operative research with the clinical departments of the Medical School.

Graduate training in the field of pharmacology usually is oriented toward the Ph.D. degree, either as a major or a minor subject. The M.S. degree is offered only under special circumstances. A number of graduate fellowships, research assistantships, teaching assistantships, or traineeships are usually available.

Prerequisites—In addition to fulfilling requirements for admission to the Graduate School students should be well grounded in the biological and physical sciences.

Major—For a major the student is required to complete each of the medical courses prerequisite to, and including, the major courses in general pharmacology (103 and 104). These include courses in physiology and biochemistry. Additional requirements are Phcl 106, 201, 202, 203, 204, and 205 and such other courses as may be indicated by the major adviser.

Minor—To meet the requirements for a minor in pharmacology, the student must satisfactorily complete course work representing 22 credits. These courses must include Phcl 103, 104, 204, and 205.

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

Master's Degree—Offered only under Plan A.

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

- 101-102.† **General Pharmacology.** Lectures and laboratory exercises on the action and fate of drugs. Limited to students of dentistry and pharmacy. (8 cr) Zimmerman, Holte, Mannering, Marrazzi, Miller, Shideman, Takemori

- 103-104.† **General Pharmacology.** Lectures and laboratory exercises on the action and fate of drugs. (10 cr; prereq PhsI 106, 107, or equiv and MdBc 100, 101, or equiv) Shideman, Holte, Mannering, Marrazzi, Miller, Takemori, Zimmerman
105. **Forensic Medicine and Medical Jurisprudence.** Lectures on legal aspects of medicine and on laws governing practice of medicine. (1 cr; prereq enrollment in Medical School or #) Mannering, McCoid
106. **Toxicology.** Lectures on the chemistry, action, fate, and detection of toxic substances. (2 cr; prereq 101 and 102 or 103 and 104 or ¶104) Mannering, Hammond
108. **Dental Therapeutics.** (1 cr; prereq 101, 102) Holte and staff
- 109x. **Problems in Pharmacology.** (Cr and hrs ar; prereq #) Shideman and staff
- 162x. **Biological Assay of Drugs.** (3 cr; prereq 101 and 102 or #) White
201. **Advanced Pharmacology: Physiological Disposition of Drugs.** Principles underlying absorption, distribution, metabolism, and excretion of drugs. (3 cr; prereq 101 and 102 or 103 and 104 or #; offered 1965-66 and alt yrs) Miller, Mannering, Shideman, Takemori
202. **Advanced Pharmacology: Pharmacodynamics.** Lectures and laboratory exercises on physiological, biochemical, and behavioral effects of drugs utilizing modern techniques. (3 cr; prereq 101 and 102 or 103 and 104 or #; offered 1966-67 and alt yrs) Takemori, Zimmerman, and staff
- 203x. **Research in Pharmacology.** (Cr and hrs ar; prereq 103 and 104 or #) Shideman and staff
- 204x. **Seminar: Selected Topics in Pharmacology.** (3 cr on completion of 3 qtrs; prereq 101 and 102 or 103 and 104 or #) Miller and staff
- 205x. **Seminar: Survey of Current Pharmacological Literature.** (3 cr on completion of 3 qtrs; prereq 101 and 102 or 103 and 104 or #) Marrazzi and staff
- 206x. **Seminar: Psychopharmacology.** Selected topics on behavioral aspects of drug action. (3 cr on completion of 3 qtrs; prereq #) Shideman, Thompson, and staff

OFFERED AT ROCHESTER

Professor

Frank T. Maher, M.D., M.S., Ph.D.

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

PHYSICAL MEDICINE AND REHABILITATION

OFFERED AT MINNEAPOLIS

Professor

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

Clinical Professor

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

Associate Professor

Glenn Gullickson, Jr., M.D., Ph.D.

Assistant Professor

Martin O. Mundale, M.S.
Helen V. Skowlund, M.S.

Clinical Assistant Professor

Ruby G. Overmann, M.S.

The field of physical medicine and rehabilitation, which includes physical therapy, occupational therapy, vocational counseling guidance and training of the physically handicapped, 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, Veterans Administration hospitals, and many state hospitals for the chronically disabled. Physical medicine, therefore, offers unusual opportunity to the young physician.

Opportunity for clinical and fundamental research, as well as clinical experience and training, is offered at University of Minnesota Hospitals. Additional clinical experience is obtained at Hennepin County General Hospital, Minneapolis Vet-

erans Hospital, and the Kenny Rehabilitation Institute. The student devotes full time to his training program and may not carry on outside practice. The 3-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 Bachelor's degrees 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. Routinely acceptable languages are French, German, Italian, Russian, and Spanish.

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 3 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 5 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. (Cr and hrs ar) Kottke
- 161s. Clinical Medicine in Rehabilitation. (5 cr) Kottke
- 180f,w,s,su. Problems in Physical Therapy. (Cr ar; prereq physical therapist) Staff
- 200f,w,s,su. Physical Medicine Service. Service at University Hospitals, Hennepin County General Hospital, Kenny Rehabilitation Institute, Veterans Administration Hospital, and other affiliated hospitals. (Cr and hrs ar) Kottke, Gullickson
- 204f,w,s,su. Peripheral Vascular Disease Clinic. (Cr and hrs ar; for physicians) Gullickson
- 205f,w,s,su. Readings in Physical Medicine and Rehabilitation. (1 cr per qtr) Kottke
- 206f,w,s. Conference on Physical Medicine and Rehabilitation. Topics vary from quarter to quarter. Prepared papers required. (1 cr per qtr) Graduate staff
- 210f,w,s,su. Research in Physical Medicine. (Cr and hrs ar) Kottke, Kubicek, Gullickson
- 211f,w,s,su. Electronics in Physical Medicine. Review of principles of electronic circuits, vacuum tubes, power supplies, and their application in physical medicine. (2 cr) Kubicek
- 212f,w,s. Electromyography. Clinical and laboratory training in use and interpretation of electromyograph. (Cr ar; prereq #) Kottke, Kubicek
- 213f,w,s. Laboratory Procedures in Physical Medicine and Rehabilitation. (1 cr per qtr; prereq #) Kubicek
- 220f,w,s. Seminar in Physical Medicine. (Cr and hrs ar) Kottke

OFFERED AT ROCHESTER

Professor

Earl C. Elkins, M.D., *head*

Associate Professor

Gordon M. Martin, M.D., M.S.

Assistant Professor

Donald J. Erickson, M.D., M.S.

G. Keith Stillwell, M.D., Ph.D.

The 3-year fellowship program in physical medicine and rehabilitation consists, in the major field, of 21 to 24 months of supervised clinical practice in the hospital and outpatient departments of physical medicine and rehabilitation, 1 to 2 quarters on related clinical services (which may include such fields as rheumatology, orthopedics, general medicine, neurology) and, as a minor, 6 to 9 months in a basic science, such as anatomy, biophysics, or physiology, including 3 months

of electromyography. The program is approved by the Council on Medical Education and Hospitals.

In clinical practice the fellow has the opportunity to become proficient in prescribing and supervising all types of physical therapy, occupational therapy, and rehabilitation procedures for outpatients as well as for patients on the hospital services. He has experience in the evaluation and care of patients having physical disabilities such as may be seen in all phases of medical practice. On the service at St. Marys Hospital the fellow can follow the various steps involved in the overall rehabilitation program of many seriously handicapped patients. He will learn to co-ordinate and utilize the services of other medical specialists and auxiliary personnel, including speech pathologists, physical and occupational therapists, social service personnel, psychologists, and vocational counselors.

Conferences, seminars, and informal discussions of unusual clinical problems make it possible for the fellow to obtain wide clinical as well as theoretical experience in all aspects of physical medicine and rehabilitation.

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—This department offers work leading to the Ph.D. degree.

M 251f,w,s,su. Physical Medicine and Rehabilitation. Staff

M 252f,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)

PHYSIOLOGICAL HYGIENE

OFFERED AT MINNEAPOLIS

Professor

ancel Keys, Ph.D., *head*
Joseph T. Anderson, 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: epidemiology, physiological chemistry, psychology, or internal medicine.

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, two foreign languages (French and German).

Master's Degree—Offered only under Plan A.

Doctor's Degree—Members of the physiological hygiene staff who are appointed to the graduate faculty in physiology or physiological chemistry may advise students majoring in physiology or physiological chemistry. In addition, in exceptional cases, physiological hygiene may be employed as the major field. The programs of students in this field will not include physiology as a minor field and will incorporate an interdisciplinary group of subjects within the major. Plans of study of these students should be drawn up early in their course of study and be submitted to the dean of the Graduate School.

PubH 191. Science of Human Nutrition. Surveys, nutritional status, malnutrition. (3 cr; prereq ‡; offered when demand warrants) Anderson, Grande

PubH 192. Physiology of Exercise. Muscular efficiency, training, deconditioning, effects of exercise on physiological systems. (Cr ar; prereq Phs1 106, 107 or equiv, and ‡; offered when demand warrants) Simonson, Taylor

PubH 195. Public Health Aspects of Cardiovascular Disease. (3 cr; prereq #) Keys, Grande, and staff

PubH 202x. Seminar: Physiological Hygiene. Nutrition, tests and measurements of human physical fitness, gerontology, adaptation in health and disease, circulatory dynamics, and related topics. (1 cr)

PubH 220x. Readings in Problems of Physiological Hygiene. (Cr ar; prereq #)

PubH 290x. Research in Physiological Hygiene and Related Areas. (Cr ar)

PHYSIOLOGY

OFFERED AT MINNEAPOLIS

Professor

Maurice B. Visscher, M.D., Ph.D., *head*
 Charles Edwards, Ph.D.
 Francisco Grande, M.D.
 Eugene D. Grim, Ph.D.
 Franz Halberg, M.D.
 John A. Johnson, Ph.D.
 Ansel Keys, Ph.D.
 William G. Kubicek, Ph.D.
 Nathan Lifson, M.D., Ph.D.
 Victor Lorber, M.D., Ph.D.
 Carlos Martinez, M.D., Ph.D.
 Ernst Simonson, M.D.
 Henry L. Taylor, Ph.D.
 Carlo A. Terzuolo, M.D.

Associate Professor

Marvin B. Bacaner, M.D.
 H. Mead Cavert, M.D., Ph.D.
 Irwin J. Fox, M.D.
 Rodney B. Harvey, M.D., Ph.D.

Assistant Professor

James S. Beck, M.D., Ph.D.
 Robert L. Evans, Ph.D.
 Jui S. Lee, Ph.D.

Lecturer

Maurice W. Meyer, Ph.D.

Prerequisites—For a major or minor in physiology, acceptable courses in general zoology, neuroanatomy, 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, 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. Acceptable languages are French, German, and Russian.

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 graduate faculty. The requirements for the minor program can be satisfied either by the use of a conventional minor or, in appropriate instances, the use of a supporting program.

100. General Physiology. For high school teachers in biological sciences and for those who wish an introduction to modern physiological science. (4 cr; prereq college algebra, 1 yr chemistry, college physics; offered first summer term)

106-107.† Human Physiology. (7 cr for 106, 8 cr for 107; prereq organic chemistry, zoology, and neuroanatomy; students may register for lect without lab) Visscher and staff

112x. 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. (3 cr; limited to 10 students; prereq #)

113x. Problems in Physiology. Arranged with qualified students. Topics assigned for laboratory study, conferences, and reading. (Cr ar; may be taken 1 or more qtrs; prereq 107) Visscher and staff

201f,w,s. Literature Seminar. (1 or 2 cr by ar; prereq 107 or equiv) Staff

202.* Readings in Physiology. Topics selected for each student, written reviews prepared and discussed. (Cr and hrs ar) Visscher and staff

- 203.° Research in Physiology. (Cr and hrs ar) Visscher and staff
- 204.°° History of Physiology. (Cr and hrs ar)
- 210.°° Selected Topics in Permeability. Advanced seminar. (Cr and hrs ar; prereq 107 or equiv, #) Lifson, Johnson, Grim
- 211.°° Selected Topics in Heart and Circulation. One or more seminars in the advanced physiology of heart and circulation. (Cr and hrs ar; prereq 107 or equiv, #) Visscher, Bacaner, Fox
- 212.°° Selected Topics in Respiration. Advanced seminar. (Cr and hrs ar; prereq 107 or equiv, #)
- 216.°° Selected Topics in Neurophysiology. Advanced seminar. (Cr and hrs ar; prereq 107 or equiv, #) Terzuolo, Edwards
- 227.°° Methods in Physiology. (Cr and hrs ar; prereq 107 or equiv, #) Staff
- 230s.°° Topics in General Physiology. Relatively systematic coverage of biological transport processes; kidney and G.I. tract. (3 cr; prereq 107 within past 8 yrs) Grim, Johnson, Lifson
- 231.°° Topics in General Physiology. Continuation of 230. (2 cr) Grim, Johnson, Lifson
- 232.°° Immunological Basis of Tissue Transplantation and Related Phenomena. (2 cr; prereq 107 within past 8 yrs) Martinez
- 233.°° Biophysics of Circulation. (3 cr; prereq 107 within past 8 yrs) Fox
- 234.°° Respiration, Acid-Base Chemistry, and Electrolyte Metabolism. (3 cr; prereq 107 within past 8 yrs)
- 235.°° Bioenergetics of Cardiac Contraction. (3 cr; prereq 107 within past 8 yrs) Cavert, Lorber
- 236.°° Renal Hemodynamics. (Cr ar; prereq 107 within past 8 yrs) Harvey
- 237.°° Biophysical Aspects of Nerve Function. (3 cr; prereq 107 within past 8 yrs) Edwards, Terzuolo
- 238.°° Neural and Humoral Control of Circulation. (3 cr; prereq 107 within past 8 yrs) Grande

OFFERED AT ROCHESTER

Professor

Charles F. Code, M.D., Ph.D., *head*
 Alexander Albert, M.D., Ph.D.
 Reginald G. Bickford, M.B., Ch.B.
 Ward S. Fowler, M.D.
 George A. Hallenbeck, M.D., Ph.D.
 Victor Johnson, M.D., Ph.D.
 Edward H. Lambert, M.D., Ph.D.
 Frank T. Maher, Ph.D., M.S.
 Kenneth N. Ogle, Ph.D.
 Charles A. Owen, Jr., M.D., Ph.D.
 John T. Shepherd, M.D., D.Sc.
 Khalil G. Wakim, M.D., Ph.D.
 Earl H. Wood, M.D., M.S., Ph.D.

Associate Professor

Albert Faulconer, Jr., M.D., M.S.
 H. Frederic Helmholtz, Jr., M.D.
 Harold J. C. Swan, M.B., Ph.D.

Assistant Professor

David E. Donald, D.V.M., Ph.D.
 Robert E. Hyatt, M.D.
 Jenifer Jowsey, Ph.D.
 Welby N. Tauxe, M.D., M.S.

Instructor

Donald W. Klass, M.D.

Much of the graduate work in physiology at the Mayo Graduate School of Medicine 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 and for those using physiology in partial fulfillment of the major or minor fields for an advanced degree.

Research projects for the M.S. or Ph.D. degrees are developed with members of the faculty in the department.

M 251f,w,s. Physiology Seminars. Presentation and discussion of topics of current research interest by visiting scientists, staff of physiology and other departments and graduate students. (1 cr per qtr) Physiology staff

M 252f,w,s. Basic Elements of Physiology. Lectures to guide review of general physiology and physiology of various organ systems including current status. Occasional demonstrations of recent advances in modern techniques. (3 cr per qtr) Physiology staff

°° Students should consult the Department for offerings during any specific quarter.

- M 253f,w,s,su. **Research in Physiology.** (Cr and hrs ar) Physiology staff
- M 254f,w,s,su. **Readings in Physiology.** (Cr and hrs ar) Physiology staff
- M 255f,w,s. **Seminar: Gastroenterology.** Review of past and current advances in physiology of the alimentary canal (secretion, motor action, and absorption). (2 cr per qtr) Code
- M 256f,w,s. **Conference on Motility of Alimentary Canal.** (2-4 cr per qtr) Code
- M 258f,w,s,su. **Basic Neurologic Sciences.** Neurology, Psychiatry, and Neurosurgery staffs
- M 263w,su. **Seminar: Cardiovascular Physiology.** Basic aspects of cardiac function and of the circulation. (Cr ar) E H Wood, Shepherd, Donald, Bassingthwaighte
- M 264f,w,s,su. **Seminar: Clinical Cardiac Physiology.** Presentations and discussion of research and diagnostic investigation in cardiac pathophysiology. (2 cr per qtr) Swan
- M 265w. **Conference on Clinical Respiratory Physiology.** Physiology of respiration, clinical disorders, and tests of function. (1 cr per qtr) Fowler, Helmholz, Hyatt
- M 266f,s. **Basic Principles of Electricity and Electronics.** Lectures on basic principles in electricity, electronic components, and circuits afford understanding of research and diagnostic uses of electrical apparatus. (1 cr per qtr) Staff
- M 267Af,w,s,su. **Neurology Conference on Electroencephalography I.** Introduction to principles of techniques and interpretation of EEG. (11 cr per qtr) Bickford, Klass
- M 267B. **Neurology Conference in Electroencephalography II.** Intermediate EEG; individual responsibility toward interpretation and use of special techniques. (11 cr per qtr) Klass, Bickford
- M 267C. **Neurology Conference on Electroencephalography III.** Advanced EEG with higher levels of individual responsibility for diagnostic interpretations. Research procedures. Klass, Bickford
- M 267D. **Neurology Diagnostic Electroencephalography.** Continuation of 267C.
- M 268f,w,s,su. **Neurophysiology.** Seminars in physiology of central nervous system; electrophysiology and quantitation of neurophysiologic data. (2 cr per qtr) Bickford, Klass
- M 269f,w,s,su. **Neuromuscular Physiology.** Lectures, discussions, demonstrations in physiology of peripheral nerves and muscle; basic aspects and mechanisms of neuromuscular diseases. (1 cr per qtr) Lambert
- Biophysics—Electronic Computers. (See Department of Biophysics)

PSYCHIATRIC NURSING

OFFERED AT MINNEAPOLIS IN THE SCHOOL OF NURSING

Professor

Edna L. Fritz, M.A., Ed.D.

Instructor

Joann R. Hubbard, M.S.

Associate Professor

Isabel Harris, M.Ed., Ph.D.
Garland K. Lewis, M.N.

The program in psychiatric nursing leads to a master of science degree. In addition to the field of concentration in psychiatric nursing, knowledge of several related fields will be required to accomplish the purpose and objectives of the program. A minimum of 18 credits in at least two fields with not less than 6 credits in each is required. Appropriate related fields include anthropology, child development, history and philosophy of education, and sociology.

Prerequisites—Completion of a baccalaureate degree which has included undergraduate preparation in psychiatric and public health nursing in an accredited program.

Language Requirement—None.

Master's Degree—Offered under Plan B only.

Nurs 181Aw,Bs. **Research in Nursing.** Exploration of needs for research and discussion of possible ways in which selected research efforts might be undertaken. Development of a study design. (4 cr; prereq PubH 108 or #) Harris

- Nurs 190f. Foundations of Nursing.** Investigation of the role of nursing in promotion of health and care of the ill or helpless. (3 cr) Harris
- Nurs 191f. Seminar: Foundations of Psychiatric Nursing.** Changing role of the psychiatric nurse in society; current trends in education and functions of psychiatric nurses. Historical development and economic, political, medical, and psychiatric influences on psychiatric nursing. Selected theoretical concepts of child development and mental health. (3 cr; prereq 190 or ¶190) Lewis, Hubbard
- Nurs 192Aw. Psychiatric Nursing Seminar and Field Experience with Individual Patients.** Nurse-patient relationships; examination of effective and ineffective interpersonal relationships. Intensive individually supervised experience with individual patients, planning dynamic nursing care and participation of the interdisciplinary team. (8 cr; prereq 191) Lewis, Hubbard
- Nurs 192Bs. Psychiatric Nursing Seminar and Field Experience with Groups.** Group relationships. Supervised experience working with a group; the individual's role within the group; identification of behaviors and therapeutic functioning within the group. These processes examined through group recreational or work activities. (5 cr; prereq 192A, ¶SW 275) Lewis, Hubbard
- Nurs 192Cs. Psychiatric Nursing Seminar and Field Experience in the Community.** Community mental health problems, community resources, and psychiatric nurse's role in the community. (4 cr; prereq 192B or §) Lewis, Hubbard
- Nurs 193w. Seminar: Psychopathology.** Eclectic approach to psychopathology as related to patient behavior observed in clinical experience. (3 cr; prereq ¶192A) Medical staff
- Nurs 195f. Problems in Nursing.** Individual study of a problem in the field of nursing. (6-9 cr; prereq regis in grad program and Δ) Lewis, Hubbard

PSYCHIATRY AND NEUROLOGY

OFFERED AT MINNEAPOLIS

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 Psychology*
 Reynold A. Jensen, M.D., *director of Child Psychiatry*
 Richard W. Anderson, M.D.
 Royal C. Gray, M.D., Ph.D.
 Robert G. Hinckley, M.D.
 Paul E. Meehl, Ph.D.
 Burtrum C. Schiele, M.D.
 William Schofield, Ph.D.
 Hildred Schuell, Ph.D.
 Werner Simon, M.D.
 Fernando Torres, M.D.

Clinical Professor

S. Allan Challman, M.D.
 Harold H. Noran, M.D., Ph.D.

Associate Professor

James F. Berry, Ph.D.
 Peter F. Briggs, Ph.D.
 A. Jack Hafner, Ph.D.
 Gordon Heistad, Ph.D.
 John Logothetis, M.D., Ph.D.
 David T. Lykken, Ph.D.
 Anthony J. Resch, M.D.
 David D. Webster, M.D.

Clinical Associate Professor

Clifford O. Erickson, M.D.
 Gove Hambidge, M.D.
 Frank Kiesler, M.D.

Assistant Professor

Michael E. Blaw, M.D.
 Floyd K. Garetz, M.D., M.S.
 Robert J. Gummit, M.D.

Clinical Assistant Professor

Virgil R. Zarling, M.D.

Master's and Doctor's Degrees—Excellent facilities are available for M.A. (Plan A) and Ph.D. degrees in psychiatry and neurology. The minor may be elected in anatomy, pathology, physiology, or other laboratory 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 3 years, i.e., fulfills the requirements of training for the American Board of Psychiatry and Neurology. The fellow in psychiatry spends 3 months of the 3 years in neurology. Opportunities for personal psychotherapy are available.

To fulfill the Ph.D. requirements, fellows in neurology must spend a minimum of 5 years (6 months to 1 year of which is spent in the basic minor field) in the program. In neurology, the Master's degree can be earned in 3 years but usually requires an additional year.

Psychiatry, Clinical Psychology, and Child 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. Routinely acceptable languages are French, German, Russian, and Spanish.

- 201f-w-s. **Clinical Seminar for Psychologists.** (1 cr; prereq #) Schofield, Koutsky
- 202f-w-s-su. **Special Research Topics.** (Cr ar; prereq #) Staff
- 203f-w-s-su. **Psychometric Clerkship.** (Cr ar; prereq #)
- 204f-w-s-su. **Internship in Clinical Psychology.** Supervised experience in application of psychological procedures to a varied population of child and adult medical patients. (2 or 4 cr per qtr; prereq Ph.D. candidate in clinical psychology, 400 hrs clerkship exper, consent of Division of Clinical Psychology) Staff
- 205f-w-s. **Advanced Seminar.** (1 cr; prereq #) Hathaway
- 206su. **Medical Psychology I.** (3 cr)
- 251f-w-s-su. **Clinical Inpatient Psychiatry.** (Cr ar; prereq MD) Staff
- 252f-w-s-su. **Clinical Outpatient Psychiatry.** (Cr ar; prereq MD) Staff
- 253f-w-s-su. **Clinical Child Psychiatry.** (Cr ar; prereq MD) Staff
- 254f-w-s-su. **Advanced Clinical Inpatient Psychiatry.** (Cr ar; prereq MD and 251, 252, 253 or equiv) Staff
- 255f-w-s-su. **Advanced Clinical Outpatient Psychiatry.** (Cr ar; prereq MD and 251, 252, 253 or equiv) Staff
- 256f-w-s-su. **Advanced Clinical Child Psychiatry.** (Cr ar; prereq MD and 251, 252, 253 or equiv) Staff
- 257f-w-s-su. **Special Assignments in Psychiatry.** (1 cr; prereq MD and 251, 252, 253 or equiv) Staff
- 258f-w-s-su. **Research in Psychiatry.** (Cr ar; prereq MD or #) Staff
- 260su. **Orientation to Clinical Psychiatry.** (1 cr; prereq MD or #) Staff
- 262f-w-s. **Techniques of Clinical Observation and Evaluation.** (1 cr; prereq MD or #)
263. **A Survey of Physiologic Treatments in Psychiatry.** (1 cr) Schiele
- 264su. **Descriptive Psychopathology.** (1 cr; prereq MD or #) Schiele
- 265su-f. **Personality Development and Psychodynamics.** (1 cr; prereq MD or #) Anderson
- 266w,s. **Therapeutic Dynamics in Hospital Psychiatry.** (1 cr; prereq MD or #) Koutsky
267. **Social Psychiatry.** (1 cr) Malmquist
- 269f,w,s. **Introduction to Psychotherapy.** (Same as Psy 271, 272, 273) (3 cr; prereq MD or #) Meehl and others
270. **Review of Current Literature.** (2 cr) Hastings
- 271f-w-s. **Basic Readings from Psychoanalysis I.** (1 cr; prereq MD or #) Hambidge
- 272f-w-s. **Reconstructive Psychotherapy.** (1 cr; prereq MD or #)
- 273w-s. **Survey of Psychosomatic Medicine.** (1 cr; prereq MD or #) Magraw
274. **Seminar: Basic Principles of Clinical Psychology.** (2 cr) Hathaway
- 275w-s. **Introduction to Collaborative Therapy.** (1 cr; prereq MD or #) Hambidge
- 276f. **Current Research in Psychiatry.** (1 cr; prereq MD or #)
- 277f. **Psychophysiology for Psychiatrists.** (1 cr; prereq MD or #) Heistad
- 278f. **Introduction to Family Therapy.** (1 cr; prereq MD or #)
- 279w-s. **Development of Psychiatric Thought.** (1 cr; prereq MD or #)
- 281f,w,s. **Readings in Psychoanalysis II.** (1 cr; prereq MD or #) Hambidge
- 283f,w,s. **Special Topics Seminar.** (1 cr; prereq MD or #) Schiele
- 284x. **Basic Readings in Child Psychiatry.** (1 cr) Jensen and others
- 285x. **Current Literature Seminar in Child Psychiatry.** (1 cr) Jensen and others
- 286x. **Diagnostic and Therapeutic Methods in Child Psychiatry.** (1 cr) Jensen and others

- 290w,s. Survey of Psychiatry for Neurology Residents. (1 cr; offered 1965 and every 3rd yr)
 291f-w-s-su. Seminar: Current Literature. (1 cr; prereq MD or #) Simon
 292f,w,s,su. Special Supervision in Psychotherapy. (1 cr; prereq MD or #)
 293f-w-s-su. Problems in Teaching Psychiatry. (Cr ar; prereq MD or #)
 295f. Introduction to Group Therapy. (1 cr; prereq MD or #)

In addition to work in the University Hospitals Psychopathic Unit, on the Neurologic Service, the Child Psychiatry Service, and the Outpatient Service, the student has access to Veterans Administration Hospital, Veterans Administration Mental Hygiene Clinic, and Hennepin County General Hospital.

The fellow is given a clinical assignment in the inpatient and the outpatient services of University Hospitals, Veterans Hospital, or Hennepin County General 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 reports on the literature or on his special studies in staff conferences from time to time.

Neurology

Language Requirement—For the Ph.D. degree, reading knowledge of two foreign languages is required. Routinely acceptable languages are French, German, Italian, Russian, and Spanish.

- 208f-w-s-su. Clinical Neurology. (Cr and hrs ar) Baker and staff
 209f-w-s-su. Research in Neurology. (Cr and hrs ar) Baker and staff
 210f-w. Advanced Neuropathology. (2 cr, §150 and Path 115; offered 1966-67 and alt yrs) Nelson
 212f-w-s-su. Survey of Neuropathology. (1 cr, §151 and Path 119) Nelson
 213x. Neuropharmacology. (1 cr per qtr) Staff
 214. Child Neurology. (1 cr) Staff
 215w. Neurological Complications of Internal Disease. (1 cr) Logothetis
 216s. Clinical Neurochemistry. (1 cr) Staff
 217. Neuroembryology. (1 cr) Staff
 218f. Neurological Language Disorders. (1 cr) Schuell
 219x. Instrumentation in the Basic and Neurological Sciences. (1 cr; prereq #) Baker and staff
 220f-w-s-su. Advanced Clinical Neurology. Selected readings and comprehensive review of specialized subjects in the neurological field. (1 cr) Baker and staff
 221w,s. Neurochemistry. (2 cr) Berry
 222s. Seizure Mechanisms. (1 cr) Staff
 223w. Brain Tumors. (1 cr) Staff
 224s. Infectious Diseases of the Nervous System. (1 cr) Baker
 225. Neuroophthalmology. Lectures on the field of ophthalmology as related to neurology. (2 cr; offered 1965-66 and alt yrs) Baker, Harris
 226f-w-s-su. Neurological-Neurosurgical Conference. Review of X rays, case histories, and neuropathological material on neurological and neurosurgical cases. (1 cr, §Surg 318, Rad 163) Peterson, Baker
 227w-s. Neurological Development. (1 cr) Staff
 228f-w-s-su. Research in Neuropathology. (Cr and hrs ar) Baker and staff
 229. Behavior Assessment of the Neurological Patient. (1 cr; offered fall 1966 and every 3rd yr) Meier
 230f. Electroencephalography. (1 cr) Torres
 231f-w-s. Applied Electroencephalography and Myography. Practical experience in reading and interpretation of electroencephalographical tracings. (1 cr) Torres

- 232f-w-s. **Applied Neuroentgenology.** Experience in the actual reading of neuroentgenological films. (1 cr) Peterson
- 233f-w-s. **Applied Neuropathology.** (1 cr) Staff
- 238f-w-s. **Neurological Clinical Pathological Conference.** (1 cr per qtr) Baker and staff
- 239s. **Neuroanatomy.** (1 cr) Baker and staff
- 240f-w-s. **Neuropathology Conference.** (1 cr per qtr) Staff
- 241f-w. **Neuroradiology.** (1 cr per qtr, §Rad 163; offered 1966-67 and alt yrs) Peterson
- 247f-w-s. **Neurological Speech Disorders.** (1 cr) Schuell
- 248f-w. **Applied Neurophysiology.** (2 cr per qtr; offered 1965-66 and alt yrs) Staff
- 249f. **Survey of Neurology for Psychiatry Residents.** (2 cr; prereq §) Baker and staff

OFFERED AT ROCHESTER

Psychiatry

Assistant Professor

Edward M. Litin, M.D., *head*

Professor

David A. Boyd, Jr., M.D., M.S.
Howard P. Rome, M.D.

Assistant Professor

John S. Pearson, Ph.D. (*Clinical Psychology*)
Wendell M. Swenson, Ph.D. (*Clinical Psychology*)

Instructor

Maurice J. Barry, Jr., M.D., M.S.
Thomas L. Brannick, M.D., M.S.
Maurice J. Martin, M.D., M.S.
Richard M. Steinhilber, M.D.

The practical work in psychiatry consists of diagnostic and therapeutic outpatient assignments in adult and child psychiatry as well as assignments to hospital services caring for psychotic and nonpsychotic patients. These provide for individual and group therapies, as well as training in all the standard psychiatric treatment techniques. The hospital psychiatric services are organized as therapeutic communities with their own recreational and occupational therapy facilities. Psychiatric social service and clinical psychological services are available. A minimum of 6 months is devoted to child psychiatry. There is opportunity for long-term intensive psychotherapy of ambulatory adults and children. Incidental to its liaison function to the medical and surgical departments there is the opportunity to study a wide variety of psychosomatic problems. As an integral part of the fellowship there are several series of conferences, lectures, and seminars both formal and informal dealing with the entire range of clinical psychiatric theory and practice. There is organized instruction in the basic behavioral sciences and related fields such as neuroanatomy, neurophysiology, neuropathology, electroencephalography, and electromyography. Assignment to clinical neurological services is also included.

A minimum of 6 months is also provided at the Comprehensive Mental Health Center in Rochester, Minnesota. This consists of facilities on the campus of the Rochester State Hospital, which includes the Rochester-Olmsted County Mental Health Clinic, the Day Hospital, and the care of inpatients at the Rochester State Hospital. There is close liaison with the Student Health Service at St. Olaf College, Northfield, Minnesota, where the mental health problems of the college-age student are studied. Also there is close affiliation with the local nursery schools and the nearby facilities for the mentally retarded.

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—This department offers work leading to the Ph.D. degree.

- M 251f,w,s,su. **Diagnosis in Psychiatry.** Research. Seminar. Staff
 M 253f,w,s,su. **Hospital Residence in Psychiatry.** Staff
 M 254f,w,s,su. **Special Psychiatry at the Comprehensive Mental Health Center, Rochester State Hospital.** Staff.
 M 255f,w,s,su. **Child Psychiatry.**
 M 256. **Clinical Psychiatry.** Staff
 M 258f,w,s,su. **Basic Neurologic Sciences.** Staff

Neurology

Professor

Kendall B. Corbin, M.D.
 Joe R. Brown, M.D., M.S.
 Clark H. Millikan, M.D.
 Donald W. Mulder, M.D., M.S.

Associate Professor

Norman P. Goldstein, M.D., M.S.
 Robert G. Sickert, M.D., M.S.
 Jack P. Whisnant, M.D., M.S.
 Robert E. Yoss, M.D., M.S., Ph.D.

Assistant Professor

E. Douglas Rooke, M.D., C.M., M.S.
 Joseph G. Rushton, M.D., M.S.
 Juergen E. Thomas, M.D., M.S.

Instructor

James A. Bastron, M.D., M.S.
 Peter J. Dyck, M.D.
 Raul E. Espinosa, M.D.
 Frank M. Howard, Jr., M.D.
 Donald D. Layton, Jr., M.D.
 Arthur G. Waltz, M.D.

The fellowship in neurology is normally for a period of 3 years, which is divided into approximately 1 year of outpatient assignments, 1 year of hospital experience, and 1 year in the laboratory sciences and other fields related to neurology. Selected individuals may extend their fellowships to a fourth or fifth year. In both the outpatient department and the hospitals, fellows work in close collaboration with the faculty, who are available for consultation and guidance at all times. In the laboratory sciences and related fields fellows obtain experience in neuropathology, neuroanatomy, electroencephalography, electromyography, funduscopy, and physical medicine and rehabilitation. Experience in psychiatry may also be 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 are closely associated with the other medical and surgical sections of the Mayo Clinic as well as with the various clinical and research laboratories.

Language Requirement—For the Ph.D. degree reading knowledge of two foreign languages.

Master's Degree—Offered only under Plan A.

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

- M 250f,w,s,su. **Diagnosis in Neurology.** Research. Seminar. Staff
 M 252f,w,s,su. **Hospital Residence in Neurology.** Staff
 M 257. **Clinical Neurology.** Staff
 M 258f,w,s,su. **Basic Neurologic Sciences.** Staff
 M 259f,w,s,su. **Neurologic Diseases of Infants and Children.** Staff
 Neuroanatomy. (See Department of Anatomy)
 Neuropathology. (See Department of Pathology)
 Neurophysiology. (See Department of Physiology)
 Neuroophthalmology. (See Department of Ophthalmology)

PUBLIC HEALTH**

OFFERED AT MINNEAPOLIS

Professor

Gaylord W. Anderson, M.D., Dr.P.H., *director*
 Richard G. Bond, M.S., M.P.H.
 Donald W. Cowan, M.D., M.S.
 Ruth E. Grout, M.P.H., Ph.D.
 James A. Hamilton, M.A., M.C.S.
 E. Gartly Jaco, Ph.D.
 George S. Michaelsen, M.S.
 Marion I. Murphy, M.P.H., Ph.D.
 Theodore A. Olson, M.A., Ph.D.
 Leonard M. Schuman, M.D., M.S.
 James W. Stephan, M.B.S.
 Stewart C. Thomson, M.D., M.S., M.P.H.

Associate Professor

Allyn G. Bridge, M.D., M.P.H.
 John O. Buxell, M.S., M.P.H.

Harry Foreman, M.D., Ph.D.
 Harold J. Paulus, M.S., Ph.D.
 Ruth von Bergen, M.P.H.
 George E. Williams, M.D.

Assistant Professor

Eleanor M. Anderson, M.P.H.
 Clare L. Blanchard, M.P.H.
 Norman A. Craig, M.P.H.
 Marie J. McIntyre, M.S., M.S.(Hyg.)
 Ruth Edna Stief, 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.
 Lee E. Schacht, Ph.D.

Language Requirement—For the Master's degree, knowledge of a foreign language may be waived on recommendation of the adviser. For the Ph.D. degree, reading knowledge of two foreign languages or of one foreign language and option of a special research technique or a collateral field of knowledge. Acceptable languages are: French, German, Norwegian, Russian, Spanish, or Swedish.

Minor—For the Master's degree, PubH 100A, B, and C and courses in statistics and either epidemiology or public health administration.

For the Ph.D. degree, PubH 100A, B, and C and 20 additional credits selected on the basis of the candidate's field of major study.

Master's Degree—Offered under both Plan A and Plan B. All candidates for this degree must take PubH 100A, B, and C.

Public Health Nursing—A program offered under Plan B is designed to prepare public health nursing faculty for collegiate schools of nursing. This program, developed in co-operation with the School of Nursing, has public health as its major with related fields in education and social science. Other qualified nurses with interest in supervision, advanced practice (including school nursing), or positions of responsibility in community programs of long-term patient care also may enter a Plan B program.

Doctor's Degree—Work leading to the Ph.D. degree is offered for majors in biostatistics, environmental health, epidemiology, hospital administration, and physiological hygiene. For further information on these programs, see the index reference.

100A. Elements of Public Health I. Occurrence and prevention of communicable, degenerative, and industrial diseases; protection of food, water, and milk; maternal and child health. (3 cr; prereq 3, 3A or 50 and a course in bacteriology) G Anderson, Thomson, Schuman

100B, C. Elements of Public Health II and III. Group work on selected public health problems. (1 cr per qtr; prereq 100A or #) Staff

102.° Environmental Sanitation. Methods for promoting man's health and comfort by controlling environment. (3 cr; prereq 100A or ¶100A and #) Bond, Buxell, Olson

102A. Environmental Sanitation. General principles of urban and rural sanitation; problems encountered by official health agencies. (2 cr; prereq 100A or ¶100A and #) Bond, others

** Inquiries concerning other work in public health, including courses of study leading to the degrees of M.P.H., master of public health, and M.H.A., master of hospital administration, should be addressed to the Director of the School of Public Health, 1325 Mayo Memorial Building, University of Minnesota, Minneapolis, Minnesota 55455.

103. **Public Health Bacteriology.** Bacteriologic and serologic diagnosis, public health laboratory administration and methods. (Cr ar; prereq MicB 102, 116, #) Bauer
- 104.* **Epidemiology I.** Basic epidemiologic principles applicable to infectious and noninfectious disease; host-agent-environment complex; factors underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods. (3 cr; prereq 100A, 140 or 110-111) Schuman
- 105.* **Epidemiology II.** Extension of epidemiologic principles to detailed study of selected diseases. (3 cr; prereq 104) Schuman
- 106.* **Public Health Administration.** Structure, basic functions, and activities of public health agencies. (3 cr; prereq 100A) G Anderson, Hamilton
107. **Maternal and Child Health.** Health needs and services for mothers and children in public health programs. (3 cr, §107A; prereq MD, DDS, nurses, or #, ¶100A) Bridge
- 107A. **Maternal and Child Health Program.** Community programs for major maternal and child health problems. (1 cr, §107; prereq hospital administrators and #) Bridge
108. **Introduction to Biostatistics and Statistical Decision.** Variation, frequency distribution; probability; significance tests; estimation; trends. Statistical approach to rational administrative decision making. Lectures and laboratory. (2 cr) Bearman, Weckwerth
- 109.* **Institutional Sanitation.** Sanitation practices in hospitals and other institutions. (3 cr; prereq hospital administrators or # and 100A) Bond, Michaelsen
110. **Biostatistics I.** Role of statistics in research; estimation; sampling distribution; tests of significance; power; regression; correlation; other measures of association; standard distributions including normal, t , χ^2 , F , binomial, Poisson; special distributions arising from nonparametric procedures. (3 cr; prereq ¶111, Math 10 or #) Brown
111. **Biostatistics Laboratory I.** Presentation of data; descriptive statistics; coding and short-cut computational procedures; use of desk calculators; practical application of principles and methods covered in 110. (2 cr; prereq ¶110) Briese, Loewenson
- 112A, B, C.* **Public Health Engineering—Plan Examinations.** 112A: Water supplies. 112B: Waste disposal systems. 112C: Swimming pools and plumbing. (1 cr per qtr, §114; prereq engineering degree and 102, and #) Bond, Buxell
- 113A, B, C.* **Public Health Engineering—Field Investigations.** 113A: Water supplies. 113B: Waste disposal. 113C: Swimming pools and plumbing. (2 cr per qtr, §114; prereq engineering degree and # and 102) Bond, Buxell
114. **Environmental Sanitation Programs.** Public health supervision of activities in urban and rural sanitation. (3 cr, §112, §113, or §116; prereq #) Bond, Buxell
- 115.* **Food Sanitation.** Sanitary problems in production, processing, and distribution of milk, meat, shellfish, and other foods; methods of public health supervision. (3 cr; prereq 100A and #) Olson
- 115A. **Institutional Food Protection Programs.** Public health implications in design, construction, and installation of food service equipment; sanitary controls in food preparation and service; regulatory controls by official public health agencies. (2 cr; prereq #) Bond, Stauffer
- 116.* **Public Health Engineering Administration.** Administrative organization of environmental sanitation activities. (2 cr, §114; prereq #) Bond
- 117-118-119.* **Sanitary Biology.** Plant and animal forms important in environmental sanitation, with special reference to disease vectors. (3 cr per qtr; prereq 100A or ¶100A or #) Olson
122. **Public Health Administration Problems.** Budgeting, program planning, and appraisal of public health procedures. (3 cr; prereq 106) G Anderson
- 123.* **Topics in Public Health.** Selected readings and problems. (Cr ar; prereq #) Staff
125. **Public Health Education.** Planning educational components of community health programs; group procedures; community organization; methods and materials. (2 cr; prereq #) Grout, Craig
- 125A. **Public Health Education.** Purposes; scope; methods and materials; planning, with special emphasis on hospitals. (1 cr; prereq hospital administrators or #) Grout
127. **Occupational Health: Nursing Aspects.** Organization and administration of nursing service in industrial health programs. (1 cr)
132. **Mental Health Program.** Community program for promotion of mental health and care of mentally ill persons. (1 cr; prereq 106 or #) Williams
133. **Mental Health.** Emotional factors underlying wholesome family relations or interfering with successful adjustment in family and community. (3 cr; prereq #) von Bergen, Williams
135. **Conservation of Hearing.** Detection, prevention, and amelioration of hearing impairments. (1 cr; prereq #) Boies and staff

137. **Dental Health.** Conditions resulting in tooth decay and loss; preventive and corrective measures; mouth hygiene; community programs for dental health. (1 cr; prereq #) Jordan
138. **Hospital Engineering Problems.** Application of environmental engineering, sanitation, and maintenance principles and techniques with reference to effective planning, administration, and operation of hospitals. (Cr ar; prereq #) Bond, Michaelsen, and staff
139. **Advanced Field Practice in Public Health Nursing: Mental Health.** Opportunity for increasing competence in public health nursing practice including use of behavioral and mental health concepts; seminar analysis concurrent with experience with public health nursing patients including psychiatric patients. (Cr ar; prereq #) von Bergen
- 140.° **Vital Statistics I.** Official sources; population changes; rates; trends; significant differences. (3 cr) Bearman
141. **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. (Cr ar; prereq #)
145. **Low Level Radioactivity and Radiation Measurements.** Advanced isotope techniques designed for assay of low levels of radioactivity in environmental samples. Includes use of gamma spectrometry, liquid scintillation spectrometry, and low background anticoincidence beta counters. (3 cr; prereq #) Foreman
146. **Radiological Health II.** Biological effects of radiation covering radiation biochemistry, acute radiation syndrome, chronic effects, cellular and hematological aspects and mutagenic properties of radiation. (3 cr; prereq #) Foreman
- 147.° **Environmental Radioactivity.** Measurement, evaluation, and control of environmental radioactivity with special emphasis on radiation to the general population. Includes natural radioactivity, fallout, reactor environs, radioactive wastes, and radiation ecology. (3 cr; prereq #) Foreman
149. **Public Health Aspects of Housing and the Residential Environment.** Principles of healthful housing and their application in community planning and development. (3 cr; prereq #) Buxell
151. **Health Aspects of Air Control in Hospitals.** Basic considerations in control of natural and mechanical air flow in hospitals to avoid spread of infection, to control odors, and to promote patient care. (2 cr; prereq #) Michaelsen
- 152.° **Industrial Hygiene Engineering.** Field and laboratory methods used by industrial hygiene engineers in study and control of occupational health hazards. (3 cr; prereq #) Michaelsen
- 154.° **Radiological Health I.** Orientation in radiation effects and study and control of radiation hazards in laboratories, hospitals, and industrial plants. (Cr ar; prereq #) Foreman
- 155.° **Introduction to Air Pollution Problems.** (3 cr; prereq #) Paulus
- 156.° **Air Pollution Surveys.** Public health engineering phases of air pollution surveys. (2 cr; prereq 155 and #) Paulus
157. **Radiation Protection Criteria for Hospital Design and Operation.** Radiation protection methods in design, shielding, equipping, and operation of a radioisotope laboratory, X-ray, and other ionizing radiation facilities. (2 cr; prereq #) Michaelsen
158. **Hospital Safety.** Theories and practices in accident and fire prevention and control for hospitals and other medical care facilities. (3 cr; prereq #) Michaelsen, Scheffler
159. **Chemical Laboratory Safety.** Principles of accident and fire prevention in chemical laboratories. (1 cr; prereq #) Scheffler
160. **Principles of Administration in Hospitals.** Lectures, seminars, and field trips in hospital administrative principles; top management and board of trustees, personnel policy formation, human relations. (6 cr) Hamilton, Stephan
161. **History and Development of Hospitals.** Functions; ownership and control; promoting and building new hospitals; integrated service; national associations and foundations. (3 cr) Hamilton, Stephan
- 162-163. **Principles of Organization and Management of Hospitals.** Departmental structures and functions; organizational principles and practice. (3 cr for 162, 6 cr for 163) Stephan, Hamilton
164. **Principles of Organization and Management of Hospitals.** Personnel department; legal liability; fiscal management, hospital insurance, research in administration. (6 cr; prereq 162, 163) Stephan, Hamilton, Bieter
166. **Hospital Clerkship.** Assignment to local hospital for survey or solution of special problem. (5 cr) Stephan
167. **Management Problems in Hospital Administration.** Assignment and solution of specific managerial problems. (6 cr; prereq 162, 163, ¶164) Hamilton

168. **Orientation to Medical Sciences.** Medical terminology, applied anatomy and physiology. (3 cr; prereq #) Thomson
169. **Administrative Residency.** Field work of 1 calendar year's duration in approved hospital; weighted rotation through departments, solution of special problems and preparation of an acceptable formal report. (Cr ar) Hamilton, Stephan
170. **Administration of Public Health Nursing.** Interpretation of background and trends in public health nursing; analysis of staff and supervisory practice. (2 cr, §170A; prereq health officers, others #) Murphy
- 170A. **Administration of Public Health Nursing.** Scope; relationship to other aspects of public health. (1 cr, §170; prereq #) Murphy
- 171°-172.° **Studies in Public Health Nursing.** Orientation to research methodology; design and completion of a project. (3 cr per qtr; prereq 140, 175, or #) Murphy
173. **Advanced Field Practice in Public Health Nursing: Functional Area.** Opportunity for field placement in suitable functional area including administration, supervision, consultation, or teaching under guidance of faculty. (Cr ar; prereq public health nurses only) Murphy, E Anderson, Blanchard, McIntyre
- 174A-B. **Administration and Supervision in Public Health Nursing.** Application of principles; analysis of selected aspects of administrative and supervisory process in public health nursing. (2 cr per qtr; prereq public health nurse, #) Murphy, Blanchard
175. **Foundations of Public Health Nursing I.** Investigation of role of public health nursing within nursing and public health; review of content and process inherent in dynamic public health nursing; current trends in education and practice. (3 cr) von Bergen and staff
176. **Foundations of Public Health Nursing II.** Dynamics of human behavior; analysis of public health nursing practice through use of case material. (3 cr; prereq 175) von Bergen, Williams
- 177A-B. **Clinical Seminar: Public Health Nursing.** Experience with selected patients and families; concurrent seminar. (3 cr per qtr; prereq 176) von Bergen and staff
178. **Seminar: Public Health Nursing Consultation.** Opportunity for selected students to deepen understanding of process involved in consultation. (2 cr; prereq #)
179. **Rehabilitation Nursing and Long-Term Patient Care.** Nursing problems associated with rehabilitation; selected experiences correlated with seminars. (Cr ar; prereq 171, 175) E Anderson and staff
180. **Introduction to Biostatistics.** Variation; frequency distribution; probability; estimation; significance tests; binomial, normal, Poisson distributions; serial dilutions; most probable number. (6 cr; prereq environmental health students only, others #) Bearman
- 181-182-183. **Principles and Methods in Public Health Education.** Role of public health educator; group procedures; community organization; communication theory; methods and materials; program planning and evaluation. (3 cr per qtr; prereq #) Grout, Craig
185. **Air Analysis.** Laboratory and field exercises on problems involving industrial hygiene and air pollution. Exercises include air flow measurement, calibration of instruments, analysis of different gases, stack sampling, dust counting and sizing, and industrial plant visits. (3 cr; prereq 152 or 155, #) Paulus
189. **Field Work in Public Health Nutrition.** Placement in an approved agency with opportunity for experience in various facets of public health nutrition programs. (Cr ar; prereq 196A, B, C) Stief and staff
190. **Field Work in Health Education.** Supervised field experience. (Cr ar; prereq 183, 227) Grout, Craig
- 191.° **Science of Human Nutrition.** Surveys; nutritional status; undernutrition; malnutrition; dietetics in social relief and medical practice. (3 cr; prereq #) J Anderson, Keys
195. **Public Health Aspects of Cardiovascular Disease.** Etiology, incidence, problems of control, and relationship to mode of life. (3 cr; prereq #) Keys, Grande, and staff
- 196A, B, C.° **Public Health Nutrition.** Current local, state, national, and international public health nutrition problems; organization, administration, evaluation of community programs; educational methods and techniques applied to community nutrition activities. (Cr ar; prereq #) Stief
200. **Research.** Opportunities will be offered by the School of Public Health and by various cooperating organizations for qualified students to pursue research work. (Cr ar)
210. **Seminar: Public Health.** (Cr ar)
- 212.° **Seminar: Public Health Engineering and Sanitation.** (Cr ar; prereq #) Bond
213. **Seminar: Epidemiology.** (Cr ar; prereq #) Schuman

214. **School Health Programs.** Review of major health problems among children of school age; methods of providing and evaluating school health services. (Cr ar; prereq 107 or #) Bridge
215. **Maternal and Child Health.** Administration of well-child and antepartum conferences; psychosomatic problems of children. (Cr ar; prereq MD, #) Bridge
221. **Seminar: Nursing in Long-Term Patient Care and Rehabilitation.** Exploration of multidisciplinary aspects; role relationships affecting nursing; review of current research findings. (Cr ar; prereq 179) E Anderson and associates
222. **Seminar: School Nursing and Related Field Practice.** Exploration of nursing in the school setting; role relationships; review of current research. (Cr ar; prereq 107 or #214) Murphy
223. **Orientation to Teaching Public Health Nursing.** Evolution of public health nursing within collegiate nursing education; rationale for the relationship; impact of various related developments. (3 cr; prereq #) Murphy, McIntyre
224. **Seminar: Public Health Nursing Within the Curriculum.** Course objectives: organization; opportunity to explore problems in development of plans for teaching public health nursing. (Cr ar; prereq #) Murphy, McIntyre
225. **Practicum in Teaching Public Health Nursing.** Planning for and evaluation of instruction; selected field experiences and seminars. (Cr ar; prereq #) Murphy, McIntyre
- 227.° **Problems in Public Health Education Programs.** Independent study and experimentation in health education. (Cr ar; prereq #) Grout, Craig
230. **Field Practice in Environmental Sanitation.** (Cr ar; prereq #) Bond
- 241.° **Epidemiology of Noncommunicable Diseases.** Application of basic epidemiologic principles to noncommunicable diseases and to trauma; selected disease examples. (3 cr; prereq 104) Schuman

RADIOLOGY

OFFERED AT MINNEAPOLIS

Professor

Harold O. Peterson, M.D., *head*
Giulio J. D'Angio, Jr., M.D.

Clinical Professor

Oscar Lipschultz, M.D.
Donn G. Mosser, M.D.

Associate Professor

Kurt Amplatz, M.D.
Joseph Jorgens, M.D., Ph.D.
Merle K. Loken, Ph.D., M.D.

Clinical Associate Professor

Daniel L. Fink, M.D.

Graduates of class A schools who have completed at least 1 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 3 months of graduate study in pathology or its equivalent in addition to the fellowship period. This course itself extends over a period of 3½ to 4 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 hospitals, and appropriate periods of time are devoted to the physics of radiation, radiobiology, radiation therapy, radiographic technique, roentgen diagnosis, and nuclear medicine. Sufficient time is spent on application of roentgen rays, radium, cobalt 60 teletherapy, beta rays, and radioisotopes to give a thorough working knowledge in this field. Appropriate periods of time are devoted to the various divisions of roentgen diagnosis, including special procedures.

Medical fellows may assist in the teaching of undergraduate students and may teach independently in elective courses. A certain amount of investigation and research should be carried out during the course of the program.

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 Outpatient Departments*—A general referral hospital of approximately 800 beds and a very active outpatient clinic together offer an unusual clinical material.

There is, in addition, Variety Club Heart Hospital, which is connected directly with University Hospitals and offers approximately 80 beds for the study of acquired and congenital heart disease and an extensive research program in this field.

Another institution closely connected with University Hospitals is the University 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 outpatient 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 roentgen therapy machines, two cobalt 60 teletherapy units, and an adequate radium supply. Work with isotopes both for diagnosis and therapy is available. (b) 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. *Hennepin County General Hospital*—This institution provides valuable experience particularly in acute pulmonary conditions, in chronic cardiac diseases, and in traumatic lesions of the skeleton. Fellows are assigned to this service for a period of 6 months.

3. *Ancker Hospital, St. Paul*—Here, as in Hennepin County 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. Good research facilities are available. Assignment to this service is for a period of 6 months.

4. *Mount Sinai Hospital, Minneapolis*—This private hospital is affiliated with the University Teaching Program, has over 200 beds, and offers excellent opportunity for clinical work and research. Some fellows are assigned to this service for a period of 3 months.

5. *Veterans Administration Hospital*—A hospital of approximately 1,000 beds, catering entirely to veterans, participates actively in the graduate program of this department. 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. Routinely acceptable languages are French, German, Italian, and Spanish.

Master's and Doctor's Degrees—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 4 years is usually required. In addition to radiology as a major, a minor subject must also be carried—usually chosen from pathology, biophysics, physiology, or anatomy.

102f,w,s. X-ray Conference. Weekly departmental meetings at which important cases seen in University, Hennepin County General, Ancker, and Veterans Administration Hospitals and most of the private hospitals of the Twin Cities during the previous period are reviewed. (1 cr)

- 103f,w,s. **Fundamentals of Radiation Physics, Radiobiology and Nuclear Medicine.** Lectures and demonstrations of basic principles in radiology. (1 cr per qtr) Staff
- 104f,w,s. **Fundamentals of Nuclear Medicine.** Lectures and demonstrations on the physics of radioactivity, nuclear instrumentation and applications of radioisotopes in medicine. (1 cr per qtr; prereq 1st yr residents) Loken
- 110su. **Radiation Biology Institute.** Effects of irradiation on living systems. Radioisotopic procedures. Physics and chemistry fundamental to radiation biology and effects on all types of chemical and biological systems. (6 cr; prereq Plan B student in education)
- 111f,w,s,su. **Medical Roentgenologic Conference.** (1 cr per qtr)
- 124f,w,s,su. **Pediatric-Roentgenologic Conference.** (1 cr per qtr)
- 135f,w,s,su. **Surgical Roentgenologic Conference.** (1 cr per qtr)
- 163f,w,s,su. **Neurosurgical-Roentgenologic Conference.** (1 cr per qtr)
- 170f, 171w, 172s. **Radiation Biophysics.** Theoretical and experimental aspects of radiological physics, medical physics, and radiobiology. Physical properties of various ionizing radiations, interaction of ionizing radiations with biological systems, and the use of radioactive isotopes as tracer elements. (3 cr per qtr; prereq #) Staff
- 200f,w,s,su. **Research in Roentgenology.** Problems in roentgen diagnosis. (Cr and hrs ar)
- 201f,w,s. **Neuroradiology.** Roentgen diagnostic procedures and roentgen findings in study of the head, including diseases of the skull, orbits, intracranial conditions, and in study of the spine and spinal canal. (2 cr per qtr; offered 1966-67 and alt yrs)
- 202f,w,s,su. **Cardiovascular Roentgenologic Conference.** (1 cr per qtr)
- 204f,w,s. **Tumor Clinic Conference.** (Cr and hrs ar)
- 205f,w,s,su. **Research in Radiation Therapy, Nuclear Medicine, and Radiobiology.** (Cr and hrs ar; prereq #)
- 206f,w,s,su. **Roentgenoscopy.** Theory and practical application of roentgenoscopy particularly to diseases of the gastrointestinal tract, lungs, and heart. (3 cr per qtr; hrs ar)
- 208f,w,s,su. **Radiology Pathology Seminar.** Weekly presentations of pathology specimens, slides, and X-rays. (1 cr per qtr)
- 209f,w,s,su. **Roentgen Diagnosis.** Theory and practical application of roentgen diagnostic methods to medical cases in general. (3 cr per qtr; hrs ar)
- 210f,w,s,su. **Roentgen Technique.** Theory and practical application of principles of roentgen technique including the study of X-ray machines and X-ray tubes, exposure, technique, and dark-room work. (2 cr per qtr; hrs ar)
- 211f,w,s,su. **Dosimetry of Internal and External Radiation Emitters.** Basic principles of radiation dosimetry discussed in detail; clinical applications considered. (1 cr per qtr) Staff
- 212w,s,su. **Seminar: Radiation Biophysics and Nuclear Medicine.** Research approaches to problems in radiation biophysics; use of radioactive isotopes discussed. Recent advances reviewed. (1 cr per qtr; prereq #) Staff
- 217f,w,s. **Roentgenologic Conference on Chest Diseases.** (1 cr per qtr)
- 220f,w,s,su. **Urologic-Roentgenologic Conference.** (1 cr per qtr)
- 236f,w,s,su. **Radioisotope Seminar.** Recent developments in nuclear medicine. (1 cr per qtr) Loken
- 238f,w,s,su. **Roentgen-Surgical Pathology Conference.** (1 cr per qtr)
- 240f,w,s. **Radiation Therapy Conference.** Recent advances in clinical radiotherapy. (1 cr per qtr) Staff

OFFERED AT ROCHESTER

Professor

C. Allen Good, M.D., M.S., *head*,
Diagnostic Roentgenology
 David G. Pugh, M.D.

Associate Professor

Donald S. Childs, Jr., M.D., M.S., *head*,
Therapeutic Radiology
 John R. Hodgson, M.D., M.S.
 Colin B. Holman, M.D., M.S.

Assistant Professor

Hillier L. Baker, Jr., M.D., M.S.
 George D. Davis, M.D., M.S.
 Owings W. Kincaid, M.D., M.S.
 Paul W. Scanlon, M.D., M.S.

Instructor

Harley C. Carlson, M.D., Ph.D.
 Malcolm Y. Colby, Jr., M.D., M.S.
 James R. Stewart, M.D., M.S.
 Martin Van Herik, M.D., M.S.
 David M. Witten, M.D., M.S.

The sections of diagnostic and therapeutic radiology at the Mayo Clinic are well arranged and equipped for examination and treatment of large numbers of clinic and hospital patients. Approximately 275,000 diagnostic examinations and 30,000 X-ray, radium, and isotope treatments are carried out from year to year in the clinic and its affiliated hospitals. In addition to these clinical facilities, adequate space has been set aside in the Radiology Department for conference, library, and study facilities. The Mayo Clinic library and the research facilities of the pathology, physiology, and biophysics laboratories are readily available to graduate students working in the field of radiology.

Approximately 30 fellowships in radiology are offered in the Mayo Graduate School of Medicine, 10 appointments being made each year. Training may begin in July or October and, under exceptional circumstances, in January or April. The graduate training program in radiology is designed, in accordance with the basic requirements stipulated by the American Board of Radiology, to provide training in radiologic physics, radiologic technique, film interpretation, fluoroscopy, X-ray therapy, radium therapy, the diagnostic and therapeutic applications of isotopes, radiobiology, and in the basic field of pathology. Numerous departmental and interdepartmental conferences and seminars are held each week. In addition to the observation of and progressive participation in the clinical work of everyday practice, there is ample opportunity for study, research, and writing in conjunction with and under the supervision of members of the staff. Those electing to prepare a thesis may on completion of 3¼ years' training become candidates for the degree of M.S. or Ph.D. in radiology. During the final year, fellows are eligible for appointments as first assistants in either diagnostic or therapeutic radiology with increased responsibilities in film interpretation and treatment of patients. Additional training and experience beyond the required 3 years may be available in some instances.

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—This department offers work leading to the Ph.D. degree.

M 251f,w. **Radiologic Physics.** An extensive series of lectures and demonstrations on radiologic physics and its applications in diagnostic and therapeutic radiology. Given yearly October to April. M M D Williams, Orvis

M 252f,w,s,su. **Diagnostic Radiology.** At least 21 months are spent in diagnostic radiology. Additional time may be arranged. For 3 months, each afternoon is devoted to study of diagnostic X-ray equipment and to practical experience in roentgenologic technique. Through observation, precept, and progressive participation in film interpretation and fluoroscopy, the student becomes thoroughly familiar with the entire field of radiologic diagnosis. He observes a wide variety of special techniques in neuroradiology, cardiovascular radiology, pulmonary diseases, gastrointestinal radiology, pediatric radiology, urologic radiology, gynecologic radiology, etc. Good, Pugh, Hodgson, Davis, Holman, Baker, Kincaid, Witten, Carlson, Stewart

M 253f,w,s,su. **Therapeutic Radiology.** At least 1 year is spent in therapeutic radiology, observing and participating in treatment of a wide variety of benign and malignant diseases which are amenable to treatment by X rays, radium, or radioactive isotopes. The student also becomes familiar with various diagnostic techniques employing radioactive isotopes. Childs, Van Herik, Colby, Scanlon

Pathology. (See Department of Pathology) Assignment to Pathology for 3 months is mandatory. Additional time may be necessary to qualify for an advanced degree.

Lectures, demonstration, and participation in the work of the pathology laboratories provide unusual opportunity to correlate the pathology of a wide variety of medical and surgical diseases with the gross pathology revealed by the roentgen ray.

SURGERY

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

General Surgery

OFFERED AT MINNEAPOLIS

Professor

Owen H. Wangenstein, M.D., Ph.D., *head*
 Joe Bradley Aust, M.D., Ph.D.
 Claude H. Hitchcock, M.D., Ph.D.
 William D. Kelly, M.D., Ph.D.
 C. Walton Lillehei, M.D., Ph.D.
 Richard L. Varco, M.D., Ph.D.

Clinical Professor

Orwood J. Campbell, M.D., Ph.D.
 Lyle J. Hay, M.D., Ph.D.
 Arnold J. Kremen, M.D., Ph.D.
 N. Logan Leven, M.D., Ph.D.
 Charles E. Rea, M.D., Ph.D.

Associate Professor

Edward W. Humphrey, M.D., Ph.D.
 Richard C. Lillehei, M.D., Ph.D.
 John F. Perry, Jr., M.D., Ph.D.
 Yoshio Sako, M.D., Ph.D.
 W. Albert Sullivan, M.D., M.S.

Clinical Associate Professor

George S. Bergh, M.D., M.S.
 Davitt A. Felder, M.D., Ph.D.
 N. Kenneth Jensen, M.D.
 Bernard G. Lannin, M.D., Ph.D.
 Carl O. Rice, M.D., Ph.D.

Assistant Professor

Karel B. Absolon, M.D., Ph.D.
 Eugene F. Bernstein, M.D., Ph.D.
 Aldo R. Castaneda, M.D., Ph.D.
 Henry Gans, M.D., Ph.D.
 Victor A. Gilbertsen, M.D., M.S.
 Theodor B. Grage, M.D., Ph.D.
 Ward O. Griffen, M.D., Ph.D.
 Arnold S. Leonard, M.D., Ph.D.
 Harlan D. Root, M.D., Ph.D.
 Peter A. Salmon, M.D., Ph.D.

Clinical Assistant Professor

Stuart W. Arhelger, M.D., Ph.D.
 Samuel W. Hunter, M.D., M.S.
 Earl G. Yonehiro, M.D., Ph.D.

Graduate work in surgery in the Medical School is designed to offer superior training to a limited number of fellows during 4 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 reappointment 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.)

The fundamental laboratories of the Medical School offer numerous graduate courses closely related to surgery. (See statements of Departments of Anatomy, Biochemistry, Microbiology, Pathology, Pharmacology, and Physiology.) 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 outpatient departments in surgical diagnosis and operative surgery, and similar opportunities are available in some of the surgical specialties, such as proctology, 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 30. 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 in-

terns, 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 Veterans Hospital in Minneapolis (25), Hennepin County 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 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. Routinely acceptable languages are: (for neurosurgery) French, German, Russian, Spanish; (for orthopedic surgery) French, German; (for general surgery) French, German, Italian, Japanese, Russian, Scandinavian; (for urology) French, German, Spanish.

Master's Degree—Offered only under Plan A.

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

The following courses are all given at all of the participating hospitals unless otherwise indicated. Registrants taking fellowships at Veterans Hospital, Hennepin County 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 Hennepin County General Hospital or "Section A" for Ancker Hospital.

- 200f,w.s. **Outpatient Clinic in Surgery.** Student is required to assist in the outpatient surgical clinic, and in this connection studies the diagnosis and treatment of selected cases. (1 cr 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 cr per qtr) Staff
- 203f,w.s. **Proctoscopy and Sigmoidoscopy (Hospital).** Treatment and diagnosis of pathological conditions found in the lower bowel, including minor surgical operations. (1 cr 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 manifestations and effects of malignant tumors which come in the province of general surgery and its divisions will be made. (1 cr 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 Outpatient Department as well as in the wards. (1 cr per qtr) Wangenstein and staff
- 208f,w.s. **Surgical Problems and Management.** 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 cr 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 cr 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 cr per qtr) Wangenstein and staff
- 215f,w.s. **Surgical-Roentgenological Conference.** A weekly exercise in which films of all surgical patients presenting interesting roentgen findings are reviewed. Staffs of the Departments of Radiology and Surgery. (1 cr 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. (Cr ar; may be taken 1 or more qtrs) Wangensteen 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 cr per qtr) Wangensteen and staff
- 218f,w,s. Surgery-Medical Pathological Conference.** A weekly exercise in which the student prepares instructive cases for review by the medical, surgical, and pathological staffs. (1 cr pr qtr) Wangensteen and staff
- 219f,w,s. Surgical Literature Conference.** Leading surgical journals are assigned to the fellows, who read and report on important articles at weekly conferences. (1 cr per qtr) Wangensteen and staff
- 220f,w,s. Peripheral Vascular Surgery.** Diagnosis and treatment of peripheral vascular disease with the introduction of the surgical techniques of vascular surgery. (1 cr) Wangensteen and staff
- 221f,w,s. Surgery-Physiology Seminar.** Current research problems are presented for interdepartmental discussion and evaluation. (1 cr per qtr) Physiology and Surgery graduate staffs

OFFERED AT ROCHESTER

Professor

John W. Kirklin, M.D., M.S., *chairman*
 B. Marden Black, M.D., M.S.
 O. Theron Clagett, M.D., M.S.
 F. Henry Ellis, Jr., M.D., Ph.D.
 Deward O. Ferris, M.D., C.M., M.S.
 (Clinical)
 George A. Hallenbeck, M.D., Ph.D.
 Edward S. Judd, M.D., M.S.
 Joseph H. Pratt, M.D., M.S. (Clinical)
 James T. Priestley, M.D., M.S., Ph.D.

Associate Professor

Oliver H. Beahrs, M.D., M.S.

Assistant Professor

Philip E. Bernatz, M.D., M.S.
 Karl A. Lofgren, M.D., M.S.
 Hugh B. Lynn, M.D.
 Dwight C. McGoon, M.D.
 Thomas T. Myers, M.D.
 W. Spencer Payne, M.D., M.S.
 William H. ReMine, M.D., M.S.
 Richard E. Symmonds, M.D., M.S.
 John S. Welch, M.D., M.S.

Instructor

Martin A. Adson, M.D., M.S.
 Donald C. McIlrath, M.D., M.S.

Graduate training in general surgery at the Mayo Graduate School of Medicine combines the opportunities for an advanced academic degree and surgical education to fulfill the requirements of the American Board of Surgery.

Appointments to fellowships are made quarterly with yearly reappointment contingent upon satisfactory performance. Assignments during the usual 4-year program are flexible, but may include 1 quarter of surgical diagnosis, 2 or 3 quarters of a wide variety of surgical specialties, 2 quarters of surgical pathology, and 11 or 12 quarters of general surgery at junior and senior levels of responsibility.

There is opportunity for alternate or additional assignments to include surgical research, physiology, or experimental pathology. Special fellowship appointments of 1 or 2 years are made in certain cases for advanced study of cardiopulmonary or gastrointestinal disease. A limited number of 1- to 3-year appointments are also available to provide basic surgical experiences prior to surgical specialty training.

Senior fellows in operative surgery who are best qualified may be appointed chief surgical residents with accompanying increased consulting and operating responsibility. Additional senior operative assignments may be made to the affiliated Rochester State Hospital.

Operative services are principally located in the Rochester Methodist Hospital with a total of 600 surgical beds. These patients, together with the outpatient facilities of the Mayo Clinic, ensure a wide exposure to general and special surgical disease.

A large number of integrated group seminars, lectures, and meetings are held each week.

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—Work leading to the Ph.D. degree is offered in this department.

M 251f,w,s,su. Peripheral Vein Surgery. Treatment of complications, surgical and medical, and varicose veins. Staff

M 252f,w,s,su. Operative Surgery. Assistantship, junior and senior levels, in operating rooms; chief surgical resident (concurrent with senior assistantship). Residence. Seminar. Staff

Operative Surgery in Surgical Specialties. (See specific departments)

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

Pathologic Anatomy. (See Department of Pathology)

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

Research on Problems in Pathologic Anatomy. (See Department of Pathology)

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 Department of Anesthesiology)

Colon and Rectal Surgery—Proctology

OFFERED AT ROCHESTER

Professor

Raymond J. Jackman, M.D., M.S., *head*

Associate Professor

John R. Hill, M.D., M.S. (Clinical)

Instructor

Markham J. Anderson, Jr., M.D., M.S.

Robert J. Spencer, M.D.

The major service in colon and rectal surgery extends over a period of 5 years and meets the requirements of the American Board of Colon and Rectal Surgery. It includes 6 months in a minor, usually surgical pathology, approximately 2 to 3 quarters in general medical and surgical diagnosis with special reference to gastrointestinal diseases. Four quarters of the 5-year period are in the field of anorectal surgery and diagnostic proctoscopy. The major portion of the 5-year program, i.e., approximately 3 years, is in the field of general surgery with special reference to abdominal surgery in which emphasis is placed on conditions that involve the colon.

Master's Degree—Offered only under Plan A.

M 251f,w,s,su. Colon and Rectal Surgery. Jackman, Hill, Anderson

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 and regional anesthesia. For details, see these departments.

Neurosurgery

OFFERED AT MINNEAPOLIS

Professor

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

Clinical Professor

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

Assistant Professor

Shelley N. Chou, M.D., Ph.D.

Master's and Doctor's Degree—Facilities are available for work toward M.S. (Plan A) and Ph.D. degrees in neurosurgery. The minor may be elected in anatomy, pathology, physiology, or other laboratory fields. The usual fellowship training period in neurological surgery is for a minimum of 4 years; many of the trainees who obtain advanced degrees remain longer than this minimal requirement. The minimal period is adjusted to comply with the requirements for certification by the American Board of Neurological Surgery. At least 30 months are spent on clinical neurological surgery, 6 months on clinical medical neurology and neuropathology, 12 months are spent in the research laboratories working out under supervision and guidance an experimental problem of the trainee's choice. During this 12-month period the trainee also takes lecture and laboratory work in neuroanatomy and neurophysiology so that reasonable competence in these fields is obtained.

More extensive training in basic sciences can be obtained in the fundamental laboratories of the Medical School, which offer numerous graduate courses related to neurological surgery (see statements of the Departments of Anatomy, Physiology, Pathology, etc.). Special investigative and research work in these departments can readily be arranged in the training program. The proximity of the medical buildings and arrangement of courses afford opportunity for co-ordination of clinical and laboratory work.

Special courses and conferences in the various clinical departments (Pediatrics, Psychiatry and Neurology, Radiology, Ophthalmology) are attended so that a well-rounded clinical training is obtained through both didactic courses and practical clinical experience.

The Division of Neurological Surgery is closely associated in its training program with the Division of General Surgery at the University and with the Section of Neurosurgery at the Mayo Clinic.

- 305f,w,s,su. Neurosurgical Diagnosis.** The neurosurgical fellow assists in instruction of clinical clerks and interns, and studies problems in diagnosis in the Outpatient Department and in University Hospitals. (3 cr) French, Chou
- 308f,w,s,su. Neurosurgical Problems and Management.** The neurosurgical fellow acts as house surgeon at University Hospitals. (4 cr) French, Chou
- 311f,w,s,su. Operative Neurosurgery.** The neurosurgical fellow acts as first assistant at operations in University Hospitals, and later may be permitted to operate. (4 cr) French, Chou
- 316f,w,s,su. Neurosurgical Research.** Problems in experimental or clinical surgery. (3 cr) French, Chou
- 318f,w,s,su. Neurosurgical Conference.** A review of X-rays and case histories on neurosurgical service. (1 cr) French, Chou

OFFERED AT ROCHESTER

Professor

Collin S. MacCarty, M.D., M.S., *head*
J. Grafton Love, M.D., M.S.

Assistant Professor

Frederick W. L. Kerr, M.D., M.S.
Ross H. Miller, M.D., M.S.

Associate Professor

George S. Baker, M.A., M.D., M.S.
Hendrik J. Svien, M.D., M.S.
Alfred Uihlein, M.D., M.S.

Preparation for neurosurgery at the Mayo Graduate School of Medicine includes assignments in the Departments of Basic Neurologic Sciences, Neurology, General Surgery, and Neuroophthalmology. The Department of Basic Neurologic Sciences assignments include work in neurophysiology, neuromyography and electroencephalography, neuroanatomy, and neuropathology. The training program of 4 years' duration preceded by 12 months of general surgery completes the requirements of the American Board of Neurological Surgery.

To acquire competence in neurologic surgery it is essential that the training in neurologic surgery itself be preceded by an adequate background in neuroanatomy, neuropathology, neurologic diagnosis, and neurologic ophthalmology. In addition

it is highly desirable that some knowledge of other fields, such as neurooentgenology, neurophysiology, and electroencephalography, be obtained. To acquire a sound background in neurologic diagnosis, fellows in neurosurgery have an opportunity to work as assistants in the diagnostic sections of neurology and on the hospital services for periods of 6 months or more and are assigned to 3 months of neuroophthalmology. 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 of Experimental and Anatomic Pathology. During the period of at least 9 months in which the fellows are assigned to the Department of Basic Neurologic Sciences, they see not only the specimens obtained at necropsy but also the pathologic specimens obtained at operation. They attend lectures on neuroanatomy and neurophysiology and have an opportunity to work on a problem in research leading to an advanced degree. 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. 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 members of the staff and to operate under the supervision of the neurosurgical 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.

Master's Degree—Offered only under Plan A.

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

M 251f,w,s,su. Surgery of the Nervous System. Operative technique and study of special problems involved. Residence. Seminar. Love, Baker, MacCarty, Svien, Miller, Uihlein, Kerr

M 258f,w,s,su. Basic Neurologic Sciences. Staff

Neuroanatomy. (See Department of Anatomy)

Neuropathology. (See Department of Pathology)

Neurophysiology, Electroencephalography. (See Department of Physiology)

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

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

Necropsy Service. (See Department of Pathology)

Neuroophthalmology. (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 MINNEAPOLIS

Professor

John H. Moe, M.D., *director*

Harry B. Hall, M.D.

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

Clinical Associate Professor

Walter Indeck, M.D.

Clinical Assistant Professor

Edward H. O'Phelan, M.D., M.S.

Master's Degree—Four-year fellowships are offered to students working toward a graduate degree in orthopedic surgery. This work is carried on at 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 Graduate School of Medicine. The Master's degree is offered only under Plan A.

Doctor's Degree—The division offers work leading to the Ph.D. degree.

401. **Orthopedic Conference.** Review of X-rays and case histories of patients on the orthopedic inpatient or outpatient service. (3 cr) Peterson, Moe, and staff
403. **Fractures.** The orthopedic fellow acts as house surgeon on the fracture service at Hennepin County General Hospital. (5 cr) Nydahl and staff
405. **Orthopedic Diagnosis.** The orthopedic fellow assists in instruction of clinical clerks and interns and studies problems in diagnosis in the Outpatient Department and in the University Hospitals. (3 cr) Moe and staff
407. **Pediatric Orthopedics.** The orthopedic fellow acts as house surgeon at Gillette State Hospital for Crippled Children. (5 cr) Moe and staff
408. **Orthopedic Problems and Management.** The orthopedic fellow acts as house surgeon at the University Hospitals. (5 cr) Moe and staff
410. **Orthopedic Pathology.** Seminar for systematic review of pathology of ossified tissues and soft tissues of the extremities. (2 cr) Moe 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. (5 cr) Moe and staff
412. **Orthopedic Anatomy.** The orthopedic fellow dissects upper and lower extremities and aids in instruction of medical students in anatomy of the extremities. (2 cr) Moe and staff
416. **Orthopedic Research.** Problems in experimental or clinical surgery. University Hospitals. (5 cr) Moe and staff

OFFERED AT ROCHESTER

Professor

Mark B. Coventry, M.D., M.S., *head*
 William H. Bickel, M.D., M.S.
 Joseph M. Janes, M.D., M.S.
 Paul R. Lipscomb, M.D., M.S.
 H. Herman Young, M.D., M.S. (Clinical)

Associate Professor

Edward D. Henderson, M.D., M.S. (Clinical)
 John C. Ivins, M.D., M.S.
 Einar W. Johnson, Jr., M.D., M.S. (Clinical)
 Patrick J. Kelly, M.D., M.S.

Assistant Professor

Lowell F. A. Peterson, M.D.
 C. Roger Sullivan, M.D., M.S.

Instructor

Anthony J. Bianco, M.D., M.S.
 Norman W. Hoover, M.D., M.S.
 Ronald L. Lindscheid, M.D., M.S.

Orthopedic surgery at the Mayo Graduate School of Medicine embraces not only the congenital deformities of childhood, such as clubfeet, dislocated hips, torticollis, etc., but also practically all the acquired deformities of the extremities and spines of children and adults. All fractures, recent and old; bone and joint infections, acute or chronic; bone and soft tissue tumors of the extremities and spine and vascular problems of the extremities are cared for on this service. In addition members of this department are in charge of hand surgery, performing tendon grafts, capsulotomies, tenotomies, and the allied procedures that are necessary for the rehabilitation of the crippled hand whether it be from a congenital deformity or acquired through trauma, arthritis, or other disease processes. An active emergency service at the St. Marys and Methodist Hospitals handles emergency cases in close co-operation with the Departments of General Surgery, Neurosurgery, Plastic Surgery, etc. All orthopedic inpatients are cared for in the St. Marys and Methodist Hospitals.

To cope successfully with such a broad field the surgeon must have a sound general surgery training. The Mayo Graduate School of Medicine is prepared to give the full 4 years of training in orthopedic surgery that are required for certification by the American Board of Orthopedic Surgery.

At the present time twelve 4-year fellowships are available annually for fellows showing a special interest and aptitude for orthopedic surgery. The service includes orthopedic diagnosis, operative and nonoperative orthopedics, service in specialties closely allied to orthopedic surgery, and a minor in either pathology or anatomy. Gross specimens and microscopic slides of all orthopedic conditions are readily available for study while regularly scheduled lectures cover the field of surgical pathology. Seminars in orthopedic surgery are held weekly during the academic year, and

there is a weekly fracture conference during which all emergency cases are reviewed in detail. Basic science seminars are held weekly during the academic year.

Fellows majoring in orthopedic surgery will be given ample opportunity to serve as first assistants in the operating room and office and may work in the Department of Physical Medicine. Senior fellows, under staff supervision, likewise care for the orthopedic patients in the Rochester State Hospital.

Through special arrangements, each fellow majoring in orthopedic surgery at the Mayo Graduate School of Medicine spends 6 months either at Gillette State Hospital, St. Paul, Minnesota, or at Chicago Memorial Hospital, Chicago, Illinois, or at Eastern New York Orthopedic Hospital, Schenectady, New York, where more intensive experience in the care of orthopedic conditions in children may be secured.

Fellows majoring in the field of orthopedic surgery may also take work in physiology, neurology, anatomy, physical medicine, or experimental surgery.

The present permanent staff is composed of 14 full-time consultants.

Master's Degree—Offered only under Plan A.

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

M 251f,w,s,su. Orthopedic Diagnosis. History taking and physical examination of orthopedic cases. 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. Coventry and staff

M 252f,w,s,su. Orthopedic Surgery. One year in service is offered to fellows majoring in orthopedic surgery. Seminar. Coventry 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.

Plastic Surgery

OFFERED AT ROCHESTER

Professor

John B. Erich, M.D., D.D.S., M.S., *head*

Associate Professor

Kenneth D. Devine, M.D.

Assistant Professor

Thaddeus J. Litzow, M.D., M.S.

Instructor

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

John C. Lillie, M.D., M.S.

James K. Masson, M.D., M.S.

Fellowships in plastic surgery at the Mayo Graduate School of Medicine include training in all aspects of this surgical specialty; the program in plastic surgery deals with cosmetic as well as reconstructive and reparative surgery and involves congenital and acquired defects of the entire body. Included in the work of this section is the treatment of burns, the management of tumors of the head and neck, and the care of traumatic injuries of the maxillofacial region. Through special arrangements each fellow is assigned for a period of from 6 months to 1 year to the Woods Veterans Administration Hospital in Milwaukee, Wisconsin, or to the Hines Veterans Administration Hospital in Hines, Illinois, where he receives more intensive training in plastic problems relating to the hand and extremities.

Fellowships in plastic surgery involve a 6 to 9 months' assignment in the Methodist and St. Marys Hospitals, where each fellow is instructed in the pre- and post-operative care of patients on the plastic service and where he works as second assistant in the operating rooms. For at least 18 months, every fellow is assigned to

advanced responsibilities under the supervision of the consultants in the Section of Plastic Surgery; in this phase of the training program, the fellow receives instruction in the diagnosis and evaluation of plastic problems and acts in a position of responsibility in the operating rooms and in the diagnostic section at the Mayo Clinic. Opportunities are available for study in the fundamental sciences (pathology and anatomy) under supervision of members of the faculty. Seminars are held regularly.

Training in plastic surgery at the Mayo Graduate School of Medicine meets the requirements of the American Board of Plastic Surgery and includes 3 years of resident training in general surgery and 3 years in plastic surgery. The applicant is encouraged to secure his general surgery training at the Mayo Graduate School of Medicine. However, any applicant may, if he so desires, receive his general surgery training elsewhere, providing that the hospital in which such training is obtained is approved by the American Medical Association. The 3-year fellowship in plastic surgery allows time for special training in this surgical specialty and for laboratory or clinical investigative work leading to an advanced degree.

M 252f,w,s,su. Diagnostic and Clinical Plastic Surgery. Theory and practice of plastic surgery. Diagnosis of diseases and defects requiring plastic repair. Pre- and postoperative care of patients. Staff

M 253f,w,s,su. Operative Plastic Surgery. Hospital residence. Second assistantship in operative service. Staff

M 254f,w,s,su. Operative Plastic Surgery. Operative plastic and reconstructive surgery of entire body including cosmetic surgery; also management of burns, tumors of the head and neck, and maxillofacial injuries. First assistantship in operative service. Staff

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

Anatomy. (See Department of Anatomy)

Proctology

Work leading to the Master's degree with a major in proctology is described under the heading Colon and Rectal Surgery. For a list of faculty and course work see this section of this bulletin.

Urology

OFFERED AT MINNEAPOLIS

Professor

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

Clinical Associate Professor

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

Associate Professor

Colin Markland, M.A., M.B., Ch.B.

Clinical Assistant Professor

Milton P. Reiser, 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. Work in urology is done at University, Minneapolis Veterans, Hennepin County General, or Ancker Hospitals.

Master's Degree—Offered under Plan A only.

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

250f,w,s,su. Urological Surgery. (4 cr per qtr) Creevy and staff

251f,w,s,su. Cystoscopy and Urological Diagnosis. (4 cr per qtr) Creevy and staff

252f,w,s,su. Urological Conference. (4 cr per qtr) Creevy and staff

253f,w,s,su. Research in Urology. (4 cr per qtr) Creevy and staff

254f,w,s. Urological Seminar. (3 cr per qtr) Creevy and staff

255f,w,s. Urological Radiological Conference. (3 cr per qtr) Creevy and staff

256f,w,s. **Urological Pathological Conference.** (3 cr per qtr) Creevy and staff

257f,w,s. **Use of the Artificial Kidney.** (3 cr per qtr) Creevy and staff

OFFERED AT ROCHESTER

Professor

Ormond S. Culp, M.D., *head*
Edward N. Cook, M.D., M.S.
John L. Emmett, M.D., M.S.
Laurence F. Greene, M.D., Ph.D.
Gershon J. Thompson, M.D., M.S.

Associate Professor

James H. DeWeerd, M.D., M.S.
Thomas L. Pool, M.D., M.S.

Assistant Professor

David C. Utz, M.D., M.S.

Major training in urology extends over a period of 3 to 4 years. Trainees who have completed the requirement of the American Board of Urology of a year in general surgery or a year in sciences basic to urology before coming here may complete their urologic training in 3 years; those who wish to receive this basic training in the Mayo Graduate School of Medicine may do so, thus extending the period of training to 4 years. A minimum of 1 year is devoted to diagnosis and treatment of diseases involving the urinary tract. Surgical training includes at least 2 years in all phases of open and transurethral operative procedures. On the surgical services at the Methodist and St. Marys Hospitals, daily rounds with one of the consultants provide ample opportunity for thorough discussion of individual cases. Junior and senior fellows participate in the management of all problems, assist at all operations, and, as their experience increases, are given added responsibilities in keeping with their ability to handle the work involved. By the time he completes his training the candidate will have performed the standard urologic 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 discussion of cystoscopic findings. Each fellow has an opportunity to perform hundreds of cystoscopic examinations.

Opportunity for the fellows to receive training in general surgery in addition to that obtained under the urologic staff (which is in all phases of genitourinary surgery) can be provided if candidates desire this; they may act as assistants to general surgeons who are also interested in those phases of surgery which to some extent overlap such as gynecologic procedures for the correction of vesicovaginal fistula, urinary incontinence, etc., adrenal surgery, etc.

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

Opportunity to extend a period of training by working in experimental surgery in the Medical Sciences Laboratories and to work with the artificial kidney is available to those who wish to do so and are deemed qualified. Most degree candidates elect a period of 6 months in the surgical pathology laboratory to meet the degree requirement for a minor field.

Master's Degree—Offered only under Plan A.

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

M 251f,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

M 252f,w,s,su. Genitourinary Surgery Including Endoscopic and Open Procedures. Cook, Culp, DeWeerd, Emmett, Greene, Pool, Thompson, Utz

M 253f,w,s,su. General Surgery, Gynecological Surgery. Staff (See these departments)

Necropsy Service. (See Department of Pathology)

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

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

INDEX

	Page		Page
Abbreviations and symbolsInside cover		Grade point average	3
Academic rank and candidacy for graduate degrees	6	Grades, required	3
Admission	3	Gynecology	49
Admission to candidacy	7, 11	Hematology, courses in	20
Advanced degrees in medicine, requirements for	6-17	Histology, courses in	19
Anatomy	19	Hospital Administration	38
Anesthesiology	20	Hospital Pharmacy	61
Assistantships	4	Immigration and Naturalization Service, regulations of	4
Attendance at commencement	9, 16	Immunology, course work in	47
Biochemistry	22	Internal Medicine	40
Biometry	30	Laboratory equipment	2
Biophysics	26	Laboratory Medicine	39
Biostatistics	28	Language certification, transfer of	14
Candidacy, academic rank and	6	Language declaration form	11
Candidacy, admission to	7, 11	Language requirements	6, 12
Child Psychiatry	71	Libraries	3
Clinical equipment	3	Licensure	6
Clinical Pathology	56	Major	7, 10
Clinical Psychology	71	Major field, transfer of	7, 10
Collateral field of knowledge	13	Major fields, list of	18
Colon and Rectal Surgery	86	Master's degree	6
Commencement	9, 16	Mayo Graduate School of Medicine Clinical equipment	3
Completion of requirements for degrees, date for	9, 16	Fellowships	5
Degrees	6-17	History	2
Academic rank and	6	Minor, requirements for	7, 10
Master's	6	Transfer of major fields	7, 10
Ph.D.	10	Medical Technology	40
With designation	6, 10	Medicine	40
Dentistry	30	Microbiology	46
Dermatology	44	Microfilm publication	15
Doctoral program form	11	Minor	7, 10
Environmental Health	36	Neurology	70
Epidemiology	37	Neurosurgery	86
Examinations	8, 14, 16	Nursing	
Faculty vote on	9, 14	Psychiatric	69
Language	7, 14	Public Health	78
Experimental and Anatomic Pathology	55	Nutrition	48
Fees	4	Obstetrics and Gynecology	49
Fellowships and assistantships	4	Office of Scientific Personnel Survey Form	16
Foreign physicians, note to	4	Ophthalmology	50
General information	2	Orthopedic Surgery	88
General Surgery	83	Otolaryngology	52

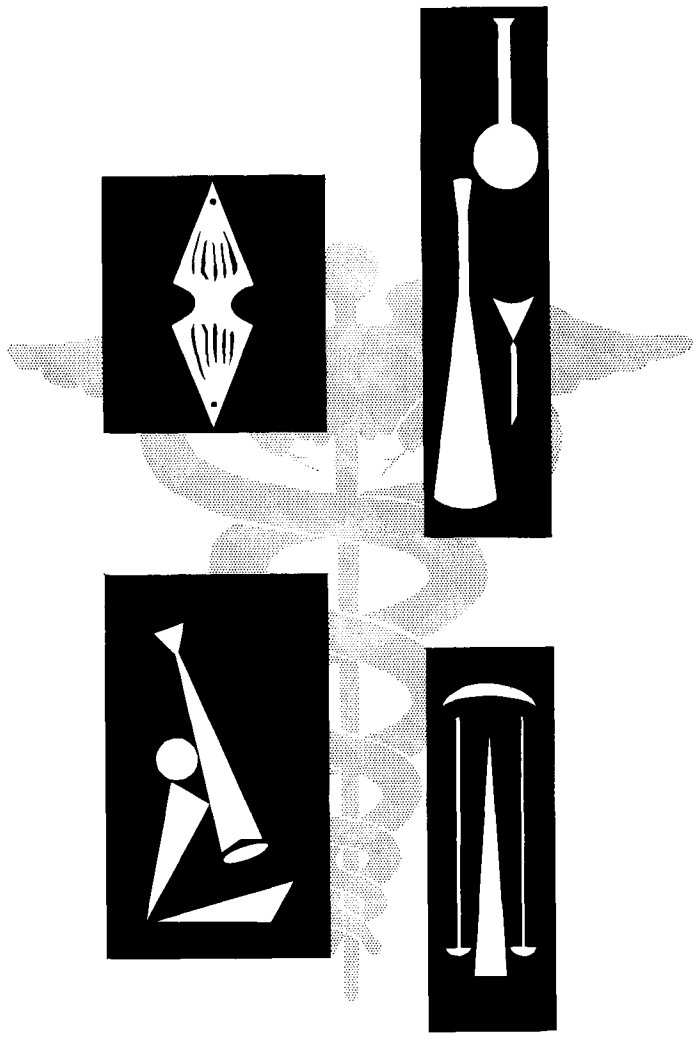
	Page		Page
Pathology	54	Rehabilitation	64
Pediatrics	57	Reports	9, 16
Pharmaceutical Chemistry	59	Required quality of study	3
Pharmaceutical Technology	60	Research technique	13
Pharmacognosy	62	Residence	6, 10
Pharmacology	63	Rhinology	52
Ph.D. program of study	11	Study, required quality of	3
Physical examination	5	Supporting program of study	10
Physical Medicine and Rehabilitation..	64	Surgery	83
Physiological Hygiene	66	Surgical Pathology	55
Physiology	67	Symbols	Inside cover
Plastic Surgery	90	Syphilology	44
Preliminary examination	14	Thesis	8, 15
Proctology	86	Thesis Title Form	12
Psychiatric Nursing	69	Time limit for Ph.D.	12
Psychiatry and Neurology	70	Transfer of language certification	14
Public Health	75	Transfer of major fields	7, 10
Public Health Nursing, courses in	78	Tuition	4
Publication of thesis	16	Urology	91
Radiology	79		
Registration	4		
By mail	12		

Delivery _____

OK Kill _____

1965-1967

DIVISION OF MEDICAL TECHNOLOGY



UNIVERSITY OF MINNESOTA BULLETIN

How to Use This Bulletin

The *Bulletin of the Division of Medical Technology* for 1965-1967 is divided into three major parts:

General Information. All students and prospective students should read this section carefully. It contains information relating to the following topics:

- Admission Requirements
- Registration Procedures
- Fees
- Health Examinations
- Residences
- Student Aid
- Placement
- Student Organizations
- Degrees
- National Certification
- College Regulations

Curriculum. This section contains specific course requirements and quarterly programs.

- Medical Technology
- Course for Medical Laboratory Assistants
- Graduate Program

Description of Courses. 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 Liberal Arts*. These bulletins are available at the information booth in Morrill Hall or may be obtained by writing to the Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

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, Minnesota 55455.

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Gerald W. Heaney, Duluth; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable Otto A. Silha, Minneapolis; and The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S.(Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

MEDICAL TECHNOLOGY

(A division of the Department of Laboratory Medicine)

Administration

Robert B. Howard, M.D., Ph.D., Dean of the College of Medical Sciences
Gerald T. Evans, M.D.C.M., Ph.D., Professor and Head, Department of Laboratory Medicine
Ellis S. Benson, M.D., Professor and Director, Division of Hospital Laboratories
G. Mary Bradley, M.D., Instructor and Assistant Director, Division of Hospital Laboratories
Ruth F. Hovde, M.S., Professor and Director, Division of Medical Technology
Verna L. Rausch, M.S., Associate Professor; Training Co-ordinator
Jean E. Linne, B.S., Instructor; Co-ordinator of Medical Laboratory Assistants Program
Grace Mary Ederer, M.P.H., Assistant Professor and Assistant to the Director, Division of Hospital Laboratories
Aija Vikmanis, B.S., Administrative Laboratory Technologist, Division of Hospital Laboratories

Faculty

Paul Alexander, M.D., M.P.H., Instructor, Division of Clinical Laboratories
Sandra Benson, B.S., Instructor, Blood Bank Laboratory
Karen Bisset, B.S., Instructor, Chemistry Laboratory
Patricia Bordewich, M.S., Assistant Professor, Hematology Laboratory
Robert A. Bridges, M.D., Associate Professor; Consultant in Clinical Microbiology
Richard Brunning, M.D., Instructor, Hematology Laboratory
Frances Casey, B.S., Instructor, Veterans Administration Hospital
Kathleen Clayson, B.S., Instructor, Chemistry Laboratory
E. Marie Dammann, B.S., Instructor, Veterans Administration Hospital
David Duffell, M.D., Instructor, Division of Clinical Laboratories

Esther F. Freier, M.S., Associate Professor; Hospital Chemist
 Lorraine M. Gonyea, M.S., Associate Professor, Hematology Laboratory
 Ben Hallaway, M.S., Assistant Professor, Chemistry Laboratory
 Kathryn Hammer, M.S., Assistant Professor, Chemistry Laboratory
 Paul H. Lober, M.D., Ph.D., Associate Professor of Pathology; Hospital Pathologist
 Herbert F. Polesky, M.D., Assistant Professor; War Memorial Blood Bank
 Joseph W. St. Geme, M.D., Assistant Professor of Pediatrics, Microbiology and Laboratory
 Medicine; Hospital Bacteriologist
 Arthur Sanders, B.S., Instructor, Veterans Administration Hospital
 Paul E. Strandjord, M.D., Assistant Professor and Director, Chemistry Laboratory
 R. Dorothy Sundberg, M.D., Ph.D., Professor of Anatomy; Hospital Hematologist
 Franklin G. Wallace, Ph.D., Associate Professor of Zoology; Consultant in Parasitology
 Edmond Yunis, M.D., Associate Professor; Director of Blood Bank
 Jorge Yunis, M.D., Associate Professor; Director of Medical Genetics Laboratory

Clinical Staff

Leonard Crowley, M.D., Pathologist, St. Mary's Hospital, Minneapolis
 Paul Finley, M.D., Pathologist, Fairview Hospital, Minneapolis
 Aina Galejs, M.D., Pathologist, Eitel Hospital, Minneapolis
 Seymour Handler, M.D., Pathologist, North Memorial Hospital, Minneapolis
 Norman Horns, M.D., Pathologist, Fairview Hospital, Minneapolis
 Wayne Schrader, M.D., Pathologist, Hennepin County General Hospital, Minneapolis
 Edward Segal, M.D., Pathologist, Methodist Hospital, Minneapolis
 Martin Segal, M.D., Pathologist, Methodist Hospital, Minneapolis
 Thomas Swallen, M.D., Pathologist, North Memorial Hospital, Minneapolis

Laboratory Staff

Blood Bank Laboratory

¹ Clareyse Nelson, B.S.
² Gayle Fellinger, B.S.
² Mary Alice Grewe, B.S.
² Kathryn Hager, B.S.
² Mary Parker, B.S.
² Jean Purcelli, B.S.
² Janet Svardal, B.S.

Chemistry Laboratory

¹ Mavis Hawkinson, B.S.
¹ Joan Yasmineh, B.S.
¹ Helen Proechel, B.A.
² Joan Aldrich, B.S.
² Ruth Brown, B.S.
² Jessie Hansen, B.S.
² Donna Wieb, B.S.
² Audrey Bernstein, B.S.
² Esther Damron, B.S.
² Joy Dean, B.S.
² Terrence Duffy, B.S.
² Patricia Freck, B.A.

² Carol Hartmann, B.S.
² Kathleen Hanson, B.S.
² Patricia Iverson, B.S.
² Joyce Larson, B.S.
² Mary Leach, B.S.
² Hubert Loewen, B.A.
² Mary Jane Moore, B.S.
² Sandra Munter, B.S.
² Carol Nelson, B.S.
² Philip St. Louis, B.S.
² Michael Tischler, B.S.

Electrocardiography and Basal Metabolism Laboratory

² Margaret Halsted, B.S.
² Eloise Greenwood, B.S.
² Linda Waters, B.S.

Heart Catheterization Laboratory

² Joanne Kerns, B.S.
² Ethel Schneider, B.S.
² Gretchen Stuart, B.S.

¹ Principal Medical Technologist
² Senior Medical Technologist
³ Student Technologist Supervisor

Hematology Laboratory

- ¹ Ruth Rosendahl, B.S.
- ² Kathryn Grave, M.S.
- ³ Audrey Christenson, B.S.
- ³ Joan Ekbohm, B.S.
- ³ Patricia Frykholm, B.S.
- ³ Marlys Keefe, B.S.
- ³ Dorothy Knutson, B.S.
- ³ Norma Peterson, B.S.
- ³ Ella Spanjers, B.S.
- ³ Anne Stiene, B.S.
- ³ Elizabeth Stone, B.S.
- ³ Faye Swearingen, B.S.
- ³ Marian Templeton, B.S.
- ³ Jean Urbank, B.S.
- ³ Betty Weisel, B.S.

Medical Genetics Laboratory

- ⁶ Mary Mayer, B.A.
- ⁴ Ann Roesner, B.S.

Medical Laboratory Assistant Program

- ³ Elizabeth Lundgren, B.A.
- ³ Karen Ringsrud, B.S.

Microbiology Laboratory

- ¹ Joanne Floeder, B.S.
- ³ Nancy Bartosh, B.S.
- ³ Donna Dzubay, B.S.
- ³ Roberta Farnham, B.S.
- ³ Marilyn Hopp, B.S.

- ³ Donna Olson, B.S.
- ³ Carol Wallestad, B.S.
- ³ Marcia Weber, B.S.

Night Technologists

- ³ Edith Clark, B.S.
- ³ Gordon Herbst, B.S.
- ³ Helen Kennedy, B.S.
- ³ Mary Kay Mart, B.S.
- ³ Carol Ott, B.S.
- ³ Mary Sanford, B.S.
- ³ Antoinette Perko, B.S.
- ³ Helen Vanderveen, B.S.

Pathology Laboratory

- ² Joanne Samuelson, B.S.
- ³ Darlene Ahlers, B.S.
- ³ Joanne Koski, B.S.
- ³ Kathleen Kryewnske, B.S.

Research Laboratories

- ⁵ Grace Anderson, B.S.
- ⁵ Dana Carroll, B.A.
- ⁵ Barbara Cohen, B.S.
- ⁵ Susan Coolidge, B.A.
- ⁵ Carole Sahlstrand, B.S.
- ⁵ Maija Stumbris, B.S.

Teaching Assistants

- Delores Harvey, B.S.
- Shirley Orth, B.S.

¹ Principal Medical Technologist
² Senior Medical Technologist
³ Student Technologist Supervisor
⁴ Laboratory Technologist
⁵ Junior Scientist

Division of 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 and for advanced study in the basic sciences and in medical technology. This course aims to provide both a strong foundation in basic sciences and 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 group serology, the preparation of tissues for microscopic study, and the chemical analysis of body fluids. 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 Liberal 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 1 or more years of work at an accredited college or university, admission with advanced standing can be made by filing an application, together with complete official college transcripts from each college attended, with the Office of Admissions and Records. This application should be made well in advance of the beginning of the quarter you plan to enter.

Admission to the Junior Class—For admission to the Division of Medical Technology the student must have completed 90 credits including the required courses with a total of 180 grade points.

Students in residence at the University of Minnesota who expect to complete the requirements for admission to the junior year should file an application for change of college with the Office of Admissions and Records 1 quarter in advance of date of transfer. Those with sufficient credits 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 program 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 Division of Medical Technology.

Students transferring from other colleges may obtain the application for admission with advanced standing from the Office of Admissions and Records. These applications should be filed with the Office of Admissions and Records 6 weeks or more before the quarter a student plans to enter.

In some instances, students transferring from other colleges may be able to make up their deficiencies by attending Summer Session classes. This would make them eligible for admission to the medical technology courses as much as 1 year earlier than would be possible otherwise. Transfer students with 3 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 1 or more quarters in attendance before beginning the senior year. It is necessary for all students to earn at least 49 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, Division of Medical Technology, Box 198, C-205 Mayo Memorial, University of Minnesota, Minneapolis, Minnesota 55455, 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 Administrative 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 Morrill Hall before proceeding with registration at the Medical Technology office.

All students in either the preprofessional curriculum in the College of Liberal Arts or in the Division of 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 University Health Service for necessary immunizations before entering 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 University Housing, 108 Wesbrook Hall. 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, unless you are over 21, or married.

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 alumni and friends of the University. Applications should be made through Minnesota high school counselors by December 15. There are also other scholarships and merit awards offered annually to students in recognition of outstanding achievement records.

For students needing financial assistance, loan funds have been established to help any student who is making normal progress toward an educational objective. Two quarters of residence at the University is required to attain eligibility for loan assistance from University loan funds, but emergency needs may be given special consideration. Students who are interested in loans provided for under Title II of the National Defense Education Act of 1958 should apply through the Bureau of Student Loans and Scholarships. Applications for National Defense Student Loans should be filed in March for the coming academic year.

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.

For students needing part-time employment to meet school expenses, the Student Employment Bureau, 30 Wulling Hall, is maintained. It should be pointed out that each of the first 3 years of the Division of 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.

The state professional societies in clinical pathology and medical technology offer scholarships for junior and senior year students in programs in medical technology. Further information about these awards may be obtained in the Medical Technology office.

Placement

Graduates of this program are assisted in finding employment by consultation with advisers in the Medical Technology office. Notices of employment opportunities in this field from all parts of the country are received in the office and are posted for the information of the students.

Student Organizations

Students in medical technology or in the preprofessional program in the College of Liberal Arts are represented by elected members from each class on the Medical Technology Council. The purpose of the Medical Technology Council is to promote student-faculty relationships, to stimulate social and educational activities, and to consider matters affecting students in this course.

Orbs is the honorary scholastic association for seniors in medical technology who have attained an over-all B average in preclinical courses. The purpose of this organization is to stimulate and promote high scholarship among the students in medical technology.

Alpha Delta Theta is a professional sorority open to students in medical technology after the first quarter of the sophomore year. The purpose of this organization is to promote fellowship and understanding among the students in medical technology, to broaden the students' personal background, and to provide a mechanism for participation with other campus organizations in University functions.

Students in the undergraduate program in medical technology are eligible for student membership in the American Society of Medical Technologists.

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 186 credits and 372 grade points—an average of 2 grade points per credit.

Upon satisfactory completion of the prescribed course of study, the bachelor of science degree will be conferred by the Board of Regents. Students completing the course with an average of 3 grade points for each credit may graduate "with distinction" and those with an average of 3.5 grade points for each credit may graduate "with high distinction."

Application for degree must be filed with the Office of Admissions and Records 3 quarters before the time of graduation. Students completing the hospital clinical study 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 Certification

Graduates from the Division of 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 American Society of Medical Technologists and its local and state affiliated groups. Full information is available in the Medical Technology office.

College Regulations

All students in the first 2 years of this curriculum are registered in the College of Liberal Arts and are subject to the regulations of that college. For full information about these regulations, consult the *Bulletin of the College of Liberal Arts*.

In the last 2 years, students are registered in the Division of Medical Technology, a unit of the Department of Laboratory Medicine of the College of Medical Sciences, and are subject to the regulations established for this program.

Any student not making satisfactory progress in the curriculum may be placed on scholastic probation upon recommendation of the Administrative Committee. This committee is composed of members of the faculty of the Division of Medical Technology.

Unsatisfactory work is defined as an average less than C (2 grade points for each credit) for all credits earned in any 1 year or in any 1 quarter. Students who fail to make satisfactory grades after being on probation for 1 quarter are in danger

of being dropped from the program. If a student fails to maintain satisfactory performance in any course or in any laboratory area while registered in this division, his record will be reviewed by the Administrative Committee for recommendation for action. If, in the opinion of this committee after due investigation and conference with the student, it is judged inadvisable for the student to continue in this curriculum, he will be discontinued.

Satisfactory performance implies not only a passing level in technical skill and knowledge but also complete personal integrity and honesty.

CURRICULUMS

A. Bachelor of Science Program in Medical Technology

Freshman and Sophomore Years—Registration is in the College of Liberal Arts. The following courses or their equivalents must be completed before admission to the junior year:

(Credits are shown in parentheses)

<p>AnCh 57—Quantitative Analysis (5) Anat 4—Elementary Anatomy (5) Biol 1-2—General Biology (10) Comm 1-2-3—Communication (12) (or) Engl 1A-2A-3A—Freshman English (12) (or) Engl 1B-2B-3B—Freshman English (12) (or) Engl A-B-C—Freshman Literature and Composition (15) (or) Exemption from requirement GeCh 4-5—Principles of Chemistry (10) GeCh 6—Principles of Solution Chemistry (4)</p>	<p>Math 10—College Algebra (5) MedT 10-11-12††—Orientation in Medical Technology (3) MedT 30-31-32††—Case Presentations (3) MicB 53—General Microbiology (5) OrCh 61-62—Elementary Organic Chemistry (8) Phys 2-3—Introduction to Physical Sciences (6) Zool 65—Histology (5) Electives to make a total of 90 credits for 2 years' work</p>
--	--

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 1 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, 1A, 1B, or Comm 1	Engl B, 2A, 2B, or Comm 2	Engl C, 3A, 3B, or Comm 3
Math 10	Biol 1	Biol 2
GeCh 4	GeCh 5	GeCh 6
MedT 10	MedT 11	MedT 12
Electives	Electives	Electives

SECOND YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
AnCh 57	OrCh 61	OrCh 62
Zool 65	Phys 2	Phys 3
MedT 30	MicB 53	Anat 4
Electives	MedT 31	MedT 32
	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)

<p>Anat 165—Hematology (4) MdBe 100-101—Biochemistry (14) MedT 60—Blood Group Serology (2) MedT 61—Introductory Clinical Hematology (3) MedT 62—Introduction to Clinical Chemistry (4) MedT 63—Introduction to Urinalysis (1)</p>	<p>MedT 64—Introduction to Clinical Microbiology (1) MicB 102—Medical Microbiology (4) MicB 116—Immunology (3) MicB 116A—Immunology Laboratory (2) Phsl 60—Human Physiology (6) Zool 93—Introductory Animal Parasitology (5)</p>
--	---

†† Students who transfer into the medical technology program after the freshman year are exempt from the MedT 10-11-12 requirement. Students who transfer into the medical technology program after the sophomore year are exempt from both the MedT 10-11-12 and 30-31-32 requirements.

The following program arrangement is suggested:

THIRD YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Anat 165	MicB 116	MedT 70
MdBc 100	MicB 116A	MedT 61
Zool 93	MdBc 101	MedT 62
	Phsl 60	MedT 64
	MedT 63	MicB 102

Senior Year—Students are not eligible to begin the year of clinical training until they have completed all the requirements of the first 3 years. The scholastic standing in the first 3 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

(53 weeks)

The clinical year in the laboratories of the University of Minnesota Hospitals includes the following courses in medical technology:

(Credits are shown in parentheses)

70—Clinical Chemistry (10) 10 weeks	83—Clinical Immunology (4) 4 weeks
73—Electrocardiography and Basal Metabolism Testing (2) 2 weeks	85—Histologic Techniques (3) 3 weeks
75—Clinical Hematology (6) 6 weeks	93—Advanced Clinical Practice (12) 18 weeks
80A—Clinical Microbiology (6) 6 weeks	(or) 93H—Honors Course in Advanced Clinical Practice (12) 18 weeks
80B—Special Clinical Microbiology (3) 3 weeks	95-96-97—Introduction to Medicine and Pathology (6)

B. Course for Medical Laboratory Assistants

The Course for Medical Laboratory Assistants 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 college aptitude ratings of 50 or higher is required. (College aptitude rating is the average of the high school percentile rank and the college aptitude percentile rank.) Applicants must have completed a course in high school chemistry. Preference is given to residents of Minnesota.

Program—Twelve consecutive months of training include 2 quarters in residence on the campus in day classes and 2 quarters in practical experience in laboratories of participating hospitals in Minnesota.

Fees—For the first 2 quarters on campus, tuition and incidental fees are \$310. No tuition is charged for the last 2 quarters 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. The student upon satisfactory completion of the course is also eligible for certification by examination by the Minnesota Society of Clinical Pathologists and the Minnesota Society of Medical Technologists or by examination by the Certified Laboratory Assistant Board of the

American Society of Clinical Pathologists and the American Society of Medical Technologists.

For further information about this course write to the General Extension Division, 54 Nicholson Hall, or to the Medical Laboratory Assistant office, Box 198, Mayo Memorial Building, University of Minnesota, Minneapolis, Minnesota 55455.

C. Master of Science Program with Major in Medical Technology

Graduate work in the field of medical technology is available for the qualified candidate who wishes to prepare himself for a career of investigation and teaching in the area of clinical laboratory methods. Regardless of the ultimate aim, each student spends a period of time in the clinical laboratories of the University of Minnesota Hospitals to familiarize himself with aspects of methodology, research, and teaching including the completion of a preliminary exercise for practice in independent work and study. Only Plan A (Master's degree with thesis) is available to students in this program. Therefore each student is required to complete a thesis problem of independent research in one of the subareas of this field under the direction of his adviser.

Admission Requirements—Admission requirements include (1) certification as MT(ASCP) or eligibility for such certification, and (2) a Bachelor's degree from an accredited institution of higher learning with sufficient scholarly attainment in chemistry and the biological sciences to justify graduate work in these areas. Previous experience in a clinical laboratory is desirable.

Application forms for admission to the Graduate School are available upon request from the Graduate School office, 316 Johnston Hall. The applications should be filed with the Dean of the Graduate School at least 4 weeks before the opening of the quarter in which the student matriculates and must be accompanied by official transcripts of undergraduate work and of graduate work that may have been completed.

Residency Requirements—Candidates for advanced degrees must be registered at the University for a minimum of 3 quarters before receiving the degree. This residency requirement does not necessarily mean registration in consecutive quarters.

The completion of a Master's program ordinarily requires 5 to 6 quarters in residence. Students should take into account this customary rate of progress. If such matters as self-support, prerequisite course work, or special study in foreign language are involved in attaining the degree, students should anticipate and definitely plan for a period longer than the customary time. It has been established that an interrupted program of graduate study has generally proved unsatisfactory.

Academic Requirements—For the major the requirements include 18 quarter credits in selected courses in the major department with grades not lower than a B. A minimum of 9 quarter credits in courses at the graduate level in any one of subareas in medical technology relating to the thesis problem will satisfy the requirements for the minor. It is likewise expected that the student maintain a B average in courses for the minor.

A reading knowledge of a foreign language is required of all candidates for the Master's degree. This requirement is not a determinant for admission but certification of proficiency in the language must be submitted before the candidate may take the oral examination required for the degree.

The thesis should be on a topic falling within one of the subareas in the field of medical technology; namely, chemistry, microbiology, hematology, or immunohematology. The thesis must show ability to work independently and give evidence of power of independent thought both in perceiving problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the

special area and correct citation of authorities are expected. The thesis must be finished and registered in the office of the Graduate School at least 8 weeks before the end of the quarter in which the student takes his degree.

The student's progress is reviewed at regular intervals by the graduate faculty in medical technology. Continuance in the program is dependent upon (1) maintaining satisfactory scholastic average in required courses, (2) satisfactory performance in the preliminary laboratory exercise, (3) satisfactory grade in the written examination, and (4) satisfactory progress in developing the thesis problem. Failure to maintain satisfactory progress and levels of achievement may be cause for recommendation for discontinuance in this program.

Examinations—In addition to the usual course examinations the candidate must pass both a written examination and a final oral examination. The written examination will be conducted by the graduate faculty in the Division of Medical Technology and will cover the general field of medical technology in the principal subareas of chemistry, microbiology, hematology, and immunohematology. The written examination will be scheduled within 9 to 12 months after the time of the initial registration in the Graduate School in this program. The written examination must precede the oral examination and will serve as one criterion for recommendation for continuance in the graduate program.

The oral examination will cover the exposition of the thesis problem and subject matter or theory fundamental to the thesis topic. This examination must be held not later than 5 weeks before the end of the quarter in which the student takes his degree. This examination will be conducted by a committee, of which the student's adviser is the chairman, appointed by the Graduate School to examine the thesis.

Complete detailed information with respect to the structure and rules of the Graduate School, the programs of study, a list of courses offered, and fees can be found in the *Bulletin of the Graduate School* which is available upon request to the Graduate School office. All inquiries concerning admission should be addressed to: Dean of the Graduate School, 316 Johnston Hall, University of Minnesota, Minneapolis, Minnesota 55455.

DESCRIPTION OF COURSES

Medical Laboratory Assistants (LA)

- LA 1-2. Basic Techniques in Clinical Chemistry.** Lecture and practice in care and use of laboratory equipment, preparation of solutions, preparation of filtrates, limited chemistry procedures. (7 cr)
- LA 3-4. Techniques in Basal Metabolic and Electrocardiography Tests.** Lectures on principles and practice in using electrocardiograph and basal metabolism machines. (2 cr)
- LA 5-6. Elementary Hematology Techniques.** Lectures and practice in doing hemoglobin determinations, blood counts, preparation of blood films, etc. (7 cr)
- LA 7-8. Elementary Urinalysis Techniques.** Lectures and practice in doing routine urinalysis, gastric analysis, and feces examination. (4 cr)
- LA 9. Blood Bank Techniques.** Lectures and practice in doing routine blood typings. (2 cr)
- LA 10. Elementary Chemistry for Laboratory Assistants.** (2 cr)
- LA 12. Elementary Chemistry for Laboratory Assistants.** (2 cr)
- LA 14. Orientation to Hospital Training.** (1 cr)
- LA 15. Elementary Bacteriology.** Introduction to microbiology. (3 cr)

Medical Technology (MedT)

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.

All courses numbered 60 or above are open only to students registered in the Division of Medical Technology.

- 10-11-12. Orientation in Medical Technology.** Orientation in the principles and practices in medical technology. (1 cr per qtr; prereq fr only)
- 30-31-32. Case Presentations.** Demonstrations and discussion of clinical laboratory techniques in relation to diagnosis and treatment of disease. (1 cr per qtr; prereq soph only)
- 60. Blood Group Serology.** Introduction to fundamental principles and laboratory techniques in blood grouping and cross matching. (2 cr)
- 61. Introductory Clinical Hematology.** Fundamental techniques in hematology. (3 cr)
- 62. Introduction to Clinical Chemistry.** Introduction to fundamental principles of laboratory procedures in clinical chemistry. (4 cr)
- 63. Introduction to Urinalysis.** Lectures and laboratory exercises in basic techniques in chemical and microscopy study of urine. (1 cr)
- 64. Introduction to Clinical Microbiology.** Introduction to applied techniques and methods used in the diagnostic bacteriology laboratory. (1 cr)
- 70. Clinical Chemistry.** Basic methods and techniques used in clinical chemistry and urinalysis. (10 cr)
- 73. Electrocardiography and Basal Metabolism Testing.** Principles and practice in the use of electrocardiographs and metabolors. (2 cr)
- 75. Clinical Hematology.** Application and use of laboratory methods in hematology. Morphology of blood cells. (6 cr)

- 80A. Clinical Microbiology.** Identification of bacteria by microbiologic techniques. Correlation with clinical cases. (6 cr)
- 80B. Special Clinical Microbiology.** Practice in serological methods, identification of parasites and fungi. (3 cr)
- 83. Clinical Immunology.** Application of technical methods in procurement of blood and blood grouping and cross matching for transfusions. (4 cr)
- 85. Histologic Techniques.** Preparation of tissue specimens for microscopic study. (3 cr)
- 93. Advanced Clinical Practice.** Advanced laboratory methods and additional experience on night duty and in special procedures used in clinical chemistry, hematology, microbiology, and blood bank techniques. (12 cr)
- 93H. Honors Course in Advanced Clinical Practice.** Assignment on night duty as well as special projects and research with more intensive treatment in theory in one of the clinical areas of chemistry, hematology, microbiology, or blood bank. (12 cr; prereq #)
- 95-96-97. Introduction to Medicine and Pathology.** Introduction to the application and relation of laboratory methods in laboratory medicine. (6 cr)

GRADUATE COURSES

- 110, 111. Advanced Clinical Laboratory Techniques.** Assignment on individual basis for observation, study, and practice in special problems; techniques and methodology in the units of the Clinical Laboratories (bacteriology, chemistry, hematology, histology, or immunology). (5 cr per qtr)
- 120. Seminar: Medical Technology.** Review and discussion of current literature; presentation and discussion of research being carried on in the department. (1 cr)
- 130, 131. Elements of Administration in Medical Technology.** Organization and role of the laboratory service in hospitals; job analysis and classification; personnel assignments and evaluation; plant, supplies, and equipment with assignment of specific problems in management. (2 cr per qtr)
- 140, 141. Educational Administration in Medical Technology.** Development, organization, and administration of educational programs in medical technology with clinical practice in techniques; analysis and construction of courses of study. (3 cr per qtr)
- 145. Development of Medical Technology.** Current problems; topics and research. (3 cr)
- 150. Selected Topics in Bacteriology.** Advanced seminar; topics assigned for conferences and reading. (Cr ar)
- 151. Selected Topics in Chemistry.** Advanced seminar; topics assigned for conferences and reading. (Cr ar)
- 152. Selected Topics in Hematology.** Advanced seminar; topics assigned for conferences and reading. (Cr ar)
- 153. Selected Topics in Immunology.** Advanced seminar; topics assigned for conferences and reading. (Cr ar)

Anatomy

- Anat 4. Elementary Anatomy.** Elementary human anatomy. (5 cr; prereq Biol 2)
- Anat 165. Hematology.** Blood and blood forming organs; emphasis on blood and bone marrow from standpoint of diagnosis and prognosis. (4 cr; prereq Zool 65)

Biochemistry

- MdBc 100-101. Biochemistry.** (14 cr; prereq organic chemistry and physics)

Chemistry

- GeCh 4-5. Principles of Chemistry.** Introduction to chemistry from the standpoint of atomic structure; periodic properties of the elements and compounds derivable from struc-

tural considerations; laws governing the behavior of matter, theories of solution, acids, bases, and equilibrium. (10 cr)

GeCh 6. Principles of Solution Chemistry. Laboratory work in systematic qualitative analysis of the cations with lectures on solutions, ionization, chemical and physical equilibria, oxidation and reduction, etc. (4 cr; prereq GeCh 5)

AnCh 57. 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 cr; prereq GeCh 6)

OrCh 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 cr; prereq 12-15 cr in chemistry)

English

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 Literature and Composition. Identical with Engl 1A-2A-3A, except that it puts even greater emphasis upon literature. Composition 6 credits, literature 9 credits. (15 cr; prereq assignment to Category 1, 1A or 2; see note above)

Engl 1A-2A-3A. Freshman English. Identical with Engl 1B-2B-3B, except that it puts greater emphasis upon literature. Composition 6 credits, literature 6 credits. (12 cr)

Engl 1B-2B-3B. Freshman English. Concentrates upon developing the student's skill in writing exposition, with an introduction to literary types as the chief means of providing subject matter for the writing. The literature read consists of novels, short stories, plays, and poems, both English and American. (12 cr)

Comm 1-2-3. Communication. Helps students use the English language more effectively, with constant practice in speaking and writing, in listening and reading. 1: Use of language to convey meaning through its structural patterns and its words; social attitudes toward language practices. 2: Use of language to influence human behavior. 3: Special effects of mass communication upon the recipient; critical reception of mass communication. Six regular conferences with instructor; use of speech equipment; special conferences with speech consultant if indicated. (12 cr)

Mathematics

Math 10. College Algebra and Analytic Geometry. Functions and graphs, quadratic equations, progressions, inequalities, complex numbers, theory of equations, permutations and combinations, probability, systems of equations, determinants, graphing of linear and quadratic equations, conics and standard position, logarithms. (5 cr; prereq Math 2 or high school higher algebra)

Microbiology

MicB 53. General Bacteriology. Lectures, demonstrations, and laboratory instruction in the morphology, physiology, taxonomy, and ecology of bacteria. Practical applications of fundamental principles are emphasized. (5 cr; prereq 10 cr in chemistry and 5 cr in biological sciences)

MicB 102. Medical Bacteriology. Pathogenic bacteria, fungi and viruses, especially in their relationship to disease; principles of infection and immunity; microbiological techniques for laboratory diagnosis and antibiotic determination. (3 cr; prereq MicB 116)

MicB 116. Immunology. Host-parasite interactions; nature of antigens and antibodies; chemical basis of serologic specificity; qualitative and quantitative aspects of antigen-antibody reactions; theories of antibody production; cellular antigens and blood

grouping; nature of complement and its role in immunologic phenomena; mechanisms of hypersensitivity; hypersensitivity-like states and immunologic diseases; homotransplantation and tumor immunity; mechanisms of natural and acquired immunity. (3 cr; prereq MicB 53)

MicB 116A. Immunology Laboratory. (2 cr; prereq ¶116)

Physics

Phys 2-3. Introduction to Physical Science. Demonstration lectures on the principles of physics and the physical phenomena underlying these principles. 2: Heat and electricity. 3: Sound and light. (6 cr; prereq high school algebra and plane geometry)

Physiology

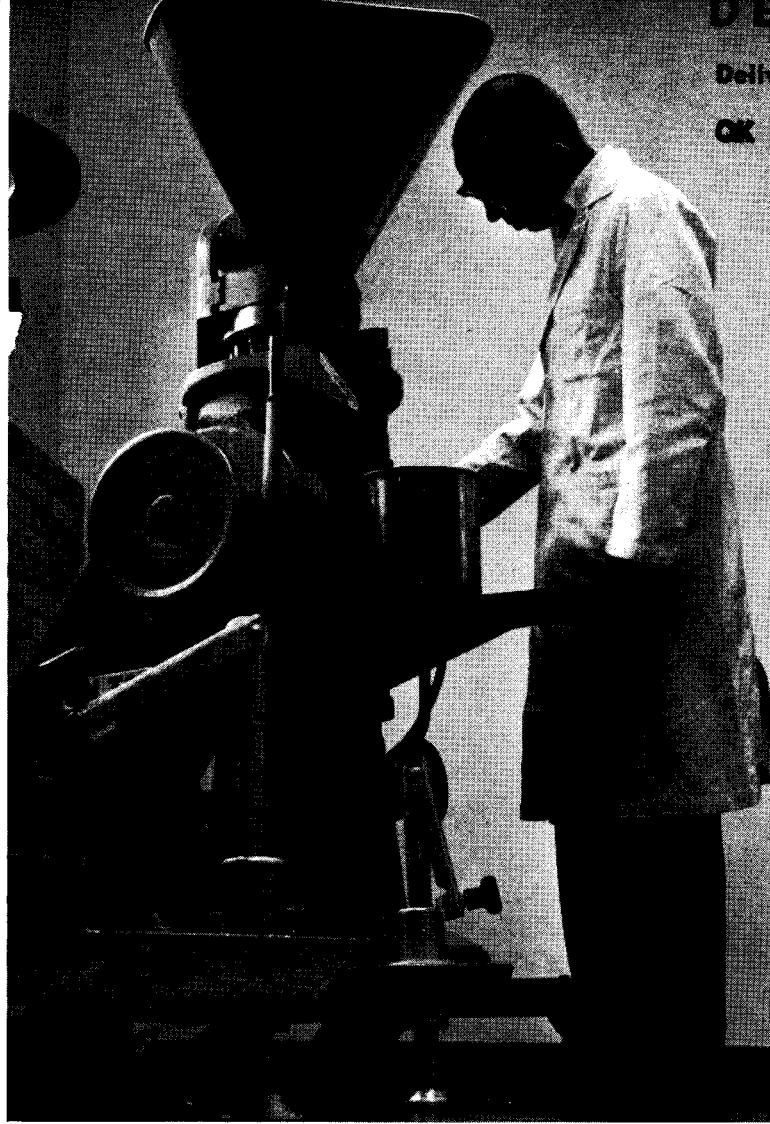
Phsl 60. Human Physiology. Lectures, conferences, and laboratory. (6 cr; prereq college course in organic chemistry, zoology, and physics)

Zoology

Biol 1-2. General Biology. Introduction to living things both plant and animal, and to the major biological concepts. Structure, function, classification, and evolution of organisms. (10 cr)

Zool 65. Histology. Microscopic structure of the tissues and organs. (5 cr; prereq Biol 2)

Zool 93. Introductory Animal Parasitology. Parasitic protozoa, worms, and arthropods, and their relation to diseases of man and animals. (5 cr; prereq Biol 2)



DESK COPY

Delivery _____

OK Kill _____

1965-1967

COLLEGE OF PHARMACY

UNIVERSITY OF MINNESOTA BULLETIN

UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarne E. Grottum, Jackson; The Honorable Albert V. Hartl, Fergus Falls; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable George W. Rauenhorst, Olivia; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S. (Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

COLLEGE OF PHARMACY

Administration

George P. Hager, Ph.D., Dean of the College of Pharmacy and Professor of Pharmaceutical Chemistry
Charles V. Netz, Ph.D., Associate Dean and Professor of Pharmaceutical Technology

Faculty

Frank E. DiGangi, Ph.D., Professor of Pharmaceutical Chemistry
Ole Gisvold, Ph.D., Professor and Head, Department of Pharmaceutical Chemistry
Willard J. Hadley, Ph.D., Professor of Pharmaceutical Technology
Taito O. Soine, Ph.D., Professor of Pharmaceutical Chemistry
Wallace F. White, Ph.D., Professor of Pharmacology
Herbert Jonas, Ph.D., Associate Professor and Head, Department of Pharmacognosy
Hugh F. Kabat, Ph.D., Associate Professor of Pharmaceutical Technology
Robert H. Miller, Ph.D., Associate Professor of Pharmaceutical Technology
Philip S. Portoghese, Ph.D., Associate Professor of Pharmaceutical Chemistry
Edward G. Rippie, Ph.D., Associate Professor of Pharmaceutical Technology
John D. McRae, Ph.D., Assistant Professor of Pharmaceutical Technology
Lee C. Schramm, Ph.D., Assistant Professor of Pharmacognosy
Harvey J. Kupferberg, Ph.D., Instructor in Pharmacology

Volume LXVIII

Number 1

June 1, 1965

UNIVERSITY OF MINNESOTA BULLETIN

Published semimonthly January 1 to December 15 inclusive. Second-class postage paid at Minneapolis, Minnesota. Send change of address notices and other communications to Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

The contents of this bulletin and of other University bulletins, publications, or announcements are subject to change.

COLLEGE OF PHARMACY

GENERAL INFORMATION

The art and science of pharmacy deals with the preparation, compounding, and dispensing of medicinal agents and the study of their chemistry, pharmacological properties, and therapeutic applications.

Beginning in 1892, the University of Minnesota awarded the Ph.G. degree for 2 years of professional pharmaceutical study. A minimum of 3 years with the degree pharmaceutical chemist (Phm.C.) was adopted in 1915-16 but was abolished in 1927-28 when a 4-year course leading to a bachelor of science in pharmacy (B.S. in Pharm.) began. Increasing responsibilities of the pharmacist and expanding opportunities for the graduate of a college of pharmacy made necessary a further extension of the curriculum. Through actions taken by the American Association of Colleges of Pharmacy and by the National Association of Boards of Pharmacy, a minimum 5-year curriculum became mandatory in all colleges of pharmacy for a degree in pharmacy, starting in 1960.

Pharmaceutical education has progressed rapidly and soundly while keeping pace with advances made in medicine, dentistry, veterinary medicine, and the other health sciences. Progress in pharmaceutical education made necessary an extended program with the following objectives: (a) greater emphasis on cultural courses which "broaden" the student's knowledge and enhance the prestige of the profession; (b) reduction in the clock-hour load which in the 4-year curriculum was too heavy because of the large number of laboratory courses. In the 5-year curriculum, the student has the opportunity to elect a wide variety of courses and to engage in many of the beneficial extracurricular activities of the University. By these means the student can enjoy the intellectual and social growth that will be so important in his future position as a professional member of society.

Students will be admitted to the 4-year professional course in the College of Pharmacy on completion of 1 year of accredited collegiate work (see Prepharmacy Year). Students who present 2 or more years of accredited collegiate work on admission to the college usually can complete their professional training in 3 years. Students applying for the 3-year professional course must have completed, in addition to the courses of the prepharmacy year, courses in basic biological sciences (botany and zoology or equivalent laboratory in general biology), physics, organic chemistry, general economics, and accounting which are equivalent to those listed in the pharmacy curriculum.

Students who complete either the 1-4 (1 year of prepharmacy work plus 4 years of professional study) or the 2-3 programs are awarded the degree, bachelor of science in pharmacy.

The college also offers an optional combined course in pharmacy and business administration. Evidence of above-average academic ability is required for admission to this course.

Graduate study with major work in pharmaceutical chemistry, pharmaceutical technology, hospital pharmacy, pharmacognosy, or pharmacology, leading to the degrees of master of science (M.S.) and doctor of philosophy (Ph.D.) is offered through the Graduate School. Graduate work 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 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 qualify them to pursue work successfully at the graduate level. Detailed information on graduate courses in pharmaceutical chemistry, pharmaceutical technology, hospital pharmacy, pharmacology, 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 in accordance with procedures set forth in the *Bulletin of General Information*.

It is recommended that those students who are still in high school and who plan to apply for admission to the College of Pharmacy after completion of their prepharmacy year in the College of Liberal Arts or other accredited institution should attempt to incorporate, in their high school training, courses in higher algebra, solid geometry, trigonometry, biology, chemistry, physics, modern foreign language, and typing.

Students who have graduated from high school and wish to complete the prepharmacy curriculum at another college or university in preparation for the professional curriculum in the College of Pharmacy should arrange their programs so as to include all subjects in the prepharmacy year.

The pharmacy curriculum consists of 238-240 credit hours of work in professional, scientific, and pharmacy administration 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.

Satisfactory academic progress in the prepharmacy or the professional curriculum will permit the student to engage only in such outside activities or work as will not interfere with his efforts in class or laboratory or with his outside study. 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 who desire a specific and/or a 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 the *Bulletin of General Information*.

Fees and Expenses

For a detailed statement of fees and expenses, see *Bulletin of General Information*.

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 Liberal 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

Students interested in entering the College of Pharmacy should apply for admission as soon as possible after completion of the required prepharmacy work (page 10). Applications should be accompanied by an official transcript of the student's record. These applications will be reviewed and all applicants will be notified, usually within 30 days after complete application and transcript have been received. All resident applicants with an average of 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 lower averages 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 prerequisite courses during a Summer Session should proceed as indicated above, being sure to supply information on (a) courses to be completed; (b) the dates of Summer Sessions at which work will be taken; (c) the college at which the courses will be pursued; and (d) application for admission to the professional work in pharmacy.

Prepharmacy and other University of Minnesota students desiring to transfer to the College of Pharmacy should make application at the proper window, 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 (grade point average = 2.00 or above) 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 while enrolled in the College of Pharmacy 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 professional 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 commencement. Application for re-examination must be made at the college office not less than 15 days prior to the particular examination he wishes to take. A fee of \$5 is charged for each re-examination.

Pharmacy Law Requirements

Section 151.10 Minnesota Statutes Annotated, reads as follows:

To be entitled to examination by the board as a pharmacist the applicant shall be a citizen of the United States, of good moral character, at least 21 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 pharmacy.

On July 18, 1941, the Minnesota State Board of Pharmacy adopted the following resolution dealing with the above passage:

(The applicant) must be a graduate of a recognized college of pharmacy. Under the Minnesota Pharmacy Law, a recognized school is one that is recognized and accredited by the American Council on Pharmaceutical Education.

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 10 days prior to the date upon which the application is to be filed with the Board of Pharmacy.

In order that practical experience obtained during summer vacations may be credited toward the year of practical experience required by law, a student must file three statements with the Board of Pharmacy: (a) within 5 days a notice of employment form showing the date employment began; (b) within 30 days after termination of employment, an affidavit by his pharmacist preceptor showing the date on which employment began and ended, this regardless of the length of time employed; and (c) a progress report covering period of employment as certified to in the affidavit. These forms may be obtained from the secretary of the Minnesota State Board of Pharmacy.

Any student wishing to obtain employment is invited to confer with the Minnesota State Board of Pharmacy, the Minnesota State Pharmaceutical Association, or the office of the dean of the College of Pharmacy.

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, 1965 Ford Parkway, St. Paul, Minnesota 55116.

Medicinal Plant Laboratory and Garden

The facilities of the medicinal plant garden, plant laboratory, and greenhouses afford opportunity for instruction in methods of cultivating, collecting, preparing, drying, and milling many official and nonofficial drugs. Many 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, plant physiology, etc.

Military Science

(Elective Course)

The student entering 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 any branch of the service.

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 sponsored by 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

During the spring vacation, an opportunity is afforded junior and senior 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.

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.

Loans, Scholarships, Fellowships, and Prizes

Loans—The following loan funds have been established for the benefit of students in the College of Pharmacy:

- Ladies Drug Auxiliary of Minneapolis Loan Fund
- Minnesota State Pharmaceutical Association Loan Fund
- North Minneapolis Pharmacists Club Loan Fund

Applications for loans are made to the Bureau of Student Loans and Scholarships. The college office will supply information about other loan funds such as the Student Loan Fund of the Women's Auxiliary of the American Pharmaceutical Association, the John W. Dargavel Foundation, and others.

Scholarships—Students in the prepharmacy year or in any of the 4 professional years of the pharmacy curriculum are eligible for scholarships as stated in the following descriptions. The faculty of the College of Pharmacy will award scholarships only to students who apply unless otherwise specified. Usually no student will be awarded more than one scholarship. The scholarships are awarded on the bases of scholastic achievement, financial need, vocational intention, and other criteria. Additional information and application forms may be obtained from the dean of the

College of Pharmacy. For information about all-University scholarships, refer to the section on Financial Aids in the *Bulletin of General Information*.

Three **American Foundation for Pharmaceutical Education Scholarships** (\$200) are awarded annually to students in the last 3 years of the 5-year curriculum.

One **Benjamin M. Cohen Memorial Scholarship** (\$250) is awarded annually to a student enrolled in the College of Pharmacy.

One **Bertha D. McWilliams Memorial Scholarship** (\$100) is awarded annually to a student in the College of Pharmacy, with preference to a woman student.

One **C. Earl Dougherty Memorial Scholarship** (\$250), sponsored by the Mando Photo Company, is awarded annually to a student in the final 3 years of the curriculum of the College of Pharmacy.

One **Cecil A. Krelitz Memorial Scholarship** (\$250) is awarded annually to a student enrolled for the prepharmacy year or the first professional year at the University of Minnesota.

One **Claude A. Mather, Memorial Scholarship** (\$300) is awarded annually to a student from the Iron Range, with preference to students in pharmacy.

One **Gray's Drug Stores Pharmacy Scholarship** (\$250) is awarded annually to a student in the prepharmacy year or the first 2 professional years of the pharmacy curriculum, with preference to male students who have demonstrated interest in the practice of retail pharmacy.

One **John W. Dargavel Foundation Scholarship** (\$200) is awarded annually to a student who is enrolled in any of the last 3 years of the pharmaceutical curriculum.

One **McKesson and Robbins (Minneapolis and St. Paul Divisions) Scholarship** (\$300) is awarded annually to a student in the College of Pharmacy with preference for a student who was recipient of the scholarship in the preceding year.

One or more **Minnesota Rexall Pharmacists Scholarships** (\$300) are awarded annually to students in the College of Pharmacy or to students enrolled at the University of Minnesota for prepharmacy training, with preference to students preparing for a career in retail pharmacy.

One **Minnesota State Pharmaceutical Association Senior Scholarship** (\$300 and a key) is awarded annually to the junior student who achieved the highest scholastic average for the first 8 quarters of professional study. No application is necessary.

Two or more **Minnesota State Pharmaceutical Association Scholarships** (\$225) are awarded annually to students entering the University of Minnesota for the prepharmacy year or the first professional year of the pharmacy curriculum.

One or more **Minnesota State Pharmaceutical Association Women's Auxiliary Scholarships** (\$250) are awarded annually to women students enrolled in the last 3 years of the pharmacy curriculum.

Two **Nelson-Forchay Pharmacy Intern Scholarships** (\$300) are awarded annually to students in the College of Pharmacy who have been nominated by pharmacists in the Twin Cities area who have been serving as preceptors in the nominees' apprenticeship training.

One **Northwestern Drug Company Scholarship** (\$400) is awarded annually to a student in the first professional year or to a student in an upper class of the College of Pharmacy who held the scholarship during the preceding year.

Two **Osco Drug Incorporated Scholarships** (\$250) are awarded annually to students enrolled in the College of Pharmacy or to students enrolled for the prepharmacy year in other departments of the University.

One **Rowell Laboratories Incorporated Scholarship** (\$300) is awarded annually to a student who is enrolled in any of the last 3 years of the pharmaceutical curriculum.

Twelve **Samuel W. Melendy Memorial Scholarships** (\$225) are awarded annually to students in the College of Pharmacy. Not more than four scholarships are awarded to students in any 1 of the 4 professional years.

Two **Snyder's Drug Stores, Inc., Scholarships** (\$250) are awarded annually to students in the prepharmacy year who intend to complete the pharmacy curriculum at the University of Minnesota.

One or more **Twin City Wholesale Drug Company Scholarships** (\$250) are awarded annually to students enrolled for the prepharmacy year at the University of Minnesota.

One **William M. and Mildred E. Peters Scholarship** (\$250) is awarded annually to a student enrolled in the College of Pharmacy.

The college office will supply additional information about the Pepsodent Presidential Scholarships, the Walgreen Pharmacy Scholarships, etc.

Fellowships—Graduate students in the professional departments of the College of Pharmacy (pharmaceutical chemistry, pharmaceutical technology, pharmacognosy, and pharmacology) are eligible for the following fellowships:

American Foundation for Pharmaceutical Education Fellowships
Samuel W. Melendy Memorial Fellowships
The Upjohn Company Fellowships

Additional information and application forms are available at the office of the Graduate School, University of Minnesota, and at the American Foundation for Pharmaceutical Education, 777 14th Street N.W., Washington, D.C. 20005.

Prizes—The following prizes are awarded by the faculty of the college to undergraduate students or to members of the graduating class. The bases for the awards are indicated in the following brief descriptions:

Bristol Laboratories Prize—Bristol Laboratories, Inc., New York, awards annually an embossed copy of *Modern Drug Encyclopedia* to that senior student having the highest numerical average in the course in compounding and dispensing.

College of Pharmacy Alumni Award—Sponsored by the College of Pharmacy Alumni Board and alumni of the college. Awarded annually to a member of the graduating class for general excellence of scholastic and extracurricular records.

Hallie Bruce Memorial Award—Sponsored by the family and friends of Hallie Bruce, class of 1916, and by alumni of the college. Awarded annually to the member of the graduating class who has achieved an outstanding record in hospital pharmacy.

Kappa Epsilon Prize—The Alumnae Chapter of Kappa Epsilon, national women's pharmacy fraternity, offers the interest on the endowed funds as a prize to the senior woman student who has rendered outstanding service to the college. The sum is to be used to defray the expenses of the State Board examination and registration.

John Y. Breckenridge Memorial Book Award—Mrs. John Y. Breckenridge established a fund which provides an appropriate award in memory of her husband, class of 1908, to be given to a junior student in the College of Pharmacy in recognition of outstanding scholastic achievement, professional promise, and leadership ability.

Johnson and Johnson Award—Awarded annually to the member of the graduating class who has made an outstanding record in the required and elective courses in the area of business administration.

Lilly Achievement Award—Eli Lilly and Company, Indianapolis, Indiana, awards annually a gold medal to the graduating senior who has distinguished himself through superior scholastic and professional achievement. Leadership qualities, as well as professional attitude, are considered along with academic performance in selection of the recipient.

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 4 years of professional work. This award consists of the *Merck Index* and *Merck Manual*.

Rexall Mortar and Pestle Award—The Rexall Drug Company offers annually a reproduction of a Spanish mortar and pestle to a member of the graduating class chosen by the faculty for outstanding service to the college.

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 1 year in the American Pharmaceutical Association. This includes a 1-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 Pharm. and who has earned the second highest general average during the 4 years of professional study.

Communications

Correspondence relating to registration or advanced standing should be addressed to the Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455. 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, Minnesota 55455.

PHARMACY CURRICULUM

(1 Year Prepharmacy—4 Years Pharmacy)

A 5-year curriculum for the bachelor of science in pharmacy degree prepared and recommended by the faculty of the college in co-operation with an *ad hoc* committee of the University was endorsed by the Administrative Committee of the Senate and approved by the Board of Regents on June 13, 1953. The curriculum became effective in the fall of 1954. Beginning in the fall of 1960, all accredited colleges of pharmacy initiated curriculums equivalent to not less than 5 academic years as a result of actions taken by the American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy.

High school graduates should enroll as prepharmacy students in the College of Liberal Arts of the University of Minnesota or in any other accredited institution. Upon satisfactory completion of the required prepharmacy courses, students are eligible to apply for admission to the College of Pharmacy. Students who undertake prepharmacy work away from the Minneapolis Campus of the University will defer the orientation course, PhmT 1A, 1B, 1C, to their first year in the College of Pharmacy.

Students should consult their advisers, especially in regard to choice of elective subjects. Careful planning of programs throughout the 5 years will expedite considerably the students' progress in preparation for one of the areas of pharmaceutical specialization, preparation for graduate study, or completion of the combined program in pharmacy and business administration in minimum time.

Applicants who have completed satisfactorily 2 or more years of college will be eligible to apply for admission to a 3-year professional curriculum in the College of Pharmacy provided their previous training includes the following courses or their equivalent in addition to the courses of the prepharmacy year.

Biol 1-2—General Biology (or equivalent work in zoology and botany)
Phys 1-2-3—Introduction to Physical Science
Phys 1A-2A-3A—Introduction to Physical Science Laboratory

OrCh 61-62—Elementary Organic Chemistry
Econ 1-2—Principles of Economics
Acct 24-25—Principles of Accounting
Electives—not less than 9 credits

PREPHARMACY YEAR

(In the College of Liberal Arts or any accredited college)

(Credits shown in parentheses)

GeCh 4-5—General Principles of Chemistry (5, 5)
GeCh 6—Principles of Solution Chemistry (4)
Math 10—College Algebra and Analytic Geometry (5)
Math T—Trigonometry (3)

Comm 1-2-3—Communication** (4, 4, 4)
PhmT 1A, 1B, 1C—Orientation (1, 1, 1)
Electives (6-8)

Total Prepharmacy Year (13-16f, 15w, 12-14s
= 43-45)

FIRST YEAR

Biol 1-2—General Biology (5, 5)
Phys 1-2-3—Introduction to Physical Science (3, 3, 3)
Phys 1A-2A-3A—Introduction to Physical Science Laboratory (1, 1, 1)
OrCh 61-62—Elementary Organic Chemistry (5, 5)
PhmT 3—Pharmaceutical Calculations (2)

PhmT 53-54—Fundamental Principles and Processes (4, 5)
PhmT 70—First Aid (2)
Electives (6)

Total First Pharmacy Year (16f, 18w, 17s
= 51)

** If these courses are not available, consult the dean's office for permissible substitutes.

SECOND YEAR

MicB 53—General Microbiology (5)	Phcg 1-2-3—Introductory Pharmacognosy (3, 3, 3)
OrCh 63—Elementary Organic Chemistry (3)	Electives (6)
Econ 1-2—Principles of Economics (4, 3)	
PhmC 1-2—Inorganic Pharmaceutical Products (4, 4)	
PhmC 54-55—Quantitative Pharmaceutical Chemistry (5, 5)	Total Second Pharmacy Year (16f, 16w, 16s = 48)

THIRD YEAR

Acct 24-25—Principles of Accounting (3, 3)	Phcl 57—Pharmacology of Official Medicinal Agents (3)
PubH 50—Personal and Community Health (3)	Phcl 101—General Pharmacology (1)
Anat 3—Elementary Anatomy (4)	Electives (3)
Phsl 70—Human Physiology (7)	
PhmT 55-56—Pharmaceutical Preparations (4, 4)	Total Third Pharmacy Year (16f, 17w, 16s = 49)
PhmC 53—Pharmaceutical Biochemistry (5)	
PhmC 161-162-163—Organic Medicinal Agents (3, 3, 3)	

FOURTH YEAR

PubH 75—Introduction to Environmental Sanitation (3)	Phcl 102—General Pharmacology (6)
Mktg 107A—Retail Management for Pharmacy Students (3)	Phcl 106—Toxicology (2)
PhmT 58-59-60—Prescription Compounding (4, 4, 4)	Specialization courses (3, 3, 3)
PhmT 64—Pharmaceutical Jurisprudence (3)	Electives (3)
PhmT 71—Pharmaceutical Specialties (3)	Total Fourth Pharmacy Year (16f, 16w, 15s = 47)
Phcg 160—Recent Advances in Pharmacognosy (3)	Grand Total Including Prepharmacy Year = 238-240

Specialization Courses—Each student is required to enroll for 9 quarter credits of specialization courses. Any combination is acceptable. The eight 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. PhmC 164-165-166 (9 cr)
2. PCh 101, 102, 103 (12 cr)

Pharmacy (retail, hospital, manufacturing)

3. PhmT 68-69 (6 cr) and 165 or 168 (3 cr)
4. PhmT 165, 166-167 (9 cr)

Biology (with a view to graduate work, retail and manufacturing pharmacy)

5. PhmT 72 (3 cr); Phcl 162 (3 cr); and Phcg 151 (3 cr)
6. Phcg 151-152-153 (9 cr)
7. Phcl 109 (3 cr), 162 (3 cr); and Stat 90
8. Phcg 165-166 (5 cr); and public health (cr ar)

Students who have demonstrated a high degree of predetermination with respect to work following graduation may petition the Committee on Student Scholastic Standing to substitute equivalent credits in subjects that they believe will be more helpful in their life's work than the "specialization courses" 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 science in business. This optional course is open only to those students who register in the College of Pharmacy and who can present evidence of better-than-average ability. Requirements for these degrees are (a) completion of all courses listed in the pharmacy curriculum; and (b) completion of the following courses in the School of Business Administration:

(Credits shown in parentheses)

Econ 1-2—Principles of Economics (7)	QA 51—Business Statistics (3)
BLaw 28—Business Law (3)	BFin 56—Corporation Finance (3)
Acct 24-25-26—Principles of Accounting (9)	Mktg 107C—Retail Management II (3)
QA 5—Elements of Statistics (3 or 4)	Mktg 187—Price Policy (3)
Mktg 57—Principles of Marketing (3)	Mktg 97—Market Analysis and Research I (3)
Prod 50—Production Management (3)	Econ 65—Intermediate Economic Analysis: The Firm (3)
Jour 18—Principles of Advertising (3)	Econ 66—Intermediate Economic Analysis: Income and Employment (3)
Mktg 107A—Retail Management for Pharmacy Students (3)	Econ 67—Money and Banking (3)
Ins 53—Risk Management and Insurance (3)	Econ 68—Elements of Public Finance (3)
Acct 55C—Managerial Costs (3)	
IR 52—Systems of Industrial Relations: Labor Marketing (3)	Total Business Administration Courses—(70-71)

If the professional and business administration courses are taken concurrently, it is estimated that between 6 and 7 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 the Summer Session the time necessary to meet the requirements for these degrees could be reduced to the minimum (6 years).

DESCRIPTION OF COURSES

Courses Offered in the College of Pharmacy

Following each course title and description is a statement in parentheses of credits, enrollment limitations, prerequisites, and number of lecture and laboratory hours per week. "Consent of instructor" for enrollment in a course is indicated by the symbol ‡.

All students are required to purchase \$5 Pharmacy Deposit Cards from the bursar. Breakage and supplies will be deducted from these cards.

PHARMACEUTICAL TECHNOLOGY (PhmT)

Professor

Charles V. Netz, Ph.D., *head*
Willard J. Hadley, Ph.D.

Associate Professor

Hugh F. Kabat, Ph.D.
Robert H. Miller, Ph.D.
Edward G. Rippie, Ph.D.

Assistant Professor

John D. McRae, Ph.D.

Lecturer

Richard H. Bachelder, LL.B.
Neal W. Schwartz, B.S. in Pharm.

Chief Pharmacist, University Hospitals

Marie L. Perreault, B.S. in Pharm.

Student Pharmacist Supervisor

Ruth Livingston, B.S. in Pharm.
Leslie W. Collins, B.S. in Pharm.

- 1A. Orientation: History.** Development of pharmacy including historical transitions in the healing arts and sciences. (1 cr; 1 lect hr per wk)
- 1B. Orientation: Laws and Organizations.** Minnesota pharmacy laws and state board regulations; local and national professional associations. (1 cr; 1 lect hr per wk)
- 1C. Orientation: Training and Opportunities.** Career opportunities in the profession and the industry and preparation for them. (1 cr; 1 lect hr per wk)
- 3. Pharmaceutical Calculations.** Mathematical procedures in pharmaceutical practice. (2 cr; 2 lect hrs per wk)
- 53-54. Fundamental Principles and Processes.** Introduction to the principal laws of physical chemistry and their applications to the quantitative aspects of pharmaceutical systems. (4 cr for 53, 5 cr for 54; prereq Phys 1, PhmT 3, OrCh 61; 4 lect hrs per wk [w], 4 lect and 3 lab hrs per wk [s])
- 55-56. Pharmaceutical Preparations.** Official and nonofficial dosage forms and preparations. (4 cr per qtr; prereq jr, 54; 2 lect and 6 lab hrs per wk)
- 58-59-60. Prescription Compounding.** (4 cr per qtr; prereq sr, 56, PhmC 55, PhmC 163, Phcl 57; 2 lect and 6 lab hrs per wk [f, w], 3 lect and 6 lab hrs per wk [s])
- 64. Pharmaceutical Jurisprudence.** Law and legal procedures, responsibilities of a pharmacist; Federal and Minnesota state laws and regulations, legal problems of practical importance to the pharmacist. (3 cr; prereq sr; 3 lect hrs per wk)
- 68-69. Introduction to Hospital Pharmacy.** (Specialization course) Training for hospital pharmacy: stock control, records, manufacture of pharmaceutical preparations, prescriptions, and parenteral solutions. (3 cr per qtr; prereq sr, 56; 1 lect hr and 6 lab hrs per wk)

- 70. First Aid.** First aid procedures including those in the American Red Cross course. (2 cr; prereq fr; 3 lect hrs per wk)
- 71. Pharmaceutical Specialties.** New medicinal preparations, sickroom supplies. Lectures by representatives of pharmaceutical manufacturers. (3 cr; prereq sr, PhmC 163; 3 lect hrs per wk)
- 72. Veterinary Products.** (Specialization course) Chemical, pharmaceutical, and pharmacological study of agents and preparations used in the prevention and treatment of disease in domestic animals and poultry. (3 cr; prereq sr; 3 lect hrs per wk)
- 165. Cosmetics and Dermatological Preparations.** (Specialization course) Pharmaceutical aspects of cosmetics and dermatological preparations. (3 cr; prereq 56; 2 lect and 3 lab hrs per wk)
- 166-167. Pharmaceutical Manufacturing.** (Specialization course) Problems in the production of pharmaceutical preparations on a pilot plant scale. Formula development and product stabilization. (3 cr per qtr; regis limited; prereq sr, 56; 1 lect and 6 lab hrs per wk)
- 168. Preparation of Parenteral Products.** (Specialization course) Principles and procedures involved in manufacture of parenteral products. (3 cr; prereq sr, 56, MicB 53, or #; 2 lect and 3 lab hrs per wk)
- 173. Special Problems in Pharmaceutical Technology.** Problems in the formulation, production, and evaluation of pharmaceutical products. (Cr ar; prereq jr or sr and #)

PHARMACEUTICAL CHEMISTRY (PhmC)

Professor

Ole Gisvold, Ph.D., *head*
 Frank E. DiGangi, Ph.D.
 George P. Hager, Ph.D.
 Taito O. Soine, Ph.D.

Associate Professor

Philip S. Portoghese, Ph.D.

Student Pharmacist Supervisor

Lyle Becker, B.S.

- 1-2. Inorganic Pharmaceutical Products.** Histories, sources, commercial manufacture, laboratory preparation, properties, and medicinal uses of inorganic chemicals. (4 cr per qtr; prereq soph, GeCh 6 or equiv; 4 lect hrs per wk)
- 53. Pharmaceutical Biochemistry.** Selected topics in biochemistry required as a basis for the understanding of the pharmacodynamic action and therapeutic use of medicinal agents. Particular emphasis is given to the modification of organic substances by a biological system. (5 cr; prereq jr, OrCh 62; 3 lect, 1 rec, and 6 lab hrs per wk)
- 54-55. Quantitative Pharmaceutical Chemistry.** Principles, procedures of gravimetric and volumetric methods of analyses of inorganic and organic pharmaceutical products. (5 cr per qtr; prereq soph, GeCh 6, OrCh 62; 3 lect and 6 lab hrs per wk)
- 161-162-163. Organic Medicinal Agents.** Sources, production, properties, reactions, structure-activity relationships, and uses of natural and synthetic organic compounds. The courses include not only the simple organic compounds (hydrocarbons, alcohols, amines, etc.) but also the vitamins, hormones, alkaloids, organometallics, etc. (3 cr per qtr; prereq jr, OrCh 62; 3 lect hrs per wk)
- 164-165-166. Special Analytical Methods.** (Specialization course) The Food, Drug, and Cosmetic Act, and official analytical methods of the U.S.P., N.F., and the A.O.A.C. Analyses of some drugs and foods with emphasis on instrumental methods. (3 cr per qtr; prereq sr, 55, OrCh 63; 1 lect and 6 lab hrs per wk)
- 173. Special Problems in Pharmaceutical Chemistry.** Elementary investigation of the analysis, synthesis, and phytochemistry of medicinal agents. (Cr ar; prereq 3rd- or 4th-year pharmacy student and #)

PHARMACOGNOSY (Phcg)

Associate Professor

 Herbert Jonas, Ph.D., *head*
Assistant Professor

Lee C. Schramm, Ph.D.

Gardeners

Onie J. Benson

Clarence Stoltman

1. **Introductory Pharmacognosy.** Characteristics of crude drugs, cultivation, preparation, identification, analysis. (3 cr; prereq soph, Biol 2, OrCh 62; 2 lect, 1 conf, and 3 lab hrs per wk)
2. **Introductory Pharmacognosy.** Physiology and breeding of medicinal plants. Extraction and identification of natural drug constituents. (3 cr; prereq soph, 1; 2 lect, 1 conf, and 3 lab hrs per wk)
3. **Introductory Pharmacognosy.** Biologicals, enzymes, allergens, antibiotics. Fundamentals of fermentation processes and applications to pharmacy. (3 cr; prereq soph, 2, MicB 53; 2 lect, 1 conf, and 3 lab hrs per wk)
151. **Pesticides and Plant Growth Regulators.** (Specialization course) Their use in the cultivation and preservation of medicinal plants and their products. (3 cr; prereq 3, Phcl 57, or #; 2 lect and 3 lab hrs per wk)
- 152-153. **Metabolism.** (Specialization course) Biochemistry and physiology of drug-producing organisms. Chemical and physical methods for production and analysis of their medicinal constituents. (3 cr per qtr; prereq 3 or #; 2 lect and 3 lab hrs per wk)
- 154-155. **Microscopy and Microchemical Methods.** (Specialization course) Their use in the study of drug-producing organisms and their constituents. (3 cr per qtr; prereq 3 or #; 1 lect and 6 lab hrs per wk)
160. **Intermediate Pharmacognosy.** Enzymes, biological and fermentation products, insecticides, fungicides, and herbicides. (3 cr; prereq 3 or #; 3 lect hrs per wk)
165. **Basic Application of Radionuclides.** (Specialization course) Properties and utilization of radioactive substances of importance in biology, pharmacy, public health, and civil defense. (3 cr; prereq jr, MicB 53, or #; 2 lect and 3 lab hrs per wk)
166. **Basic Laboratory Course in Radionuclide Techniques.** (Specialization course) Demonstration and participation experiments in fundamental isotope techniques and applications. (2 cr; prereq 165, ¶165, or #; 6 lab hrs per wk)
167. **Advanced Course in Radionuclides.** (Specialization course) Advanced lecture course expanding on 165. (3 cr; prereq 165 or #; 2 lect and 3 lab hrs per wk)
168. **Laboratory Course in Advanced Radionuclide Techniques.** (Specialization course) (2 cr; prereq 167, ¶167, or #; 6 lab hrs per wk)
173. **Special Problems in Pharmacognosy.** Problems dealing with the botany, biochemistry, and physiology of medicinal plants and microorganisms and their products. Radioisotope applications. (Cr ar; prereq #)

PHARMACOLOGY (Phcl)

Professor

Wallace F. White, Ph.D.

Instructor

Harvey J. Kupferberg, Ph.D.

57. **Pharmacology of Official Medicinal Agents.** Introductory course with emphasis upon topics of particular importance to the dispensing pharmacist. (3 cr; prereq jr or #; 3 lect hrs per wk)
109. **Pharmacological Problems.** (Cr ar; prereq #)

162. **Biological Assay of Drugs.** (Specialization course) Quantitative pharmacological procedures with an introduction to biostatistics. (3 cr; prereq sr, grad, or #; 1 lect and 6 lab hrs per wk)

Required Courses Offered by Other Departments

PREPHARMACY YEAR

(Credits shown in parentheses)

- | | |
|--|-------------------------------|
| GeCh 4-5—General Principles of Chemistry (10) | Math T—Trigonometry (3) |
| GeCh 6—Principles of Solution Chemistry (4) | Comm 1-2-3—Communication (12) |
| Math 10—College Algebra, Analytic Geometry (5) | Electives (6-8) |

PROFESSIONAL YEARS

- | | |
|---|---|
| MicB 53—General Microbiology (5) | Phys 1-2-3—Introduction to Physical Science (9) |
| Biol 1-2—General Biology (10) | Phys 1A-2A-3A—Introduction to Physical Science Laboratory (3) |
| OrCh 61-62-63—Elementary Organic Chemistry (13) | Phsl 70—Human Physiology (7) |
| Econ 1-2—Principles of Economics (7) | PubH 50—Personal and Community Health (3) |
| Acct 24-25—Principles of Accounting (6) | PubH 75—Environmental Sanitation (3) |
| Mktg 107A—Retail Management (3) | Anat 3—Elementary Anatomy (4) |
| Phcl 101-102—General Pharmacology (7) | |
| Phcl 106—Toxicology (2) | |

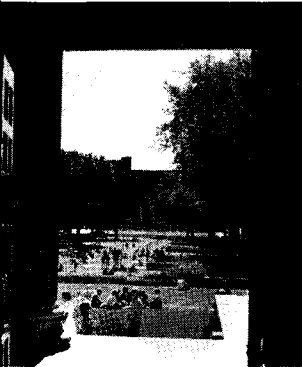
VIII-4

DESK COPY

Delivery _____

OK Kill _____

DEPARTMENT OF MORTUARY SCIENCE



1963-1967

UNIVERSITY OF MINNESOTA BULLETIN

How to Use This Bulletin

This bulletin gives information about the Department of Mortuary Science. *The student is held responsible for the information contained in this bulletin.* You should become familiar with all the materials presented in it and keep the bulletin available for easy 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, 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, it should be retained 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 student personnel services and campus activities.

Copies of all bulletins of the University can be obtained at the Information Window in Morrill Hall.

**The Department of Mortuary Science office is
located in room 114 Vincent Hall**

UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarne E. Grottum, Jackson; The Honorable Gerald W. Heaney, Duluth; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S., M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

DEPARTMENT OF MORTUARY SCIENCE

Administration

Willard L. Thompson, Ph.D., Dean of University Extension
Robert C. Slater, B.S., Director of Mortuary Science
Gertrude O. Koschig, Administrative Assistant to the Director

Faculty

Robert S. Carney, LL.B., Instructor in Funeral Law
Jerome E. Gates, B.S., Instructor in Restorative Art
Richard A. Grayson, B.A., LL.B., Instructor in Funeral Law
Gertrude O. Koschig, Licensed Mortician, Instructor in Restorative Art and Funeral Service Orientation
Eugene M. Larson, B.S., Instructor and Co-ordinator in Public Health Laws and Regulations
Reuel I. Lund, Ph.D., Associate Professor of Accounting
John Oman, S.T.M., D.D., Special Lecturer
Robert C. Slater, B.S., Professor of Embalming and Mortuary Management
Dale E. Stroud, A.M.S., B.S., Instructor in Embalming

All other appointments are made from full-time staff members of the co-operating colleges and departments

INTRODUCTION

The profession of funeral service is unique in its demands upon those who choose it for a life's vocation. After personal qualifications have been evaluated and found satisfactory, the choosing of a college to fulfill the scholastic and academic requirements becomes of prime importance. The University of Minnesota since 1908 has maintained as a part of its academic offerings a program in mortuary science. Throughout its more than half century of service to the nation it has graduated students from practically every one of the 50 states and several foreign countries.

The curriculum of the department has always been maintained at a standard consistent with the curriculum offerings of a large state-supported institution of higher learning. Its faculty has been selected from professionally qualified people, well educated in their respective fields of teaching. The profession within the state of Minnesota and the Minnesota State Board of Health each contribute to the status of the department through their co-operation and assistance.

Every student who matriculates at the University is encouraged to develop his professional potential to the fullest of his capability. The University demands an acceptable level of scholarship and professional sensitivity of each of its graduates and therefore offers to each of its students the utmost in academic training and professional growth.

The department accepts fully the obligation entrusted to it by funeral service to strive for the continual advancement of the profession through higher education and the careful selection and preparation of those who seek entrance into the profession. The department also accepts the obligation assigned to it by each matriculated student to offer him the finest in scholastic preparation to enter his chosen profession. The department believes that funeral service is a profession which finds its greatest fulfillment in serving the living, while caring for the dead and giving dignity to man.

Based on these purposes and obligations the Department of Mortuary Science presents this bulletin which, together with the *Bulletin of General Information*, will give the prospective student insight and knowledge regarding the curriculum offerings and the facilities of the Department of Mortuary Science.

Department of Mortuary Science

GENERAL INFORMATION

The Department of Mortuary Science is located in Vincent Hall on the Minneapolis Campus of the University of Minnesota. Its students enjoy all the advantages which come from participation in the activities of a university composed of academic, scientific, and professional schools and colleges.

The program, established in 1908, was the first such program to be organized as a part of a state university. The dean of the General Extension Division is charged with the administration and supervision of this all-University department. The College of Medical Sciences and the Minnesota State Department of Health have shared in the professional responsibilities of the department since its creation by the Board of Regents in March of 1908.

The first session was of 6 weeks' duration. In 1916 the curriculum was extended to 8 weeks and in succeeding years made increases to 12 weeks, 24 weeks, and 36 weeks. In 1951 the Board of Regents authorized a 2-year curriculum and the granting of an associate in mortuary science degree. This curriculum was expanded to the current 3-year program in 1955.

The curriculum in mortuary science combines the instruction in the basic sciences, training in the mortuary arts and sciences, instruction in the liberal arts, and cultural subjects deemed necessary and desirable for proficiency in funeral service. The curriculum is fully accredited by the American Board of Funeral Service Education and the Conference of Funeral Service Examining Boards of the United States, Inc., and is accepted by those states requiring such certification.

The primary objective of the department is to offer that academic training to the student which will best prepare him to accept his obligation in the community, both as a professional person and as a citizen. In addition to this proficiency it is the desire of the department and its faculty to train for the profession that person whose ethical conduct and practices, professional relationship with the bereaved, desire for research and professional growth, and respect for the public health laws and regulations will be such as to foster and promote the fuller acceptance and recognition of funeral service and its contribution to the American way of life.

Curriculum

The course program in mortuary science is specifically planned to assist those who desire college preparation in addition to the professional educational requirements. Many states now require such a combination for licensure.

To give its students the broadest possible University contacts through its instructional staff, the department uses only Regent-approved and Regent-appointed instructors. With but a single exception these are all full-time University personnel from the faculties of the colleges within the University. This highly trained teaching staff together with the modern classroom and laboratories of this leading University enables the student to study mortuary science under the most favorable conditions.

Instruction is given by lectures, laboratory courses, demonstrations, and clinical practice. Throughout the entire program the teaching is integrated closely with the basic science laboratories and the clinical facilities offered in Minneapolis and St. Paul.

The terminal professional year class is matriculated only once a year, in the fall, although students planning on entering mortuary science can begin their liberal

arts education at the beginning of any regularly scheduled quarter or summer term.

The curriculum leading to the degree of associate in mortuary science is offered in two different plans:

Plan A—Designed to fulfill the licensure requirements of 2 years of college and a year of professional training as required in Minnesota and approximately 20 other states. This is a 9 academic-quarter program with a minimum of 137 required and elective credits. The subject areas included and credit hours required are designed to meet the requirements of most of the states which specifically outline course content.

Plan B—Designed to fulfill the licensure requirements of those states requiring 1 year of college and 1 year of professional training. This is a 6 academic-quarter program requiring a minimum of 102 required and elective credits for graduation.

Both Plan A and Plan B curriculums, which may be entered with advanced standing from any accredited college or university, are integrated to bring the maximum of professional success and to contribute most to the general welfare of the student.

Fees

Tuition fee (per quarter)	
Residents of Minnesota	\$105.00
Nonresidents	280.00
Incidental fee (per quarter)	20.00
(For privileges such as the Coffman Memorial Union, the Health Service, and the <i>Minnesota Daily</i> .)	
Graduation fee	10.00
Special fees:	
Examination for credit (after first quarter in residence)	5.00
Special examination (may be taken only upon approval of appropriate committee)	5.00

Privilege Fees—The fee for the privilege of late registration or late payment of fees is \$3 through the first week of classes. During the second week the fee is \$5 and after the second week the fee is \$10.

Part-Time Fees—Students not registered for the full course will be charged tuition at the rate of \$8.75 per credit for residents, \$23.50 for nonresidents.

Department Regulations

In this section will be found the answers to the most common questions of students. It is imperative that the following paragraphs be read carefully. Students who know the details of department procedure, the rules and regulations of the department, registration procedure, the degree requirements, and other information can more easily plan their own education; it will save trouble in the future; and it will be possible to get problems settled more quickly and satisfactorily. The director and his staff are available for conference and request that students come for help to help themselves.

Application—All credentials and applications for admission to the Department of Mortuary Science should be addressed to the Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455. Freshman and advanced standing applications may be obtained from either the department office, the Office of Admissions and Records, or any accredited Minnesota high school office.

Admission—Admission to the Department of Mortuary Science requires graduation from an accredited high school or satisfactory evidence of high school equiva-

lency. It does not require any specific pattern of high school subjects but the natural and basic science areas are strongly recommended. A student may either enter directly from high school or transfer from another college within the University or from other accredited colleges or universities.

Following favorable action by the committee on admissions, an admission certificate will be mailed to each student accepted for matriculation. 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 1 month before the opening of the next quarter. Students must present this admission certificate when reporting for registration.

Registration—Along 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 and a suggested program plan for the completion of all degree requirements. These will make the process of registration relatively simple. Your registration will be completed with the help of the director of the department and his staff.

Equipment and Books—The University will furnish the larger pieces of equipment needed for clinical training and laboratory procedures, but the student must furnish his own personal equipment such as gowns, aprons and gloves. These will not be needed until a student enters the professional year of the curriculum.

Books may be purchased in used or new supply. The average cost of books per quarter is \$18 with the exception of the professional year of the curriculum. During the 3 quarters of the professional year the expenditure for books will be approximately \$40 the first quarter and \$12 for the second and third quarters.

Counseling—Because of the specialized nature of the work in funeral service, all applicants are urged to consult with the director or his staff before registration. Advisers for mortuary science are available for consultation, in person or by letter, with prospective students. Their offices are located in 114 Vincent Hall. A pamphlet, *Funeral Service—A Heritage, A Challenge, A Future*, is available upon request.

Transfers Within the University—If you have completed work satisfactorily in another college of 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 grade 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 grade point deficiencies as might be required for graduation.

Transfers 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 the grade point average, only the grades earned in this University are considered.

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. At the time of your first registration, you will be assigned the services of a faculty adviser.

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 2 days of orientation and registration during the month of September. Those unable to come then and those entering the winter or spring quarters are offered a modified program for 2 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: Fill out a "Cancel-Add" form obtained in the department office, have it signed by your adviser, and tally it if required. 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 the director.

Courses may be canceled without grade during the first 6 weeks of classes, although if the total load falls below 12 credits, the approval of the Scholastic Committee is required. After the first 6 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 2 weeks before the beginning of final examinations, cancellation is not permitted except under most unusual circumstances.

Requirements for the Degree of Associate in Mortuary Science—The associate in mortuary science degree (Plan A or Plan B) is awarded in recognition of the successful completion of 3 years (Plan A) or 2 years (Plan B) of work in the Department of Mortuary Science. Requirements are as follows:

1. The earning of 137 credits (Plan A) or 102 credits (Plan B) of required and elective courses.
2. The earning of 274 grade points (Plan A) or 204 grade points (Plan B).
3. Final medical examination by the University Health Service.
4. Recommendation by the faculty of the department.

The student should file an application for a degree at the information window, Office of Admissions and Records, during the fall quarter of the academic year in which he expects to graduate. Associate in mortuary science degrees are awarded usually only at the June Commencement.

Credit Load 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 more than 17 credits provided you have a scholarship average of 2.00 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.

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 delete the first grade when calculating grade point average.

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 final professional year of the curriculum.

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 1 day, he should report that fact to the department office in 114 Vincent Hall at least 10 days prior to the final examination period for possible adjustment. Any other examination schedule problems should be presented to the Scholastic Committee.

Grades and Grading—Letter grades A, B, C, D, F, or I are assigned for each course at the end of the quarter. These are made available to the student through the Office of Admissions and Records and the department office.

The grade of I (Incomplete) is a temporary grade indicating that a student has a satisfactory record in work completed and, for justifiable reasons satisfactory to the instructor, was unable to complete the work of the course by the end of the quarter. The work must be completed within the first 30 days of the next quarter in residence.

Ordinarily, an F grade must be followed by a repeating of the course. This is always true in the case of a course required for the degree. In the case of an elective the decision as to repeating the course will be made by the student and/or the Scholastic Committee.

Grade Points and Grade Point Average—The quality of work is indicated by grade points. Grade points are assigned to course grades as follows: to each credit with a grade of A, 4 grade points; to each credit with a grade of B, 3 grade points; to each credit with a grade of C, 2 grade points; to each credit with a grade of D, 1 grade point. The grade of F carries no grade points. Thus for a 3-credit course completed with a grade of B the student would be assigned 9 grade points.

The grade point average (GPA) is defined as the number of grade points earned divided by the total number of credits earned and failed (grades A to F). A grade point average of 2.00 (C average) is the minimum standard required for satisfactory progress toward the associate in mortuary science degree. Each student is notified quarterly of his current and cumulative grade point average and scholastic standing.

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.

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 1 quarter to show improvement. Usually the probation period will not be extended beyond 2 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.

A student may also be placed on probation if:

1. He is admitted from another institution with an average of less than 2 grade points 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 1 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 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.

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 the department office within the first 6 weeks of residence.

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 have received a Bachelor's degree, and you must be seeking a special and limited course of study.

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 1 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.

Canceling Out of College—This always involves referral to the department 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. Following your interview at the department office you report to the department window at 105 Morrill Hall (window 20) to check on your financial status, cancel courses for the current or succeeding quarter, and generally clarify your relationship with the University.

If you are likely to enter the armed services upon leaving the University, you will find the discussion especially important. If you wish, the department will prepare a summary of your academic and extracurricular background for your use in seeking proper placement in the services.

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.

Summer Session Work

The recent curriculum changes have made necessary the offering of certain courses during the regular terms of the University Summer Session. Bulletins for Summer Session curriculums are available upon request from the Summer Session office. For further information regarding this schedule, you should contact the director of the department. *These offerings will be of special interest to those individuals who have attended other institutions and will be transferring with advanced standing.*

Student Personnel and Special Services

Student Responsibility for Notices—There are two methods that the University and the department use to contact students throughout the school year. The Official Daily Bulletin published in the *Minnesota Daily* contains information which the

student is required to know. Notices involving an individual student are sent directly to his local mailing address. Every student is held responsible for notices received in *either* of these two methods.

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 department regulations. It is empowered also to make exceptions to department 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. 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 administrative assistant to the director for the department serves as secretary. Two other members are appointed yearly from the faculty by the dean of the General 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 2 days of testing, counseling, and group activities. You will profit from group discussions 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 students, 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.

Loans and Scholarships—The University of Minnesota has numerous loan funds. They are restricted in their distribution to individuals meeting certain requirements. A loan or scholarship usually cannot be obtained before 2 quarters of attendance at the University, during which time the student will have the opportunity to demonstrate his ability and integrity. The only security for loans to students is the character of the applicant and his ability to do college work. Application for loans or scholarships may be made to the Bureau of Student Loans and Scholarships located in Wesbrook Hall.

Self-Support—The University Employment Bureau assists students who find it necessary to earn part or all of their expenses. The department also arranges for part-time work in the funeral homes in Minneapolis and St. Paul. However, the program in mortuary science is a full one and some students may find it difficult to devote many hours a week to outside employment.

Housing—Most out-of-town students live either in University-maintained residence halls or in private rooming houses. All such students must live in University-approved residences under substantially the same obligations. Information concerning residence halls, private rooming houses, and facilities for married couples with or without children can be obtained from the Student Housing Bureau, 209 Eddy Hall. Application should be made early for accommodations. Final acceptance by the University is not necessary before applying. Cancellations may be made without penalty if the Student Housing Bureau is notified immediately following nonacceptance by the University.

Most of the part-time positions in local funeral homes furnish housing as a part of the remuneration.

Bulletin of General Information—This is the bulletin prepared for use by all colleges and departments within the University. As the name implies it contains general information pertinent to all students regardless of the college or department in which they are registered, and will give specific answers to questions regarding the following subjects:

University Organization	Library Facilities and Services
Admission Policy and Requirements	Cultural and Recreational Opportunities
Orientation and Registration	Financial Aids
Degree and Course Requirements	Housing Facilities
University Calendar	Fees and Expenses
Special Services for Students	Athletic Purposes
Veteran, War Orphan, and Selective Service Information	

Awards

Award of Merit—Each year the Minnesota Funeral Directors Association will award at the Class Day festivities 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 in Mortuary Science, 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 in 1951 and is given annually to a member of the graduating class in mortuary science. The student selected for this award will be one who best exemplifies the qualities of perseverance, diligence, and co-operation, and who manifests the greatest rate of academic improvement, regardless of final grade point average. The award is a gold key appropriately inscribed and will be presented at Class Day festivities.

Director's Service Award—The director of the department each year presents a service award to the student who has contributed the most to his class and the department. The award, in addition to personal service, takes into consideration attitude, leadership ability, and consciousness of citizenship responsibility. It is a gold key appropriately inscribed and is presented at Class Day festivities.

Mu Sigma Alpha—The National Association of Colleges of Mortuary Science has established an honorary scholastic society to give recognition to those students

of mortuary science who have displayed outstanding merit in scholarship and who have conducted themselves as college citizens of whom we are justly proud. The candidates are carefully screened by a committee of the faculty. No more than 10 per cent of any current graduating class may be nominated for this award in any given year. Recipients are invested into the society at Class Day festivities and each receives a gold engraved key as evidence of his election. A permanent membership roll is inscribed and placed on file in the national office of the society.

Frigid Fluid Award—The Frigid Fluid Company of Chicago, Illinois, annually presents a gold engraved plaque and a \$100 United States Savings Bond to the student who excels in the proficiency in the mortuary arts and sciences and is likewise proficient in the other areas of the curriculum. Nominations for the award are screened by a faculty committee and the presentation is made at Class Day festivities.

Scholarships

MFDA Scholarship—The Minnesota Funeral Directors Association sponsors a full-tuition scholarship each year. This distinctive scholarship shall be open to residents of Minnesota who are pursuing or intend to pursue advanced training in the Department of Mortuary Science, and who at the effective date of the scholarship are within 9 months of graduation. Selection criteria include the following: academic aptitude, professional promise, personal attributes, leadership potential, and financial need. Interested students may request an application from the Bureau of Student Loans and Scholarships or the Department of Mortuary Science office.

Silver Anniversary Fund—This fund is established by the classes of the department that celebrate their 25th anniversary of their graduation with their reunion. Its resources are used for a variety of purposes, one of which is student aid. Each year several students are given quarterly tuition grants. Recipients are nominated by the faculty on the basis of need and scholarship.

A. A. Hodroff Scholarship—This scholarship is a \$500-a-year stipend given to a student selected by the faculty on the basis of need, scholarship, and professional promise. The grant is to cover tuition, books, and other fees incidental to matriculation. The donors are the L. H. Kellogg Chemical Company and the Kelco Supply Company.

The American Board of Funeral Service Education administers a nationwide scholarship fund. All students interested in determining their eligibility should contact: The American Board of Funeral Service Education, William H. Ford, Administrator, 201 Columbia Street, Fairmont, West Virginia.

Fred C. Olson III Memorial Scholarship is available, by application, to any regularly matriculated student in mortuary science. It consists of awards in varying amounts from \$100 to \$500 made by the family of a former department student who was accidentally killed during his senior year of matriculation.

Mortuary Science Service Fund is a fund established and maintained by former students and friends of the department. The resources of this fund are available for special services and programs of benefit to students.

Mortuary Science Emergency Loan Fund was established to assist those students who, due to extenuating circumstances, need small amounts of cash for a short (30-60 days) period of time. Applications for this type of assistance are made through the director.

Past Presidents Fund is established by former presidents of the Minnesota Funeral Directors Association. Annually, scholarship grants are made from this fund in varying amounts.

Application Procedure—All students desiring to apply for the above scholarships or any other general scholarship should make application through the University Bureau of Student Loans and Scholarships in Westbrook Hall. Application for the emergency loan service should be made directly to the director of the Department of Mortuary Science.

Special Occasions

In addition to the regularly scheduled events on the University calendar, the department schedules special programs.

Convocations—Quarterly convocations are sponsored by the department. Speakers, specially qualified in their subject areas, are invited to present topics of interest dealing with professional growth. The fall quarter convocation is designated at the Dean's Convocation at which time the dean of the General Extension Division addresses the student body and especially welcomes the new students.

Periodically, special lecturers in the area of funeral service are invited to present topics of special interest. The large metropolitan area of Minneapolis and St. Paul provides the department with a large number of such resource persons.

Recognition and Class Day Festivities—On Commencement Day in June, the department faculty together with the Senior Class sponsors a Recognition Dinner honoring the graduating class in mortuary science, their families and friends. On this occasion each graduate is recognized and awards and prizes are announced.

Organizations

The Student Association of the Department of Mortuary Science is a recognized University student organization and each student matriculated in the Department of Mortuary Science is a member. The association has a council of 12 members, 10 voting members composed of elected representatives from each class plus a faculty adviser and 2 nonvoting members, one the fraternity representative and the second the alumni representative.

The purpose of the association is to establish a government to serve as a sounding group for student opinion regarding matters of mortuary education, to create a liaison between the students and faculty, to formulate and implement student policy, and to serve as a public relations agency for mortuary education.

Alpha Mu Sigma is the professional fraternity for students in mortuary science. It is a recognized University student organization. Its program is both social and educational. Membership is recommended as a "first step" in professional organizational involvement.

University-Approved Organizations—These groups are open to membership for all department students if they meet the specified qualifications. A wide variety of experience is available in such areas as vocational, social, political, social service, and recreational interests.

PLANS OF INSTRUCTION

Below are outlined the suggested plans of instruction, under both Plan A and Plan B. For that student who takes all of his work within this department at the University, the program would be planned in these sequences. For those students who take a portion of their liberal arts training in other colleges or institutions, these suggestions will be found helpful in planning their courses and areas of instruction. A detailed description of the courses will be found in the following section of this bulletin.

Plan A

(Quarter credit evaluation is shown in parentheses)

FIRST YEAR

English Composition (9)
General Psychology (5)
General Inorganic Chemistry (5)
Sports Education (3)
Personal Health (3)

Fundamentals of Speech (5)
Orientation in Funeral Service (2)
Electives (7)

Total Credits—39

SECOND YEAR

General Biology (10)
Social Sciences (9)
Introduction to Restorative Art (3)
Principles of Accounting (3)
Mortuary Law (6)

Psychology of Funeral Service (2)
Electives (7)

Total Credits—40

THIRD YEAR

Anatomy (8)
Restorative Art (3)
Pathology (6)
Medical Science Survey (3)
Embalming Theory and Practice (9)
Embalming Laboratory (2)
Public Health, Laws and Regulations (2)

Mortuary Management (9)
Business Methods (2)
Embalming Chemistry (6)
Microbiology (4)
Clinical Embalming (4)

Total Credits—58

Plan B

(Quarter credit evaluation is shown in parentheses)

FIRST YEAR

English Composition (9)
General Psychology (5)
General Inorganic Chemistry (5)
Personal Health (3)
Sports Education (3)
General Biology (10)
Introduction to Restorative Art (3)

Orientation in Funeral Service (2)
Mortuary Law (6)
Principles of Accounting (3)
Business Methods (2)
Psychology of Funeral Service (2)

Total Credits—53

SECOND YEAR

Restorative Art (3)
Anatomy (8)
Pathology (6)
Medical Science Survey (3)
Embalming Theory and Practice (9)
Embalming Laboratory (2)
Public Health, Laws and Regulations (2)

Mortuary Management (9)
Embalming Chemistry (6)
Microbiology (4)
Clinical Embalming (4)

Total Credits—56

DESCRIPTION OF COURSES

Explanations

Course Numbering—A course is designated by a number, a letter, and occasionally an abbreviated prefix denoting a different department offering the course. A course has the same number in whatever quarter it is offered. The quarter is indicated by letter (f, fall; w, winter; s, spring; su, summer).

1f-2w, a 2-quarter course given in the fall and winter.

1w,s, the same course given in the winter and spring.

3f,w,s, a 1-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.

† To receive credit, all courses listed before the single dagger must be completed.

‡ Students may enter sequence course in any quarter which precedes the double dagger.

§ No credit is granted if credit was received for equivalent course listed after section mark.

¶ Concurrent registration is allowed with the course listed after paragraph mark.

Consent of instructor is required.

△ Consent of department or school offering course is required.

Mortuary Science

2f. Introduction to Art. Basic drawing, design, and color theory. (3 cr) Gates

3w-4s. Anatomical Drawing and Modeling. (1 cr per qtr; prereq 2) Gates

5s. Restorative Art. Laboratory skills, cosmetics and restorations. (1 cr per qtr; prereq 2) Gates

8f,w,s. Orientation. An overview of funeral service; history, customs, development; personal qualifications, aptitudes; field trips. (2 cr) Koschig

13f,s-14f,w. Mortuary Law. Probate proceedings, social security, life insurance benefits, public and personal liability, business law. Licensing; restrictions on mortuary sites; business organization; duties, rights, and liabilities for final disposition. (3 cr per qtr) Carney, Grayson

51f-52s. Anatomy. Descriptive anatomy of the human body taught by system; special attention to regional anatomy of value to the mortuary science student. (4 cr per qtr; prereq Biol 2) Staff

53f-54w. Pathology. Disease survey; causative factors and clinical features correlated with pathologic changes. (3 cr per qtr; prereq Biol 2) Staff

55s. Medical Science Survey. Relationship of pathology to areas of medical science, including recent research and developments. (3 cr; prereq 54) Staff

56f-57w-58s. Embalming. Procedures and techniques of embalming. Embalming theory; consideration of special treatments. (3 cr per qtr; prereq Biol 2) Stroud

59f,w,s. Public Health, Minnesota Laws and Regulations. Basic principles and practices of public health administration; organization and functions of agencies at local, state, and federal levels of government engaged in preservation and protection of public health. Role of the mortician; regulatory procedures. Orientation in responsibilities; relationships with local boards of health and State Department of Health. (2 cr; prereq PubH 3, 50 or GC 10B) Larson

- 60f-61w-62s. Funeral Management.** Current practice and procedures; funeral direction; funeral home operation; records and forms; professional overview and image; professional regulations. Field trips. Clinical experience. (3 cr per qtr; prereq soph) Slater
- 63w,s. 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; accounting problems as related to partnerships, corporation. (2 cr; prereq Acct 24 or GC 16A) Lund
- 64f,w,s. Psychology of Funeral Service.** Applied psychological principles helpful to a prospective mortician in dealing with his clients, especially those in an emotional crisis. (2 cr; prereq GC 2A or Psy 2) Oman
- 70f,s-71w. Embalming Chemistry.** Fundamentals of inorganic and organic chemistry. Chemistry of the body; sanitation; toxicology; chemical changes in cadavers, disinfection, and embalming fluids. (3 cr per qtr; prereq introductory course in general chemistry) Lewis
- 72w. Microbiology.** (Same as MicB 1) Distribution, nutrition of bacteria, bacterial physiology; disinfection and sterilization, transmission of infection, immunity, pathogenic bacteria; viruses, pathogenic fungi, protozoa. (4 cr; prereq Biol 2) Staff
- 76f,w,s. Embalming Laboratory.** Laboratory procedure; practical experience in embalming; evaluations of theory. (2 cr per qtr; prereq 56 or #) Stroud and staff
- 77f,w,s-78f,w,s. Clinical Training.** Practical experience in embalming; evaluations of theory. (2 cr per qtr; prereq 56 or #) Stroud and staff

Biology

General Biology. Introduction to living things, both plants and animals, and to the major biological concepts. Structure, function, classification, and evolution of organisms. (10 cr)

Chemistry

General Inorganic Chemistry. Study of the general laws of chemistry and of the non-metals and metals and their compounds. (5 cr)

Economics

Principles of Accounting. Methods of recording, reporting, and interpreting business events. Use of accounting as a tool of business management. (3 cr)

English

English Composition. Practical training in reading and writing as ordinarily required of all college freshmen. (9 cr)

Physical Education

Sports Education. Orientation course in variety of recreational sports. The objective is to provide instruction and competition in those sports in which men may participate now and in the future. A means of obtaining recreation, regular exercise, and social intercourse. (3 cr)

Note to women students—Arrangements for meeting this requirement are made in co-operation with the Department of Physical Education for Women.

Psychology

General or Introductory Psychology. Science of human behavior with emphasis on development of the individual. (5 cr)

Public Health

Personal and Community Health. Fundamental principles of health conservation and disease prevention. (3 cr)

Reserve Officers' Training Corps (ROTC)

The programs in Aerospace Studies (United States Air Force), Military Science (United States Army Reserve), and Naval Science (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

Social Sciences. Factors—historical, political, economic, social, psychological, and cultural—that influence and are influenced by man's conduct. (9 cr)

Note—This requirement may be fulfilled by completing 12 quarter credits or their equivalent in any of the following areas or combination thereof: anthropology, economics, geography, history, political science, or sociology.

Speech

Fundamentals of Speech. Development of basic skills in speech, voice and action, oral reading, discussion, and extemporaneous speaking. (5 cr)

ELECTIVES

Each student is permitted to take elective courses and is required to take enough elective credits to meet the graduation requirements. The total number of elective credits is determined by the requirements of the plan under which the student is registered. Plan A allows for a minimum of 17 elective credits and Plan B allows for a minimum number of elective credits. These elective 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. For those students who plan to go on working toward an advanced degree, it is important that they make a 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 student's adviser at the time of registration. The following subject areas are recommended:

In the College of Liberal Arts

(Credits shown in parentheses)

Anthropology

- 1A—Introduction to Anthropology: Prehistoric Man and Culture (5)
- 2A—Introduction to Anthropology: Cultural Anthropology (5)

Art

- 1—Principles of Art (5)

Astronomy

- 11—Descriptive Astronomy (5)

Classics

- 48—Technical Terms of Science, Medicine, and Humanities (3)

Economics

- B—The Scope, Methods, and Application of Economics (3)
- C—Introduction to Economic Analysis (3)
- 1-2—Principles of Economics (6)

Family Studies

- 1—Dynamics of Dating, Courtship, and Marriage (3)
- 15—The Home and Its Furnishings (3)

Geography

- 1—Physical Geography (5)
- 4—Human Geography (5)

Geology

- 1—Physical Geology (4)
- 2—Historical Geology (4)

History

- 1-2-3—Civilization of the Modern World (9)
- 20-21-22—American History (9)

Humanities

- 1-2-3—Humanities in the Modern World (15)

Journalism

- 11—Reporting for Nonmajors (3)

Natural Science

- 1-2-3—Orientation in the Natural Sciences (15)
- 4-5—The Physical World (6)

Personal Orientation

- 1—How to Study (2)

Philosophy

- 1—Problems of Philosophy (5)
- 2—Logic (5)
- 3—Ethics (5)

Political Science

- A-B—The State in the Modern World (6)
- 1-2—American Government and Politics (6)
- 5—American Government and Politics (5)
- 25—World Politics (3)

Sociology

- 1—Introduction to Sociology: Man in Modern Society (3)
- 3—Introduction to Sociology: Social Problems (3)
- 45—Social Statistics (5)

In the General College

(Credits shown in parentheses)

Personal Development

- 1A—Individual Adjustment (4)
- 2B—Fields of Applied Psychology (5)
- 2C—Psychology of Human Development (3)
- 3B—Food Selection and Purchase (3)
- 3E—Income Management: Individual and Household Buying (2)
- 4—Leisure Today (3)

Natural Science and Mathematics

- 7A-B-D—Physical Science: Physics, Astronomy, Geology (15)
- 8A—Applied Mathematics (5)
- 10A—Biology: Fundamental Similarities in the Living World (5)
- 10B—Human Biology: Human Anatomy and Physiology (5)

Social Studies

- 37—Social Trends and Problems (5)
- 40—Problems of Contemporary Society (5)
- 44B—Current History (2)
- 45A—Growth of American Democracy (5)
- 45C—Minnesota History (5)
- 45D—Community Problems (1-3)

General Arts

- 21—General Arts (3)
- 24A—Music Today: Music in Society (3)
- 26A-B—Photography (6)

Literature, Writing, and Speech

- 29C—American Literature (3)
- 29D—Contemporary Books and Periodicals (5)
- 30A—Reading and Vocabulary Development (5)
- 32D—Oral Communication: Group Discussion (3)
- 32E—Oral Communication: Business Speech (3)

Typing

By arrangement with an adviser

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, 114 Vincent Hall, University of Minnesota, Minneapolis, Minnesota 55455.

The Mortuary Science Curriculums are accredited by:

The American Board of Funeral Service Education
William H. Ford, Administrator
201 Columbia Street
Fairmont, West Virginia

and

The Conference of Funeral Service Examining Boards
of the United States, Inc.
25 South Washington Street
Naperville, Illinois

VIII-12

DESK COPY

Delivery _____

~~OK Kill~~ _____

School of Public Health

PROGRAM IN HOSPITAL ADMINISTRATION



1965-1967

UNIVERSITY OF MINNESOTA BULLETIN

— THE HOSPITAL —

Dedicated to the service of mankind through co-operative effort.

UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarné E. Grottum, Jackson; The Honorable Gerald W. Heaney, Duluth; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S. (Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students
Bryce L. Crawford, Jr., Ph.D., Dean of the Graduate School
Robert B. Howard, M.D., Ph.D., Dean of the College of Medical Sciences
Gaylord W. Anderson, M.D., Dr.P.H., Director, School of Public Health

Advisory Committee

James A. Hamilton, M.C.S., M.A., Professor and Director, Program in Hospital Administration
Gaylord W. Anderson, M.D., Dr.P.H., Mayo Professor and Director, School of Public Health
Ray M. Amberg, Ph.C., Director Emeritus, University Hospitals
Richard L. Kozelka, Ph.D., Professor of Business Administration

School of Public Health

Gaylord W. Anderson, M.D., Dr.P.H., Mayo Professor and Director, School of Public Health
Stewart C. Thomson, M.S., M.D., M.P.H., Professor, Associate Director, School of Public Health
Lee D. Stauffer, B.S., M.P.H., Assistant Director, School of Public Health
James A. Hamilton, M.C.S., M.A., Professor and Director, Program in Hospital Administration
Jacob E. Bearman, Ph.D., Professor of Biostatistics
Richard G. Bond, M.S., M.P.H., Professor of Environmental Health
Ruth E. Grout, M.P.H., Ph.D., Professor of Public Health Education
Marion Murphy, R.N., M.P.H., Ph.D., Professor and Director, Program in Public Health Nursing
Leonard M. Schuman, M.S., M.D., Professor of Epidemiology
Allyn G. Bridge, M.D., M.P.H., Associate Professor
George E. Williams, M.D., Associate Professor
Norman A. Craig, B.A., M.P.H., Assistant Professor

Volume LXVIII

Number ~~13~~ 14

July
June 15, 1965

UNIVERSITY OF MINNESOTA BULLETIN

Published semimonthly January 1 to December 15 inclusive. Second-class postage paid at Minneapolis, Minnesota. Send change of address notices and other communications to Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

The contents of this bulletin and of other University bulletins, publications, or announcements are subject to change.

Hospital Administration

- James A. Hamilton, M.C.S., M.A., Professor and Director, Program in Hospital Administration
- James W. Stephan, M.B.S., Professor and Associate Director, Program in Hospital Administration
- E. Gartly Jaco, Ph.D., Associate Professor
- Jerome T. Bieter, B.B.A., M.H.A., Assistant Professor
- John C. Dumas, B.A., M.H.A., Assistant Professor
- A. Douglas Kincaid, Jr., B.A., Assistant Professor
- Theodor J. Litman, Ph.D., Assistant Professor
- Vernon E. Weckwerth, Ph.D., Assistant Professor
- David V. Damberg, B.A., M.H.A., Instructor
- John E. Kralewski, B.S., M.H.A., Instructor
- Robert J. Laur, B.B.A., M.H.A., Instructor
- Donald W. Dunn, B.A., M.H.A., Lecturer
- Edith L. Hamilton, Ph.D., Lecturer
- Kenneth M. Kelley, B.B.A., M.H.A., Lecturer
- Helen L. Knudsen, M.D., M.P.H., Lecturer; Chief, Division of Hospital Services, Minnesota Department of Health
- Fred A. McNamara, B.A., Lecturer; Hospital Consultant, Washington, D.C.
- Telmer O. Peterson, B.S., M.H.A., Lecturer; President, Northern Pacific Beneficial Association
- John Sweetland, Jr., B.A., M.H.A., Lecturer

Clinical Preceptors

- Frederick Diedrich, Captain, USAF Hospital Travis, Travis Air Force Base, Fairfield, California
- Bright M. Dornblaser, B.B.A., M.H.A., Director, Franklin County Public Hospital, Greenfield, Massachusetts
- David L. Everhart, B.A., M.P.H., Administrator, Johns Hopkins Hospital, Baltimore, Maryland
- Richard K. Fox, B.A., Superintendent, St. Luke's Hospital, Duluth
- Gertrude M. Gilman, B.A., Director, University of Minnesota Hospitals, Minneapolis
- Frank S. Groner, B.A., LL.D., Administrator, Baptist Memorial Hospital, Memphis, Tennessee
- Kenneth J. Holmquist, M.P.H., Superintendent, Bethesda Lutheran Hospital, St. Paul
- Lloyd L. Hughes, B.A., LL.B., M.H.A., Executive Director, Rhode Island Hospital, Providence, Rhode Island
- John A. Kelley, Major, USAF Hospital Keesler, Keesler Air Force Base, Biloxi, Mississippi
- Merton E. Knisely, A.A., Administrator, St. Luke's Hospital, Milwaukee, Wisconsin
- Carl C. Lamley, M.H.A., Executive Director, Stormont-Vail Hospital, Topeka, Kansas
- Matthew F. McNulty, Jr., B.S., M.H.A., M.P.H., Administrator, University of Alabama Hospitals, Birmingham, Alabama
- Harold C. Mickey, B.B.A., Administrator, Rochester Methodist Hospital, Rochester, Minnesota
- Robert Millar, B.A., Administrator, Abbott Hospital, Minneapolis
- Russell H. Miller, B.A., M.H.A., Associate Director, University of Kansas Medical Center, Kansas City, Kansas
- Wade Mountz, B.A., M.H.A., Administrator, Norton Memorial Infirmary, Louisville, Kentucky
- Stanley R. Nelson, B.S., M.H.A., Administrator, Northwestern Hospital, Minneapolis
- David E. Olsson, B.S., M.H.A., Administrator, San Jose Hospital, San Jose, California
- Carl N. Platou, B.A., M.H.A., Executive Vice-President, Fairview Hospital, Minneapolis
- Boone Powell, LL.D., Administrator, Baylor University Medical Center, Dallas, Texas
- Jack W. Rivall, B.A., M.H.A., Administrator, Eitel Hospital, Minneapolis
- Kenneth J. Shoos, B.A., Superintendent, St. Luke's Hospital, Cleveland, Ohio
- Sister Marybelle, B.A., M.H.A., Administrator, St. Mary's Hospital, Duluth
- Sister Mary Madonna, B.A., M.S.S.W., M.H.A., Administrator, St. Mary's Hospital, Minneapolis
- Sister Mary Paul, B.S., R.N., Administrator, St. Alexius Hospital, Bismarck, North Dakota
- Roger R. Starn, B.S., M.H.A., Administrator, St. Luke's Hospital, St. Paul
- Owen B. Stubben, B.A., M.H.A., Administrator, Hennepin County General Hospital, Minneapolis
- Richard W. Trenkner, B.B.A., M.H.A., Administrator, Memorial Hospital of South Bend, South Bend, Indiana

William N. Wallace, B.A., M.H.A., Administrator, The Charles T. Miller Hospital, St. Paul
Frank S. Walter, B.S., M.B.A., Director, St. Barnabas Hospital, Minneapolis
Rolland E. Wick, B.A., M.H.A., Administrator, Children's Hospital, San Francisco, California
Russell B. Williams, B.A., M.H.A., Administrator, Kaiser Foundation Hospitals, Los Angeles, California
P. David Youngdahl, B.A., M.H.A., Administrator, Frederick Memorial Hospital, Frederick, Maryland

Special Lecturers 1964-1965

Janet Brodahl, M.H.A., Assistant Administrator, Bethesda Lutheran Hospital, St. Paul
Ray Brown, M.B.A., H.H.D., Director, Program in Hospital Administration, Duke University, Durham, North Carolina
George Bugbee, Director, Program in Hospital Administration, University of Chicago, Chicago, Illinois
O. J. Campbell, M.D., Ph.D., Surgeon, Minneapolis
James D. Colman, President, Associate Hospital Service of New York, New York City, New York
Dean Conley, B.B.A., Executive Director, American College of Hospital Administrators, Chicago, Illinois
Thomas Cook, Executive Secretary, Hennepin County Medical Society, Minneapolis
Richard Crist, President, Minnesota Hospital Service Association, St. Paul
Edwin L. Crosby, M.D., Dr.P.H., D.Sc., Executive Director, American Hospital Association, Chicago, Illinois
Ann Crowley, M.S., Administrative Dietitian, Abbott Hospital, Minneapolis
John M. Danielson, M.H.A., Executive Vice-President, Evanston Hospital Association, Evanston, Illinois
Paul M. Densen, D.Sc., Deputy Commissioner of Health, City of New York, New York
Lloyd F. Detwiller, M.H.A., Consultant-Administrator, Health Sciences Centre, University of British Columbia, Canada
Joseph F. Follmann, Jr., Director of Information and Research, Health Insurance Institute, New York City, New York
P. M. Gilfillan, Chaplain, St. Barnabas Hospital, Minneapolis
Melvin A. Glasser, Director, Social Security Department, United Automobile Workers, Detroit, Michigan
Mrs. Russell Hanson, President, Hospital Auxiliary, Benson, Minnesota
Warren B. Hempstead, Physicians and Hospitals Supply Company, Inc., Minneapolis
Lawrence A. Hill, M.A., M.H.A., Associate Professor and Director, Program in Hospital Administration, University of Michigan, Ann Arbor, Michigan
Robert F. Hoffman, M.H.A., Superintendent, State Hospital, Fergus Falls, Minnesota
Eugene H. Keating, LL.B., Attorney at Law, Minneapolis
Lucile P. Leone, M.A., L.D.H., D.Sc., Litt.D., Chief Nurse Officer, U.S. Public Health Service, Washington, D.C.
Charles C. Lindstrom, M.H.A., Administrator, Fairview Southdale Hospital, Minneapolis
Edward Lynn, M.H.A., Associate Administrator, Abbott Hospital, Minneapolis
Thomas F. Manley, President, Associated Hospital Service of Philadelphia, Philadelphia, Pennsylvania
John R. Mannix, Executive Vice-President, Blue Cross of Northeast Ohio, Cleveland, Ohio
Maurice McKay, General Manager, Group Health Plans, Inc., St. Paul
Walter J. Mc Nerney, M.H.A., President, Blue Cross Association, Chicago, Illinois
J. P. Medelman, M.D., Radiologist, St. Paul
David Y. Morris, President, University of Minnesota Employees Union, Local 450, Minneapolis
Gerry E. Morse, M.B.A., Vice President, Employee Relations, Minneapolis Honeywell Regulator Company, Minneapolis
Beverly C. Payne, M.D., Physician, Ann Arbor, Michigan
John W. Poor, Director, Division of Public Assistance, Minnesota Department of Welfare, St. Paul
Glen V. Taylor, Executive Secretary, Upper Midwest Hospital Association, Minneapolis
T. M. Tierney, Executive Vice President, Colorado Hospital Service, Denver, Colorado
George G. Ulmer, President, Physicians and Hospitals Supply Company, Inc., Minneapolis
David J. Vail, M.D., Medical Director, Minnesota Department of Public Welfare, St. Paul
Geraldine B. Wedel, Assistant Executive Secretary, Minnesota Nurses' Association, St. Paul
Donald E. Wood, M.H.A., Executive Director, Twin City Regional Hospital Council, St. Paul

PROGRAM IN HOSPITAL ADMINISTRATION

GENERAL INFORMATION

The hospital as a social institution plays a vital role in the physical and mental health of the people of our nation. In 1875, there were fewer than 200 hospitals in the United States and only 35,000 hospital beds. Rapid advances in the medical sciences during the 20th century, together with a tremendous rise in the utilization of hospitals, created a demand for greatly expanded and improved facilities. As a result, the number of hospitals has mushroomed to more than 7,000 and the number of hospital beds to more than 1.6 million. As a group, hospitals today comprise one of our country's largest and most essential service enterprises.

The growing importance of hospitals as a center of community health resources and the innate complexity of their organizational structure have made the management of these institutions a very specialized responsibility. The University of Minnesota was one of the nation's colleges and universities to recognize early the need for professionally educated administrators. In 1946, with the assistance of a 3-year grant from the W. K. Kellogg Foundation, it established the Program in Hospital Administration.

Although this program and other programs, leading to a Master's degree in hospital administration, have graduated a substantial number of individuals into the field, the demand for competent hospital administrators still exceeds the supply and will continue to do so for many years to come. Thus, the opportunities for growth and development in the field are extensive.

The Master's degree program was designed to produce practitioners in hospital administration and to help develop in them a broad philosophy toward the health field, so that its graduates might take their proper places in providing not only sound institutional management but also leadership within their professional organizations and in the community at large.

Throughout the first decade of the Master's program, another set of needs, directly relating to scholarship, began to be recognized. Teachers must be prepared for university hospital administration programs in the United States and elsewhere. Scholars capable of carrying on research in the health field financed by governmental agencies and private foundations must be developed. Some of these needs can be met by scholars trained in such areas as sociology, psychology, economics, and industrial engineering, but each of these persons is trained to see just one part of the complex field of hospital administration. Someone must take the overview, must be in the position to unite these many facets and exert leadership toward common purposes and goals. The doctoral program in hospital administration is designed to help fill these needs and focuses on the role of the hospital in society.

Admission Requirements

Master's Degree Program—It is realized that the students who apply for admission will present varying backgrounds and the program has been designed with this fact in mind. Applicants may be college graduates without specialty or they may be physicians, registered nurses, business administration graduates, clergymen, members of religious orders, graduates of specialized professions within the health

and welfare field, or others with special interests and aptitudes for hospital administration. Hospital work experience is desirable but not essential.

All applicants must possess a Bachelor's degree from an accredited educational institution. Individuals with a broad liberal arts education are favored as well as persons with a more specialized undergraduate degree. Only full-time students are accepted and no credit will be given for previous experience or instruction that would shorten either the academic year or the residency period. Applicants must also show evidence of personal capability, fitness, and motivation for work in the hospital field, and must have completed college level courses in the elements and principles of accounting. Prospective students who have not completed the latter may take these courses during the summer quarter or by correspondence prior to the beginning of the academic year.

Other courses which provide a desirable background but which are not required for admission include human physiology, general microbiology, principles of economics, principles of sociology, English composition, business law, mathematics, biology, business policy, cost accounting, government regulation of business, labor problems and trade unionism, public administration, recent social legislation, psychology, and public speaking.

All communications should be addressed to the Director, Program in Hospital Administration, School of Public Health, 1260 Mayo Memorial Building, University of Minnesota, Minneapolis, Minnesota 55455. Admission application blanks will be supplied upon request. All applications should be submitted preferably before January 1 of the year in which the applicant intends to enter the program and must include the following items:

1. Two completed admission forms.
2. Two certified transcripts of the applicant's college record.
3. A letter indicating the applicant's previous work experience as well as his or her reasons for selecting the field of hospital administration.
4. Names of three references, preferably those familiar with the applicant's work experience.

Applicants are expected to have an interview either with a member of the faculty or, if too distant, with an alumnus of the Program in Hospital Administration selected by the faculty.

To insure that all students receive the maximum benefit from their academic period, only a limited number of applicants, usually 30 to 35, is accepted each year for admission to the program. An advisory committee assists the program director in screening applicants. Selections are based on academic ability, personality, motivation, work experience, and references. Applicants are notified of their acceptance or rejection about April 1.

Doctoral Program—Since this program is designed to prepare those who wish to pursue scholarly careers as teachers or research workers in the highly complex field of health care, it provides for both intensive and broad education. The program is therefore interdepartmental in character and comes under the administration of the Graduate School, all the requirements of which must be met. Students successfully completing the program will have earned a doctor of philosophy degree. Some will have a major in hospital administration; others who wish to major in a social science may take a minor in hospital administration; and others may wish to major in hospital administration and also to major in a social science.

In any case, a candidate for doctoral work must have demonstrated marked academic ability and show potential for independent study and research. He must have at least a Bachelor's degree from an accredited educational institution, preferably with breadth in the social sciences, mathematics, and administration. The

attainment of a Master's degree in hospital administration will serve ordinarily but not absolutely as the first step for those who wish to major in this field at the doctoral level. Graduate work satisfactorily completed prior to entering the program may be submitted for credit. Each student's program will be individually planned to build upon his own background and interests. He will have two advisers, one from hospital administration and one from the social science field in which he takes his major or minor subject. Before taking his preliminary examinations for the doctorate, the student will be required to pass a reading comprehension test in one or more foreign languages and to have met requirements in either a special research technique or a collateral field of knowledge.

Application for the doctoral program may be initiated either by correspondence with the Graduate School office or by writing directly to the Director, Program in Hospital Administration, School of Public Health, 1260 Mayo Memorial Building, University of Minnesota, Minneapolis, Minnesota 55455. Admission application blanks will be supplied upon request. Before the admissions process is completed, the following items will be required:

1. Completed application forms, provided by the University.
2. Two certified transcripts of the applicant's college records, both undergraduate and graduate.
3. A letter indicating his previous work experience and his reasons for wishing to enter this program.
4. The names of three references, persons who can attest to the applicant's scholarship, personality, and fitness for a teaching or a research career.
5. An acceptable score on the Miller Analogies Test, Graduate Level.

A personal interview with a member of the faculty is considered highly desirable but is not compulsory.

The number of candidates is not limited in the doctoral program, but it is anticipated that classes will be small. The intention is to produce quality in scholarship rather than quantity.

Living Expenses

Living expenses will, of course, vary tremendously from person to person. As a general guide for single students, the University of Minnesota estimated that the average cost to the student for room and board in University residence halls during the 1963-64 academic year ranged from \$245 to \$300 per quarter. This figure does not include laundry and clothing expenses nor does it account for such items as recreation and travel.

It is virtually impossible to estimate living costs for married students because of the variance in the size of their families, the standard of living which they wish to maintain, and the type and size of the accommodations they desire. Such students will have to estimate these expenses for themselves on the basis of their own personal experience. Rent is a major item of expense for married students. As a general rule, they can expect to pay from \$70 to \$80 per month for housing in University-maintained facilities and a higher amount for private accommodations. The figures quoted are based on the rental rates in effect during the 1963-64 academic year and, except for Thatcher Hall, include heat and all other utilities except the telephone.

For further information concerning housing in University-maintained facilities or in private rooming houses, consult the *Bulletin of General Information* of the University of Minnesota or write to Director of Student Housing, 209 Eddy Hall, University of Minnesota, Minneapolis, Minnesota 55455.

Expenses

(Subject to change)

Master's Degree Program

(1965-1966)

Academic Year	Resident of Minnesota		Nonresident of Minnesota	
	Per Quarter	Per Year	Per Quarter	Per Year
Tuition	\$155	\$465	\$380	\$1,140
Incidental*	20	60	20	60
Total	\$175	\$525	\$400	\$1,200
Residency Year				
Tuition (1 quarter only)	\$155		\$380	
Course fee (1 quarter only)	100		100	
Total**	255		\$480	
Graduation Fee	\$ 10		\$ 10	

Doctoral Program

(1965-1966)

	Resident of Minnesota	Nonresident of Minnesota
	Per Quarter	Per Quarter
Tuition (for more than 6 credits).....	\$ 91	\$280
Incidental*.....	20	20
Total.....	\$111	\$300
Thesis Only.....	\$ 45.50	\$140

* The quarterly incidental fee entitles students to the privileges of Coffman Memorial Union, the University Health Service, the Speech Clinic, the Student Counseling Bureau, the Minnesota *Daily* (including the official Daily Bulletin), the University Address Book, and University recreational facilities.

** The total fees for the residency year are due at the beginning of fall quarter of that year.

Student Services and Activities

Library—The University's system of libraries ranks tenth in size among the university research libraries in the United States. Of particular importance to hospital administration students is the Bio-Medical Library located opposite the Mayo Memorial Building where the Program in Hospital Administration is situated and the James A. Hamilton Associates Library at 425 Harvard Street S.E. Both of these libraries contain books and journals which should be of interest to future hospital administrators.

In addition to the above facilities, the Program in Hospital Administration has one reading room of its own. The volumes, journals, and other materials in this room are specifically concerned with hospitals, management, and related areas such as medicine and public health.

University Health Service—The maintenance of student health is a major concern of the University. The Health Service, located adjacent to the University Hospitals, provides complete medical care facilities and health counseling for all students.

Food Services—Most of the University dormitories operate dining rooms for their residents. In addition, Coffman Memorial Union has a large cafeteria, two grills, and a soda fountain. The Union also maintains “commuter” lunchrooms for students who desire to bring their own lunches.

Cultural, Social, and Recreational Opportunities—Numerous cultural, social, and recreational opportunities are available to students on the University campus and in the surrounding area.

For additional information regarding student services or cultural, social, and recreational opportunities, consult the University of Minnesota *Bulletin of General Information*.

Financial Aids

Traineeships—A limited and varying number of United States Public Health Service traineeships is available annually and should be applied for on special application forms at the time of application for admission.

Student Loans—Numerous loan funds are available to hospital administration students who need financial assistance. These funds vary somewhat in their rates of interest, the amount of money that can be borrowed, and in the requirements students must meet.

The Bureau of Student Loans and Scholarships, located at 201 Eddy Hall on the Minneapolis Campus, administers the majority of the loan funds. Additional information about these funds can be secured from this bureau or from the director of the Program in Hospital Administration. Loan funds are also available through the Alumni Associations' Educational Trust Fund which is administered by the officers of the Alumni Association. Information regarding these funds can be obtained through the Program in Hospital Administration.

Special Stipends—Stipends for doctoral students have been granted to the University for a limited time period by the W. K. Kellogg Foundation. Inquiries should be addressed to the director of the Program in Hospital Administration.

Student Employment—The Program in Hospital Administration at the University of Minnesota does not object to the outside employment of its students during the academic year provided such employment does not interfere with the satisfactory completion of their studies and their other responsibilities to the program. However, the heavy schedule does not permit much time for such employment.

The Student Employment Bureau, located in 30 Wulling Hall, maintains a file of available full-time and part-time jobs on the University campus and in the Twin Cities. Students who desire the assistance of the bureau in obtaining employment must apply in person before they will be considered for any of the available positions.

The responsibilities of hospital administration students during the residency year are such that outside employment on either a full-time or a part-time basis is not permitted.

PROGRAMS OF STUDY

Master's Degree Program

The Program in Hospital Administration at the University of Minnesota is organized under the School of Public Health, a unit of the College of Medical Sciences. It also draws upon other University departments and upon the facilities of the hospitals and related institutions in the area. The academic curriculum consists of a central core of subjects pertaining directly to hospital administration, plus supplementary instruction in related fields.

The course of study is entirely on the graduate level and covers a period of 21 months. It consists of an academic year of 3 quarters in full-time attendance at the University and an administrative residency of 1 calendar year under a faculty-appointed clinical preceptor in an approved hospital. Upon satisfactory completion of the program, students are awarded the degree of master of hospital administration.

Geographically, the University of Minnesota is well situated with respect to the education of hospital administrators. With more than 30 hospitals of varying sizes and types of ownership and control in Minneapolis and St. Paul, the opportunities for observation and effective field work are excellent. The support of these and other hospitals throughout the state is a vital and integral part of the program. The co-operation of the local, state, and regional hospital associations is of similar value.

Objectives

The objective of the Master's program in hospital administration at the University of Minnesota is to prepare men and women to achieve, after the requisite years of practical experience in responsible supervisory and managerial positions, the chief executive status of administrator or director of a hospital. The program aims to improve the capability of future hospital administrators for effective participation in the making of decisions that will raise the level of operation of their individual hospitals and benefit the individual patient as well as the health service as a whole. Recognition is given the fact that the successful hospital administrator must have personal qualities meriting the respect of others, sympathetic understanding of human values and motivations, and an acute awareness of the impact of the hospital's policies on the community, the associated health activities, and society. With these goals in mind, the curriculum emphasizes breadth of learning in contrast to advanced technical development.

Academic Year

The academic year begins with the fall quarter. Each of the 3 quarters is designed to provide a mixture of courses pertaining directly to hospital administration and courses in related areas. Students are graded in each course and must maintain a grade point average of 2.5 (based on A = 4, B = 3, C = 2, and D = 1).

Class lectures and seminars are supplemented throughout the year by field trips to hospitals and related institutions in the Twin Cities and the state. Practical administrative experience is provided during the winter quarter when students are assigned to various hospitals in Minneapolis and St. Paul to work on an existing management problem.

In the spring quarter, students are encouraged to attend the convention of the Upper Midwest Regional Hospital Conference which is held each year in

either Minneapolis or St. Paul. The convention gives them an opportunity to meet and associate with a large number of administrators and other hospital personnel from a wide area. In addition, the convention's exhibit hall permits them to see many of the new developments in hospital equipment and supplies. Students also attend the annual week-long in-service Institute for Hospital Administrators which is sponsored jointly by the Program in Hospital Administration and the Minnesota Hospital Association, and held at the Center for Continuation Study on the University of Minnesota campus in February.

Because the regional office of the Coordinator of the American Hospital Association's Continuation Education Center is located at the Program in Hospital Administration, its activities are available for review and understanding by the students.

Residency Year

The Program in Hospital Administration guides and assists students in obtaining administrative residencies in approved hospitals. The administrators of these institutions hold University faculty appointments as clinical preceptors on a continuing basis and residents are placed with them each year.

Content programs of instruction have been developed by this joint faculty to meet the objectives of the residency period and to afford full opportunity for tutorial methods of teaching.

The resident's schedule during this second year will vary with the individual hospital. Under the pattern most commonly employed, the resident rotates through the different hospital departments for the first 6 months. Such a rotation gives the resident an opportunity to observe and participate in the work of the various departments. It allows him to gain an insight into the role these departments play in the total hospital program, their organization, standards of performance, methods of control, and major problems of operation.

Following the rotation period, the resident normally functions as a member of the administrative staff. Under the close supervision of the preceptor, he is given assignments which carry some independent responsibility and is assigned to work on specific management problems.

Twelve credit hours are granted for satisfactory completion of the residency period, including the submission of an acceptable thesis.

Residency Thesis—During the residency period, each student is required to prepare and submit a thesis. This thesis is a research project for the purpose of gaining an appreciation and understanding of research design and methodology. The subject matter is selected by the resident but must be approved by both the preceptor and a member of the academic faculty.

Faculty Visits—Normally, a faculty member visits each resident and preceptor during the year. Such visits enable the faculty to determine the resident's progress, to evaluate the various residency programs, and to assist in co-ordinating the academic and residency years.

Student Evaluation Reports—Periodically during the year, the residents are formally evaluated by their preceptors on the skills they should be developing in the residency period and on their personal characteristics. The preceptors submit these evaluations to the program after discussing them with the residents.

Residents' Institutes—In June of their residency year, students return to the University campus for a week of lectures, seminars, and discussions on hospital operation and administration. This provides an academic ending to the students'

formal training in hospital administration. In addition, it gives the students an opportunity to review and evaluate their residency experience and, by sharing this experience with others, to gain an insight into varying types of hospital operation and methods of administration and control.

Preceptors' Meetings—A successful administrative residency depends, in large measure, upon the role assumed by the clinical preceptor and his relationship to the student. The clinical preceptors and the academic faculty meet annually at the University in joint session to evaluate the residency period, to develop a mutual understanding of the objectives and content of the program, and to achieve co-ordination between the academic and residency years.

Residency Stipends—The stipends received by students during the residency period vary from one hospital to another. Stipends help to defray living and other expenses during that period. In addition, full or partial maintenance is granted administrative residents at some hospitals.

Research Program

There is a growing emphasis on research in the hospital field. Students in the Program in Hospital Administration have an opportunity to develop skills in this area during the academic and residency years. A full-time research staff was added to the faculty in 1955, and currently research is being carried out at both the faculty and student levels. Research projects are principally supported by grants from governmental and foundation sources.

Summary of Master's Degree Program

(Credits shown in parentheses)

First Year—Fall Quarter

- PubH 100A—Elements of Public Health (3)
- PubH 160—Principles of Administration in Hospitals (6)
- PubH 161—History and Development of Hospitals (3)
- PubH 162—Principles of Organization and Management of Hospitals (3)
- PubH 168—Orientation to Medical Sciences (3)
- Total fall quarter credits (18)

First Year—Winter Quarter

- PubH 100B—Elements of Public Health, Group Work (1)
- PubH 106—Public Health Administration (3)
- PubH 108—Introduction to Biostatistics and Statistical Decision (2)
- PubH 163—Principles of Organization and Management of Hospitals (6)
- PubH 166—Hospital Clerkship (5)
- Spch 106A—Public Speaking and Conference Leadership (3)
- Total winter quarter credits (20)

First Year—Spring Quarter

- PubH 100C—Elements of Public Health, Group Work (1)
- PubH 107A—Maternal and Child Health (1)
- PubH 109—Institutional Sanitation (3)
- PubH 125A—Public Health Education (1)
- PubH 132—Mental Health (1)
- PubH 141—Social, Economic and Political Aspects of Medical Care (3)
- PubH 164—Principles of Organization and Management of Hospitals (6)
- PubH 167—Management Problems in Hospital Administration (6)
- PubH 170A—Public Health Nursing (1)
- PubH 210—Public Health Seminar (3 quarters) (1)
- Total spring quarter credits (24)
- Total credits for first year (62)

Second Year (Residency)

- PubH 169—Administrative Residency (12)
- Total credits for second year (12)
- Grand total (74)

Student Awards

Five awards are given each year. The James A. Hamilton Award is given to the member of the graduating class who shows the "greatest promise of achievement" in the field of hospital administration. The Sabra M. Hamilton Award is presented to the graduating student who writes the "best research or management report." The Class of 1954 Award is given to the student who submits the "best hospital clerkship paper" during the academic year. The American Surgical Trade Association Awards are presented for outstanding scholarship in the academic period—one for the highest scholastic average in the administration courses and one for the highest scholastic average in the public health courses.

Doctoral Program

Objectives

The objective of this program is to produce scholars who plan to pursue teaching or research careers in hospital administration. The field of hospital administration is conceived to be more than the internal management of a hospital. Rather it is understood to encompass broadly all elements that affect the hospital and its related health services as social institutions.

Requirements for Admission

1. Bachelor's degree from an acceptable institution, preferably with breadth in the social sciences, mathematics, and administration.
2. A Master's degree, with a major in hospital administration, will ordinarily serve as a first step in acquiring the Ph.D.
3. Evidence of marked academic ability and potential for independent work and research.
4. Letter indicating applicant's reasons for seeking advanced education.
5. Names of three references attesting to scholarship, personality, and fitness for a teaching or research career.
6. Acceptable score on the Miller Analogies Test, graduate level.

Students lacking the basic public health courses will be required to complete such courses concurrently with their doctoral program. Graduate work satisfactorily completed prior to entering the doctoral program may be applied where appropriate and in accordance with the regulations of the Graduate School.

Plan of Instruction

The program emphasizes breadth of learning in contrast to technical development. The student will be given opportunity (1) to understand human society and the dynamic relationships between social behavior and health; (2) to comprehend the economic, political, psychological, and social aspects of health services; (3) to extend his knowledge of the planning, organization, and development of health services; (4) to acquire knowledge of research and skill in its application to the hospital and other health services; and (5) to obtain experience and guidance in teaching hospital administration.

Each student's program of study will be arranged individually with the guidance of his advisers and in accordance with Graduate School requirements. Each

program will cover subject matter of the major field in the following three areas: (1) organization and administration of hospitals and related health services; (2) social, psychological, economic, and political aspects of health care services; and (3) methodology of hospital and related health services research. In addition, the student will achieve competency in social science fields particularly related to the major field. Especially recommended are economics, political science, psychology, and sociology. With the approval of his advisers, the student will complete one of the following requirements: (1) at least 24 credits in a coherent program of courses selected from the related social science fields; (2) all of the minor field requirements in one of the related social science fields or in two fields as a split minor in social science; or (3) a second major in one of the related social science fields. All candidates will also complete a minimum of 9 credits in statistics courses numbered 100 or higher.

Language

A reading knowledge of two foreign languages or of one foreign language with the option of a research technique or a collateral field of knowledge is required.

Thesis

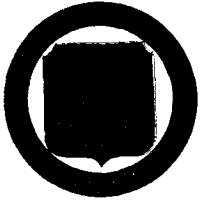
A dissertation dealing with a significant problem concerning health care services as they relate to the role and function of the hospital is required.

DESCRIPTION OF COURSES

(A sharp sign [#] means "consent of instructor")

- PubH 100A. Elements of Public Health I.** Occurrence and prevention of communicable, degenerative, and industrial diseases; protection of food, water, and milk; maternal and child health. (3 cr; prereq #) G Anderson, Thomson, Schuman
- PubH 100B. Elements of Public Health II.** Group work in evaluation and solution of representative community health problems. (1 cr; prereq 100A)
- PubH 100C. Elements of Public Health III.** Continuation of group work in evaluation and solution of representative community health problems. (1 cr; prereq 100B)
- PubH 106. Public Health Administration.** Structure, basic functions, and activities of public health agencies. (3 cr; prereq 100A) G Anderson, Laur, Amyot
- Spch 106A. Public Speaking and Conference Leadership.** The management of basic communication problems in administration. Discussion and exercises in communication problems, informational speaking, persuasive speaking, conference forms, and conference leadership. (3 cr) Shapiro
- PubH 107A. Maternal and Child Health Program.** Community programs for major maternal and child health problems. (1 cr; prereq #) Bridge
- PubH 108. Introduction to Biostatistics and Statistical Decision.** Variation, frequency distribution; probability; significance tests; estimation; trends. Statistical approach to rational administrative decision-making. Lectures and laboratory exercises. (2 cr; prereq #) Bearman, Weckwerth
- PubH 109. Institutional Sanitation.** Sanitation practices in hospitals and other institutions. (3 cr; prereq #) Bond
- PubH 125A. Public Health Education.** Purposes; scope; methods and materials; planning, with special emphasis on hospitals. (1 cr; prereq #) Grout, Craig
- PubH 132. Mental Health Program.** Community program for promotion of mental health and care of mentally ill persons. (1 cr; prereq 106 or #) Williams
- PubH 141. Social, Economic and Political Aspects of Medical Care.** Social, economic and political forces affecting administration and financing of medical care; sickness insurance, group hospitalization; concern of government in provision of medical care. (3 cr; prereq #) Hamilton, Jaco, Detwiller, and special lecturers
- PubH 160. Principles of Administration in Hospitals.** Lectures, seminars, and field trips in hospital administrative principles; top management and board of trustees, personnel policy formation, human relations. (6 cr; prereq #) Hamilton, Stephan, Sweetland
- PubH 161. History and Development of Hospitals.** Functions; ownership and control; promoting and building new hospitals; integrated service; national associations and foundations. (3 cr; prereq #) Hamilton, Stephan, Kincaid, Laur
- PubH 162-163. Principles of Organization and Management of Hospitals.** Departmental structures and functions; organizational principles and practice. (3 cr for 162, 6 cr for 163; prereq #) Stephan, Hamilton, Bieter, Damberg, Kincaid, Sweetland, Dumas, Laur
- PubH 164. Principles of Organization and Management of Hospitals.** Personnel department; legal liability; fiscal management; hospital insurance; research in administration. (6 cr; prereq 162, 163) Stephan, Hamilton, Bieter, Laur
- PubH 166. Hospital Clerkship.** Assignment to local hospital for survey and solution of special problem. (5 cr; prereq #) Bieter, Dumas
- PubH 167. Management Problems in Hospital Administration.** Assignment and solution of specific managerial problems. (6 cr; prereq 162, 163, 164) Hamilton, Sweetland, Laur

- PubH 168. Orientation to Medical Sciences.** Medical terminology, applied anatomy, and physiology. (3 cr; prereq #) Thomson
- PubH 169. Administrative Residency.** Field work of 1 calendar year's duration in approved hospital; weighted rotation through departments, solution of special problems, and preparation of an acceptable formal report. (Cr ar) Hamilton, Laur, Kralewski
- PubH 170A. Administration of Public Health Nursing.** Scope of public health nursing; relationship to other aspects of public health. (1 cr; prereq #) Murphy
- PubH 210. Seminar: Public Health.** (Cr ar) Staff
- PubH 261-262-263. Alternative Patterns for Meeting Health Care Needs.** Future role of hospital in light of patient needs and community services. (3 cr per qtr; prereq #) Hamilton, Stephan, Jaco, Litman, and staff
- PubH 264. Seminar: Medical Care Patterns Abroad.** (3 cr; prereq #) Litman
- PubH 265. Seminar: Research Studies on Health Services.** (3 cr; prereq #) Jaco, Litman, Weckwerth, and staff
- PubH 266. Hospital Administration Topics.** Independent study under tutorial guidance on selected problems, current issues. (Cr ar; prereq #) Hamilton, Stephan
- PubH 267. Health and Human Behavior.** The social ecology of health; social and personal components of illness; health and the community; social and cultural aspects of health care services. (3 cr; prereq #) Jaco
- PubH 269. Political Aspects of Health Services.** Analysis of interrelationships between government, politics, and health services; the political and social bases of health legislation and community decision-making in the provision and modifications of health services. (3 cr; prereq #) Litman
- PubH 273. Contemporary Problems of Hospital and Related Health Services.** Current concepts, problems, principles, and future developments in hospital and related health services. (Cr ar; prereq #) Hamilton, Stephan, Jaco, and staff
- PubH 274. Readings in Theory and Principles of Hospital Administration.** (Cr ar; prereq #) Hamilton, Stephan, and staff



1965-1967

COLLEGE OF VETERINARY MEDICINE
UNIVERSITY OF MINNESOTA BULLETIN

How to Use This Bulletin

This bulletin is the basic source of information about the College of Veterinary Medicine. Prospective students should read it carefully and keep it at hand for ready reference.

Index

	Page
Accreditation	3
Activities, Student	7
Administration	1
Admission Requirements	
Preveterinary	10-11
Professional	11-13
Awards and Scholarships	8-9
Career in Veterinary Medicine	2-3
Course Descriptions	14-20
Curriculum	
Preveterinary	10-11
Professional	13
Degrees Offered	13
Estimated Expenses	8
Evaluation of Work	
Grades	5
Grade Point Average	5
Departments and Facilities	3-5
Faculty	14-19
General Information	2-9
Graduate Study	2
History of Veterinary Education	3
Housing—Student	7-8
Loans and Financial Aids	9
Student Government	6-7
Student Personnel Services	5-6

In addition to this particular bulletin, the student should also consult the *Bulletin of General Information* which tells about the University as a whole. For more information regarding the preveterinary curriculum at the University of Minnesota, the student is referred to the *Bulletin of the College of Agriculture, Forestry, and Home Economics*. These bulletins can be obtained by writing to the Office of Admissions and Records, University of Minnesota, St. Paul, Minnesota 55101.

Explanation of Symbols Used

The following symbols are used throughout the course description section and will carry no page footnotes:

- ° Courses through which it is possible for graduate students to prepare Plan B papers.
- † All courses listed before dagger must be completed before credit is granted.
- § No credit is given if credit has been received for equivalent course listed after section mark.
- ‡ Means "concurrent registration in."
- ‡ A sharp mark means "consent of instructor."
- △ A triangle means "consent of the division, department, or school offering course."
- x After a course number, means "course is offered more than 1 quarter."

UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarné E. Grottum, Jackson; The Honorable Albert V. Hartl, Fergus Falls; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable George W. Rauenhorst, Olivia; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S.(Ch.E.), M.E., Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students

COLLEGE OF VETERINARY MEDICINE

Administration

William T. S. Thorp, D.V.M., M.S., Professor and Dean, College of Veterinary Medicine
(256 Veterinary Science Building)
Robert K. Anderson, D.V.M., M.P.H., Professor and Associate Dean, College of Veterinary
Medicine (300 A Veterinary Science Building)

College of Veterinary Medicine

GENERAL INFORMATION

The buildings of the College of Veterinary Medicine at the University of Minnesota are located in the southeast quarter of the St. Paul Campus, immediately north of Commonwealth Avenue, and extend from Boyd Avenue on the west to the State Fair Grounds on the east.

Veterinary Medicine as a Career—Veterinary medicine is modern medical science applied to animals. The study of veterinary medicine is concerned with gaining a thorough knowledge of the fundamental biologic and physical sciences relating to animal functions in health and disease. In the clinical years one correlates and applies this knowledge to the many areas of professional service. With this broad biologic knowledge and clinical training, the veterinarian may choose from among many challenging and interesting career opportunities following graduation. Individuals with almost every kind of interest, if they are devoted to animals and like biomedical work, can find a position in veterinary medicine that will bring them satisfaction and a rewarding career.

Professional Service and Activities—About 60 per cent of the veterinarians in the United States are engaged in private practice, either general or specialized. At present this usually means caring for large animals in rural areas or small animals in urban areas, or both, as in a general practice. There is a growing tendency to develop specialty practice concerned with only one species such as cattle or horses. Other specialty areas, such as obstetrics and surgery, are also developing in both large and small animal practices. Although practice may mean long hours and difficult work at times, it offers professional independence, a sense of satisfaction, and a rewarding career.

A growing percentage of veterinarians in the United States are engaged in fields other than private practice. Many have found careers in biomedical research. An increasing number of veterinarians are preparing themselves through graduate training to specialize in careers devoted to the search for knowledge through research and the satisfaction of disseminating this knowledge as teachers in colleges and universities.

A large number of veterinarians serve as professional specialists, administrators, and research scientists in industry and governmental agencies—state, national, and international. Veterinary medical knowledge and skill contribute to the advancement of science and the health of animals and man in such agencies as the Public Health Service, Department of Agriculture, United States Army, United States Air Force, Atomic Energy Commission, National Aeronautics and Space Administration, and the Food and Drug Administration. Industry is employing an increasing number of veterinarians in research and development as field specialists, consultants, and executives.

Increasing Opportunities in the Future—At present the demand for doctors of veterinary medicine far exceeds the supply. New areas of service are constantly developing and expanding, such as space biomedical programs, comparative medical research, and public health. With the tremendous growth in population more food-producing animals are needed and the expansion in size of herds and flocks offers new challenges and opportunities. More families and more children mean a greater number of household pets which will need veterinary medical care. It has been esti-

mated that we will need to increase the number of veterinarians in the United States, from 22,000 to 47,000, by the year 1980 to keep pace with the expected demand for veterinary medical service.

Historical Highlights—It has been said that veterinary medicine developed contemporaneously with the domestication of animals. There is historical evidence that ancient peoples practiced this science and art. Records of formal education in veterinary medicine go back to 1761 when a school for the study of anatomy and diseases of animals was established at Lyons, France. The first veterinary college was established in England late in the 18th century. In 1852 the first veterinary college in North America, the Veterinary College of Philadelphia, was granted a charter. Since 1852, veterinary colleges have been established throughout the United States. At present, there are 18 colleges of veterinary medicine with approximately 4,000 students.

Veterinary Education in Minnesota—The College of Veterinary Medicine at the University of Minnesota came into existence as a result of a combination of several factors. For a number of years the livestock industry of the state of Minnesota had expressed the opinion that a college of veterinary medicine was needed in this region. In 1945 many students from this state were interested in obtaining an education in veterinary medicine. A combination of student demand for veterinary medical education and the need of the livestock industry for increased veterinary services and research in animal diseases led to the appropriation of funds by the 1947 Minnesota State Legislature for the establishment of the School of Veterinary Medicine on the St. Paul Campus of the University. The first class, admitted in the fall quarter of 1947, was graduated in the spring of 1951. From 1947 to 1954 veterinary medicine was administered as a unit of the College of Agriculture, Forestry, Home Economics, and Veterinary Medicine. In 1954 the School of Veterinary Medicine became a separate unit of the Institute of Agriculture; in 1957 the College of Veterinary Medicine was established as a separate college of the University of Minnesota.

In 1956 the College of Veterinary Medicine at the University of Minnesota was fully accredited by the Council on Education of the American Veterinary Medical Association, subject to continued development and maintenance of standards comparable to other accredited colleges of veterinary medicine.

Departments

The teaching and research activities of the College of Veterinary Medicine, University of Minnesota, are housed in five major and several minor buildings. Some of the buildings and facilities will be discussed briefly in the following paragraphs.

Veterinary Anatomy—This department is located on the first and second floors of the new addition to the Veterinary Science Building and offers courses in anatomy, histology, embryology, and neuroanatomy. The laboratory housing the electron microscope is also located in this department.

Veterinary Bacteriology and Public Health—This department occupies the third floor of the Veterinary Science Building and is concerned with teaching and research in the areas of bacteriology, immunology, mycology, virology, and public health. The basic courses in microbiology are taught to first- and second-year veterinary students while public health and the diseases of poultry are offered to third- and fourth-year students.

Veterinary Diagnostic Laboratories—Located in the Veterinary Diagnostic Laboratory Building, this laboratory serves as the official veterinary diagnostic laboratory

for the state of Minnesota. Diagnostic laboratory techniques and procedures are taught to fourth-year students.

Veterinary Medicine—This department is located in the Veterinary Clinic Building. Courses in diagnosis, prevention, and treatment of animal diseases are taught to third- and fourth-year students. Business methods and forensic veterinary medicine are also taught in this department.

Veterinary Obstetrics and Gynecology—Located in the Veterinary Clinic Building, this department offers courses in obstetrics and reproductive diseases to third- and fourth-year veterinary students.

Veterinary Pathology and Parasitology—Courses in animal pathology and parasitology are offered to second-year veterinary students by this department which occupies the second floor of the Veterinary Science Building. The department also operates the clinical laboratories and necropsy room which are located in the Veterinary Clinic.

Veterinary Physiology and Pharmacology—Located in a large temporary building (TEH) adjacent to the Veterinary Clinic and on the first floor of the Veterinary Science Building, this department is responsible for teaching courses in physiology and pharmacology to second- and third-year veterinary students.

Veterinary Surgery and Radiology—This department is located in the Veterinary Clinic Building, though courses in surgery are taught both in the Veterinary Clinic and in the Veterinary Anatomy Building (old veterinary science building). Courses in surgery, radiology, hereditary diseases, and radiobiology are taught to students in the professional curriculum.

Veterinary Clinic—The Veterinary Clinic provides facilities for the medical and surgical treatment and for the hospitalization of household pets and domestic animals. Facilities are available to hospitalize approximately 60 dogs, cats, and other small animals and about 50 cattle, horses, sheep, and swine. Clinical laboratories and radiologic services are available within the building. Faculty from nearly every department in the college participate in the daily teaching program carried out in the Veterinary Clinic. The diagnosis and treatment of animal patients, under staff supervision, enable third- and fourth-year students to learn the applied aspects of medicine, surgery, and obstetrics. The clinical laboratories provide opportunities for learning the application of principles of parasitology, pathology, bacteriology, and chemistry to diagnosis and treatment of diseases of animals.

Ambulatory Clinic—Ambulatory clinics consist of bringing veterinary care to animals on farms. Of the several aspects of this service, one consists of providing veterinary medical care to animals on University farms and to animals on farms within reasonable distance from the St. Paul Campus. Another service is designed to provide clinical training and experience in diseases of reproduction. This service, staffed by members of the Department of Veterinary Obstetrics and Gynecology, provides fertility examination programs for 20 herds or approximately 2,000 cattle. Similar programs are conducted for horses. A third service is located at Maple Plain, Minnesota. Here, facilities include a modern clinic building and housing for students assigned to this service. Modest laboratory facilities are available at this clinic. Veterinary service is provided to livestock owners in the surrounding area. Farm calls are dispatched by two-way radio to provide for maximum efficiency of service.

Ambulatory clinics are designed to provide experience to students in handling cases on the farm. It supplements the training received in the veterinary clinic and is an essential and integral part of the clinical training in veterinary medicine to prepare students for large animal practice.

Other Facilities—The veterinary library of the College of Veterinary Medicine is presently located in the old Veterinary Science Building, but will soon occupy the fourth floor of a new addition to the Veterinary Science Building. The veterinary library contains all current veterinary journals as well as many books and current periodicals from related fields such as medicine and animal science.

The facilities of the meat packing plants in South St. Paul are utilized for instruction in meat inspection and hygiene. The facilities of the Minneapolis Health Department, Minnesota Livestock Sanitary Board, and the Animal Disease Eradication Division of the United States Department of Agriculture are also utilized in the teaching of the public health aspects of veterinary medicine.

Evaluation of Work

Grades—If a student is doing passing work in a course, he will be given one of four passing grades: A, B, C, or D. The grade of C indicates work of average quality; B and A indicate higher levels of achievement; D denotes work of inferior quality. The grade F (failure) is given for work which in the opinion of the instructor does not deserve college credit.

The grade of I (incomplete) usually, but not necessarily, indicates that the instructor considers a student's performance incomplete for the quarter. The grade of I must be changed to a permanent letter grade before 6 weeks of the succeeding quarter has elapsed. If such change is not recorded within the prescribed time, the grade will automatically revert to F.

Grade Point Average—To measure quality of work, grade points are assigned to the various letter grades as follows: each credit of A, 4 points; each credit of B, 3 points; each credit of C, 2 points; each credit of D, 1 point. The grade of F does not carry any grade points. There is a minimum grade point average requirement in the College of Veterinary Medicine. For a more complete discussion see Scholarship Requirements under Professional Curriculum.

Student Personnel Services

Faculty Advisers—In the College of Veterinary Medicine, each class has an adviser. The adviser is concerned with interpreting the program for the students and with their general progress. When a student has problems which need special individual attention, the adviser may refer him to other faculty members, an appropriate college officer, or to a specialized counseling agency. Students are urged to consult class advisers regarding any matter requiring attention.

All-University Personnel Services—The personnel agencies listed below are available to the student at any time. He may consult them with or without referral from a faculty adviser.

Preveterinary Medical Adviser—Any problems or questions relating to the preveterinary curriculum should be directed to the preveterinary adviser who may be found at 215 Coffey Hall.

Student Counseling Bureau—This bureau is located at 101 Eddy Hall on the Minneapolis Campus. A representative is available at 101 Coffey Hall, St. Paul Campus. The bureau provides help and advice on personal problems and on problems of vocational choice.

Student Activities Bureau—This bureau has offices in Temporary North of Mines, Minneapolis Campus, and at 103 Agricultural Botany Building, St. Paul Campus. This bureau and the program consultants of the Minne-

apolis Campus Student Union and St. Paul Campus Student Center are helpful in the matter of participation in extracurricular activities.

Bureau of Student Loans and Scholarships—If a student is in need of financial help, he may apply at this bureau, located in 104 Westbrook Hall, Minneapolis Campus.

Student Housing Bureau—For help in finding a suitable room or apartment, a student may consult this bureau. Offices are located at 209 Eddy Hall, Minneapolis Campus, and at 101 Coffey Hall, St. Paul Campus.

Student Employment Office—For a part-time job on or off campus a student may apply to the various heads of departments or to the Student Employment Office, 30 Wulling Hall, Minneapolis Campus.

Study Skills—Help may be obtained for improvement of study skills such as reading at the Department of Rhetoric, 230 Agricultural Engineering Building, St. Paul Campus, or at the Reading and Study Skills Clinic, 101 Eddy Hall, Minneapolis Campus.

Speech and Hearing Problems—The student having such problems should consult the Department of Rhetoric, 230 Agricultural Engineering Building, St. Paul Campus.

Veterans' Benefits—105 Morrill Hall, Minneapolis Campus.

Adviser for Foreign Students—Foreign students should keep in contact with the adviser for foreign students, 717 East River Road, Minneapolis Campus.

Health Problems—Consult the Health Service staff, University Health Service, St. Paul or Minneapolis Campuses.

Co-ordinator of Religious Activities—211 Eddy Hall, Minneapolis Campus.

Student Government

Student Council—The Student Council directs and co-ordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from all major areas of the College of AFHE and from the College of Veterinary Medicine.

The council co-operates with the Minnesota Student Association and the Senate Committee on Student Affairs. It brings questions from the student body to the administration of the colleges and discusses matters of general interest.

Honor System—Under the provisions of the Student Self-Government Honor System, the students of the College of Veterinary Medicine, rather than the faculty, monitor examinations and quizzes. The honor system is operated on the assumption that honesty prevails among the students. Students place themselves on their honor not to give or receive aid during examinations. The responsibility of honesty is between student and student; the faculty does not place the student on his honor. Under the honor system students monitor examinations.

If the student should observe dishonesty during an examination period, he may take some appropriate step at the time to halt the dishonest act, or may report the incident later to the Honor Case Commission of the college. The Honor Case Commission, comprised of students from the various classes, considers confidentially the various aspects of the situations reported. If it is clear that scholastic dishonesty has occurred, the commission recommends to the Committee on Admissions and Scholastic Standing of the faculty an appropriate penalty to be levied on the offending student.

The honor system is essentially a preventive, rather than a punitive, system. New students are urged to discuss the honor system with students previously registered in the college.

Staff-Student Liaison Committee—The purpose of this committee, composed of a student representative from each class and staff members, is to maintain a helpful relationship between members of the student body and the faculty. When the student questions or encounters situations which in his opinion need clarification, he is urged to bring the problem to the attention of this committee. Likewise, faculty members may refer problems to the committee.

Student Activities

Students enrolled in the College of Veterinary Medicine have available to them a varied program of extracurricular activities. In a large institution such as the University of Minnesota organized groups and facilities may be found which satisfy the needs and interests of all.

College of Veterinary Medicine—Within the college there are student organizations which are dedicated to a common interest in veterinary medicine. These include Phi Zeta, an honorary society which sponsors lectures presented by outstanding scientists in the field of veterinary medicine; Alpha Psi, a social fraternity for veterinary students; and the Student Chapter of the American Veterinary Medical Association, a preprofessional society which sponsors lectures by outstanding medical scientists and performs a variety of service and social functions on behalf of the student body.

St. Paul Campus—The St. Paul Campus Student Center is the focal point for social life on the St. Paul Campus. A varied recreational program is provided here. Such campus-wide organizations as the Toastmasters and Toastmistresses, and Punchinello, a dramatics organization, enable the students to exercise and improve special skills and hobbies. The churches near the campus have student programs with counselors or directors. Some maintain student centers with recreational and dining facilities. Students enrolled in the college may also participate in campus-wide student government organizations such as the Student Council and the Student-Faculty Intermediary Board. The St. Paul Campus Gymnasium provides extensive facilities including a swimming pool, tennis courts, basketball courts, handball courts, and equipment for a great variety of other sports. Students and their families may avail themselves of these facilities.

Minneapolis Campus—Students are eligible to participate in the numerous activities of the Minneapolis Campus. These include a hikers' club, canoe club, YMCA and YWCA, and many other organizations bringing together students having common interests.

Housing Facilities on the St. Paul Campus

Single students attending the University of Minnesota on the St. Paul Campus may live in University residence halls, in private homes, rooming houses, or apartments. Information about all housing facilities may be obtained from the Student Housing Bureau, 101 Coffey Hall, St. Paul Campus.

University residence halls on the St. Paul Campus include Bailey Hall (a co-educational residence); Brewster, Dexter, and North Halls for men students; and Meredith Hall for women. Meals for all halls are served in the Dining Center. All residence halls require a contract for the academic year of 3 quarters. The 1964-65

rates range from \$265 to \$314 per quarter. Further information on residence halls may be secured by writing directly to Residence Hall Director, Bailey Hall, St. Paul Campus, University of Minnesota, St. Paul, Minnesota 55101.

Married students may live in University-operated housing in Commonwealth Terrace, a new apartment development on the St. Paul Campus. The one bedroom units rent for \$70 per month, the two bedroom units for \$80 per month. The units are unfurnished and the rent includes all utilities except telephone. Further information and applications may be secured by writing to Family Housing, 1295 Gibbs, St. Paul, Minnesota 55108.

The Student Housing Bureau will assist students in locating suitable housing in approved and supervised off-campus locations, if desired.

Room rents for single rooms range from \$25 to \$40 per month and double rooms range from \$20 to \$30 per month per student. Eating accommodations are available in the University-operated Dining Center on the St. Paul Campus, and in student-operated co-operatives.

Off-campus apartment rents vary from \$75 to \$130 per month and may be furnished or unfurnished. Listings of apartment vacancies throughout the Twin Cities area are available. A married student may find it advisable to come to the campus alone and take temporary housing until suitable quarters for the entire family are found.

Trailer parking space is not provided at the University, but there are private trailer parks located outside the Twin Cities limits, and upon request a list of these places will be sent by mail.

Estimated Expenses per School Year

Tuition and incidental fee per school year

Resident (\$160 per quarter)	\$ 480
Nonresident (\$400 per quarter)	1,200
Microscope, dissecting set, insurance on equipment (first year only)	250-500
Books and laboratory equipment	125

Awards and Scholarships

Caleb Dorr—Usually a sum of approximately \$350 per year is available to the College of Veterinary Medicine. This sum is subdivided into four separate awards and given to the individual with the best cumulative grade point average in each class. As an example, for 1964-65 the breakdown was as follows: Senior Class, Gold Medal; Junior Class, \$125; Sophomore Class, \$100; Freshman Class, \$90.

Minnesota State Veterinary Medical Association—Annual award of \$25 to the outstanding senior student in clinical veterinary medicine.

Women's Auxiliary to the American Veterinary Medical Association—Annual award of \$50 to the senior student for outstanding contributions to student activities on the campus.

Women's Auxiliary to the Minnesota State Veterinary Medical Association—Annual award of \$25 to the junior student in the College of Veterinary Medicine selected on the basis of need and scholarship.

Duluth Kennel Club Award—Three awards of \$100 each to outstanding junior students showing the most promise and interest in small animal medicine.

Carl Schlotthauer Award—This award is made to a senior student in veterinary medicine demonstrating outstanding ability in veterinary surgery.

Veterinary Medical Scholarship Fund—This fund, provided through the generosity of alumni of the College of Veterinary Medicine, provides tuition scholarships to worthy students enrolled in or eligible for admission to the College of Veterinary Medicine.

Harvey H. Hoyt Memorial Scholarship Award—An annual award of \$50 to be made in memory of Dr. Harvey H. Hoyt to an outstanding senior student in the College of Veterinary Medicine on the basis of scholarship and intent to pursue a career in teaching and research in veterinary medicine with a preference to be made for students with interests in clinical veterinary medicine.

Merck Veterinary Medicine Award—An award of a Merck Veterinary Manual to a student in each of the junior and senior classes in the College of Veterinary Medicine on the basis of their scholastic records.

Caleb Dorr Special Scholarship Prizes—An award, usually a book, to all students in the College of Agriculture, Forestry, and Home Economics and in the College of Veterinary Medicine who have had 2 or more quarters of work in these colleges and who have a GPA of 3.5 or better.

Alpha Zeta Traveling Scholarship—When a veterinary student receives this award, it is used to help defray the expenses of sending the president of the student chapter of the American Veterinary Medical Association to the annual meeting of the American Veterinary Medical Association.

AVMA Foundation Undergraduate Scholarship Awards—Scholarship awards made by the American Veterinary Medical Association to undergraduate veterinary students to stimulate interest in research. For further information, contact the Office of the Dean, College of Veterinary Medicine.

Students in the College of Veterinary Medicine are eligible to compete for many general scholarships available to all University students. For additional information concerning these scholarships, contact the Bureau of Student Loans and Scholarships, 201 Eddy Hall, Minneapolis Campus.

Loans and Financial Aids

It is possible to obtain loans which are administered by the Bureau of Student Loans and Scholarships of the University of Minnesota or the Women's Auxiliary of the American Veterinary Medical Association as follows:

National Defense Student Loans are available through the University to students whose backgrounds indicate superior ability. These loans have a maximum limit of \$1,000 per year with a total limit of \$5,000. Interest is at 3 per cent per annum beginning 1 year after graduation and may be spread over a period of 10 years.

The **University of Minnesota** has funds for loans which are available to students who have completed at least 2 quarters of academic work. The limit of indebtedness is \$750 for any 1 year and the total indebtedness which may be incurred as a student is \$1,500. The interest rate on these loans is 3 per cent per annum until graduation. After graduation the interest rate is 5 per cent per annum. Payments may be deferred until after graduation and may be spread over as many as 10 years.

The **Women's Auxiliary of the American Veterinary Medical Association** has funds for loans which may be made to selected senior veterinary students, junior veterinary students, or to graduate students. The limit of indebtedness allowed is \$500. The interest rate is 2 per cent per annum. Repayment of principal may be deferred until 2 years after graduation.

The **Reuel Fenstermacher Student Loan Fund for Veterinary Medicine** has been established to provide loan assistance to needy students in the College of Veterinary Medicine who are making satisfactory progress toward a degree from the college, and who indicate a sincere intention of completing the requirements for the degree. The limitations and interest rate are the same as those listed under University of Minnesota student loan funds.

ADMISSIONS AND CURRICULUMS

Training in veterinary medicine includes 2 years of collegiate study in a pre-veterinary curriculum and 4 years of professional study in the College of Veterinary Medicine. The preveterinary requirements may be obtained at either the Minneapolis or St. Paul Campuses of the University of Minnesota, or at another institution offering the required courses.

Preveterinary Curriculum

Admission Requirements and Suggested Preparation

1. The student must meet the general requirements for admission to the College of Agriculture, Forestry, and Home Economics as listed in the *Bulletin of General Information*. The following high school units are required for admission: 3 units in English, 2 units in mathematics (1 unit in elementary algebra and 1 unit in plane geometry or higher algebra) and 1 or more units in natural science or agriculture. Beginning fall quarter 1966, 3 units in mathematics (1 unit elementary algebra, 1 unit plane geometry and 1 unit higher algebra or equivalent) will be required for admission.

2. Students not having completed higher algebra while in high school will require preparatory course work at extra cost to themselves. Completion of trigonometry while in high school is recommended as the student with an acceptable performance will not be required to take trigonometry at the college level.

3. Prospective students are encouraged to include biology, chemistry, and physics in their high school programs.

Curriculum

Preparation for a career in veterinary medicine requires a minimum of 2 years of study in a preprofessional curriculum and 4 years in the professional curriculum. The University of Minnesota provides opportunities for completion of the entire course of study. The 2-year preprofessional curriculum is offered in the College of AFHE or may be pursued at any institution offering the required courses.

A minimum of 90 quarter credit hours of work at the college level is required of all students prior to entrance into the College of Veterinary Medicine. These include:

<i>Required Areas of Study for Admission</i>	<i>Suggested Preveterinary Courses, College of AFHE, University of Minnesota</i>
English (12-15 credits) English or rhetoric (communication), 9 credits, public speaking, 3 credits	Orie 1—College Orientation Lectures (1) Rhetoric—Freshman Communication requirement (9) Rhet 22—Public Speaking (3)
Humanities (5-6 credits) Humanities, comparative literature, or philosophy	Rhet 41 and 42 or 43—Humanities (6)
Mathematics (5-15 credits) Trigonometry and college algebra or their equivalent. Number of credits will depend on high school mathematics background.	Math T, 10—Trigonometry; College Algebra (8)

Chemistry (25 to 30 credits)

General inorganic and qualitative, quantitative, and organic (must include laboratory)

GeCh 4-5—General Principles of Chemistry (10)

GeCh 6—Principles of Solution Chemistry (4)

AnCh 57—Quantitative Analysis (5)

OrCh 61-62—Organic Chemistry (8)

Physics (8-12 credits)

Should include mechanics, heat, electricity, sound and light, with laboratory; college algebra and trigonometry or their equivalent must be prerequisites.

MeAg 24, 25—College Physics I, II (8)

Biology (10-12 credits)

General biology, zoology, or zoology and botany (must include laboratory)

Biol 1-2—General Biology (10)

Selected areas (10 or more credits)

Must be in at least two of the following areas: agricultural economics or economics, anthropology, geography, history, political science, psychology, social science, sociology, or a foreign language.

Other electives

Sufficient additional electives should be chosen to give at least 90 quarter credits (2 academic years) of college work. These electives may be selected on the basis of the student's interest in a broad educational program. Students without farm experience may wish to elect courses in animal and dairy husbandry and poultry science. Students planning a career in academic or research fields are encouraged to take additional courses in chemistry and mathematics.

Professional Curriculum

Procedure for Gaining Admission—Enrollment in the professional curriculum of the College of Veterinary Medicine is limited. Admission requirements must be satisfied before or during the academic year in which the student makes application. Application forms should be obtained from the Office of Admissions and Records at the beginning of the fall quarter of the second year of the preveterinary program. All candidates are required to take the following admissions tests during the early part of the second year of their preveterinary program: Minnesota Multiphasic, Strong Vocational Interest Inventory, Veterinary Aptitude Test. Each candidate will receive detailed information relative to the scheduling of the tests shortly after he has filed his completed application form. The results of these tests will be forwarded to the Office of Admissions and Records, University of Minnesota, St. Paul, Minnesota 55101.

The completed application form for admission should be returned to the Office of Admissions and Records as soon as possible, but definitely not later than November 1.

Students who have taken their preveterinary work at colleges or universities other than the University of Minnesota must submit, or have forwarded, to the Office of Admissions and Records two complete transcripts which include all preveterinary work taken during the first year of their preveterinary program. A \$5 fee is charged for evaluation of preveterinary credits submitted by nonresidents of Minnesota. A complete transcript of all preveterinary work should be forwarded to the Office of Admissions and Records when the preveterinary program is completed.

Selection of Candidates—Students are selected for admission to the first year of the professional curriculum on the basis of their scholastic standing in the required preveterinary courses, their scores in the veterinary aptitude tests, their interest, character, and personal fitness for the practice of veterinary medicine. Preference is given to residents of Minnesota, followed by residents of adjoining states which do not have veterinary medical schools. Applications of other non-

residents who have special reasons for attending the College of Veterinary Medicine at the University of Minnesota may be considered.

In the selection of candidates for admission to the College of Veterinary Medicine a personal interview is required with members of the veterinary faculty or other persons designated by the dean of the college. Selections will be made as rapidly as possible following receipt of the application, transcripts, references, and test scores. If preveterinary courses are in progress, admission will be provisional, subject to their satisfactory completion. In most instances no final decision will be made until a complete transcript of preveterinary course work has been received and evaluated.

Procedure Following Admission—All applicants will be informed as to the status of their application on or about March 15. All inquiries or material relative to any application or to the admission requirements of the College of Veterinary Medicine should be sent, in writing, to the Office of Admissions and Records, University of Minnesota, St. Paul, Minnesota 55101. Accepted applicants will receive a statement for a preliminary fee of \$10 to be applied on the tuition for the first quarter. This must be paid within 10 days after receipt of statement and will not be returned if the applicant fails to matriculate.

Registration—The Office of Admissions and Records announces the registration dates for each quarter. If you are accepted for admission, the dates of registering and detailed instructions will be included in the information that is sent to you. New students who do not register within 24 hours of the announced deadline for registration will be dropped from the admission list and forfeit their \$10 preliminary deposit fee.

Special Needs—All students are required to provide their own microscope. If a used microscope is purchased, it is necessary to have the equipment examined and approved by a member of the faculty. This item will be used throughout the entire 4 years of the professional curriculum. In addition to a microscope and textbooks, the student will be expected to purchase certain special items of clothing and some instruments.

Class Attendance—In the College of Veterinary Medicine attendance is compulsory for certain classes. In many courses, because of their nature, attendance is required at all times. If you miss class for good reasons beyond your control, you have the privilege of requesting the instructor's assistance in making up the class work you miss. The instructor is under no obligation, however, to give assistance if you willfully or deliberately absent yourself from class, although there are situations in which he may properly wish to do so.

The following situations will be accepted by instructors as reasons that would justify absence from class and a request for assistance in making up work: (a) illness certified by the University Health Service or by the family physician; (b) emergencies caused by a death or serious illness in the immediate family; (c) emergencies approved by the Committee on Admissions and Scholastic Standing; and (d) participation in University-approved, co-curricular activities (certification that a student was absent from class because he was engaged in such activities will be made by the dean of students).

If you wish to make up work, you should confer directly with the instructor in regard to the justification for your absence and the possibility and ways of making up the class work. The Committee on Admissions and Scholastic Standing will enter into the situation only when special emergencies (item c above) are involved and as an appeal agency.

Grades—Quarterly grades will be given on the same basis as outlined in the General Information section of this bulletin.

Scholarship Requirements—A student shall obtain a grade point average of 1.50 or higher for any one quarter. Students failing to obtain a grade point average above 1.50 or receiving a grade of “failure” shall automatically be dropped from the professional curriculum. Those having a grade point average between 1.50 and 2.00 shall be placed on probation.

A grade point average of 2.00 must be maintained for each year to continue in the succeeding year of the professional curriculum.

The Committee on Admissions and Scholastic Standing may grant permission for repeating 1 to 3 quarters of work. Permission will not be given for repeating more than 1 year in the 4-year curriculum. A grade point average of 2.50 or higher is required for each quarter of work repeated. If a single course is repeated, the grade earned must be above the median C. A grade point average of 2.00 must be maintained in nonrepeat courses that are taken. Substitute courses will be considered as repeat courses and will not be permitted without prior approval of the Committee on Admissions and Scholastic Standing.

Readmission—If a student is dropped, he may not be reinstated without the permission of the Committee on Admissions and Scholastic Standing. Credits earned at other institutions during the period of suspension will not apply toward graduation from the University of Minnesota unless permission was given in advance by the Committee on Admissions and Scholastic Standing. If permitted to return, the student will be placed on probation and may be dropped again at any time when his work is unsatisfactory.

Degrees Offered and Requirements—The College of Veterinary Medicine will recommend students for the following degrees:

1. *Bachelor of science* (B.S.) degree, without designation, following completion of the first 2 years of veterinary studies with a grade point average of 2.00 or above and a minimum of 192 credit hours of work.

2. *Doctor of veterinary medicine* (D.V.M.) following satisfactory completion of the 4 years of the professional curriculum with a grade point average of 2.00 or above and a minimum of 235 credit hours of work in the professional curriculum.

Required Courses

The student enrolled in the College of Veterinary Medicine has few problems in the selection of courses. His curriculum is prescribed according to standards established by the Council on Education of the American Veterinary Medical Association. There is virtually no free academic time available for the pursuit of formal studies in other schools and colleges. All members of a given class move together through the 4-year curriculum. The first 2 years are devoted to mastery of the basic science courses. These include biochemistry, anatomy, physiology, pharmacology, microbiology, pathology, and parasitology. Clinical experience is not gained until the student attains third-year status. By this time he has gained an insight into the fundamentals of normal and abnormal functions of the body. This knowledge is integrated and expanded in the more applied courses such as those in medicine, surgery, and public health. Required courses are indicated under Description of Courses.

Animal Science Courses

Veterinary students are required to enroll in AnHu 71, Feeds and Feeding, during their junior year. In addition they must elect any two of the following during their senior year:

AnHu 63—Swine Production

Poul 61—Industry Feeding and Production Practices

DyHu 120—Feeding and Management

AnHu 65—Beef Cattle Production

DESCRIPTION OF COURSES

Department of Veterinary Anatomy (VAna)

Professor

Alvin F. Weber, D.V.M., Ph.D., *acting head*

Instructor

Wesley D. Anderson, D.V.M.
Thomas F. Fletcher, D.V.M.
Janis Friedkalns, D.V.M.

100. **Orientation for Veterinary Students.** History of veterinary medicine, various phases of veterinary medical endeavor, and matters pertaining to professionalism. (1 cr; prereq #)
101. **Anatomy of the Dog.** Detailed study of gross anatomical structures and their functions. (7 cr; prereq #)
102. **Anatomy of Nonruminants.** Anatomy of the horse, pig, and poultry as compared to the dog. (5 cr; prereq 101 or #)
103. **Anatomy of Ruminants.** Anatomy of the cow and sheep. (3 cr; prereq 102 or #)
106. **Veterinary Surgical Anatomy.** Topographical anatomy of domestic animals as applied to surgery and the practice of veterinary medicine. (1 cr; prereq 103, VMC 101, #)
130. **Veterinary Neuroanatomy.** Functional study of the gross and microscopic anatomy of the central nervous system and special sense organs of domestic animals. (3 cr; prereq 101, 151, #)
150. **Comparative Prenatal Development of Domestic Animals.** Microscopic and gross anatomical studies of the origin and development of body organ systems and morphological considerations of fetal-maternal relationships. (4 cr; prereq #)
- 151-152-153. **Microscopic Anatomy of Domestic Animals.** Microscopic studies of tissues and organs of domestic animals. (3 cr for 151, 4 cr for 152, 5 cr for 153; prereq #)
190. **Seminar: Veterinary Anatomy.** (1 cr; prereq 101, 151, #)
- 191x. **Special Studies in Veterinary Anatomy.** Individual problems in gross anatomy, histology, embryology, neurology, hematology, and histological techniques. (1-5 cr per qtr; regis for more than 1 qtr permitted; prereq 151, or equiv, #)

For Graduate Students Only

- 201, 202. **Comparative Veterinary Neurology**
- 203x. **Experimental Comparative Veterinary Neurology**
250. **Morphology of Animal Cells and Intercellular Substances**
- 251x. **Histological and Ultrahistological Techniques**
252. **Applied Optical Methods in Veterinary Medical Research**

Department of Veterinary Bacteriology and Public Health (VBac)

Professor

Benjamin S. Pomeroy, D.V.M., Ph.D., *head*
R. K. Anderson, D.V.M., M.P.H., *associate dean*

Associate Professor

Robert K. Lindorfer, Ph.D.

Assistant Professor

Keith I. Loken, D.V.M., Ph.D.

Instructor

Charles J. Smith, D.V.M.

Robert B. Mericle, D.V.M.

H. J. Osterholt, D.V.M.

James H. Steele, D.V.M., M.P.H.

Daniel F. Werring, D.V.M.

Lecturer

Jack G. Flint, D.V.M.

C. C. Hamilton, D.V.M.

- 53. General Microbiology.** Lectures and laboratory exercises concerning the morphology, taxonomy, genetics, physiology, and ecology of microorganisms. Practical application of the fundamental principles of microbiology to other phases of science and industry. (5 cr; prereq 10 cr chemistry, 4 cr biological science)
- 101. General Veterinary Bacteriology and Immunology.** Lectures and laboratory on the classification, morphology, and physiology of bacteria; the bacteriology of water, sewage, milk, and food. Basic principles of infection and immunity. (6 cr; prereq 10 cr zoology, 13 cr chemistry, #)
- 102. Pathogenic Bacteria and Fungi.** Lectures and laboratory on animal pathogens with emphasis on basic mechanisms of infection. (6 cr; prereq 101 or equiv, #)
- 103. Veterinary Virology.** Lectures and laboratory on the basic techniques of virology. Emphasis on viral and rickettsial agents causing animal diseases. (4 cr; prereq 102 or equiv, #)
- 125-126-127. Veterinary Public Health.** Principles of epidemiology; selected diseases of man and of animals transmissible to man; principles and methodology of food hygiene including meat, poultry, milk, and other foods as related to animal and human health; veterinarians' relationship to public health and animal disease control agencies. (4 cr for 125, 3 cr for 126, 2 cr for 127; prereq 103, VPAP 153, #)
- 128. Problems in Veterinary Bacteriology and Public Health.** (Cr ar; prereq 103 or equiv, #)
- 131. Poultry Diseases.** Lectures dealing with diseases of poultry. (4 cr; prereq 103, VPAP 153 or equiv, #)

For Graduate Students Only

- 201x.* Advanced Poultry Diseases**
- 205x.* Advanced Veterinary Bacteriology**
- 211. Seminar: Veterinary Bacteriology**
- 221. Advanced Veterinary Public Health**

Department of Veterinary Medicine (VMC)

Professor

Dale K. Sorensen, D.V.M., Ph.D., *head*

Donald G. Low, D.V.M., Ph.D., *director of clinics*

George W. Mather, D.V.M., Ph.D.

Associate Professor

Robert A. Merrill, D.V.M.

Assistant Professor

Donald W. Johnson, D.V.M., Ph.D.

Instructor

John Arbaugh, D.V.M.

Ralph Farnsworth, D.V.M.

LaRue W. Johnson, D.V.M.

Peter B. Little, D.V.M.

Carl Osborne, D.V.M.

William Quinn, D.V.M.

- 101. Veterinary Physical Diagnosis.** Fundamentals of clinical veterinary medicine, procedures in physical diagnosis and restraint of animals. (4 cr; prereq regis in 2nd yr VMed)
- 102. Large Animal Medicine.** A study of the diseases of the skin, musculoskeletal system, respiratory system, and cardiovascular system. (4 cr; prereq 101)

103. **Large Animal Medicine.** A study of the diseases of the hemic and lymphatic system, and digestive system. (4 cr; prereq 102)
104. **Large Animal Medicine.** A study of the diseases of the urinary system, endocrine system, nervous system, and organs of special sense. Discussions of metabolic diseases, nutritional deficiencies and toxic diseases affecting several systems or the body as a whole. (5 cr; prereq 103)
106. **Small Animal Medicine.** A study of the diseases of the skin, musculoskeletal system, respiratory system, cardiovascular system, hemic and lymphatic system, and digestive system. (5 cr; prereq regis in 3rd yr VMed)
107. **Small Animal Medicine.** A study of the diseases of the urogenital system, endocrine system, nervous system, and organs of special sense. Discussion of infectious diseases, nutritional deficiencies and toxic diseases affecting several systems or the body as a whole. (4 cr; prereq 106)
110. **Clinics.** (For 3rd yr VMed) Medical, obstetrical, radiological, surgical, and ambulatory clinics and laboratory examination of diseases of animals. (5 cr; prereq 101)
111. **Clinics.** (For 3rd yr VMed) Continuation of 110. (5 cr; prereq 110)
112. **Clinics.** (For 3rd yr VMed) Continuation of 111. (5 cr; prereq 111)
114. **Clinical Conference.** (For 3rd yr VMed) Group discussion of clinical cases. (1 cr; prereq regis in 3rd yr VMed)
115. **Clinical Conference.** (For 3rd yr VMed) Continuation of 114. (1 cr; prereq 114)
116. **Clinical Conference.** (For 3rd yr VMed) Continuation of 115. (1 cr; prereq 115)
121. **Clinics.** (For 4th yr VMed) Medical, obstetrical, radiological, surgical, and laboratory examination of diseases of animals including ambulatory clinics. (3 cr; prereq 112)
122. **Clinics.** (For 4th yr VMed) Continuation of 121. (5 cr; prereq 121)
123. **Clinics.** (For 4th yr VMed) Continuation of 122. (5 cr; prereq 122)
124. **Clinics.** (For 4th yr VMed) Continuation of 123. (5 cr; prereq 123)
126. **Clinical Conference.** (For 4th yr VMed) Group discussion of clinical cases. (1 cr; prereq #)
127. **Clinical Conference.** (For 4th yr VMed) Continuation of 126. (1 cr; prereq 126)
128. **Clinical Conference.** (For 4th yr VMed) Continuation of 127. (1 cr; prereq 127)
130. **Veterinary Jurisprudence and Business Methods.** Business and legal procedures applicable to veterinary practice. Responsibilities of the veterinarian to the client, the public, and the profession. (3 cr; prereq regis in 4th yr VMed)
131. **Infectious Diseases of Large Animals.** Principles of the host-parasite relationship, including mechanisms of resistance, epizootiology, and preventive medicine. Discussions of the bacterial, mycotic, viral, and rickettsial diseases of large animals, affecting the body as a whole, emphasizing the pathogenesis, symptomatology, differential diagnosis, treatment, prevention, and control procedures. (5 cr; prereq 104)
132. **Preventive Veterinary Medicine.** Principles and application of preventive medical procedures for specialized practice. (5 cr; prereq regis in 4th yr VMed)
137. **Animal Diseases and Poisonous Plants.** Systematic study of important plants poisonous to animals. Special emphasis is placed on identification, toxicology, diagnosis, and treatment. (3 cr; prereq 104)

For Graduate Students Only

201. **Advanced Veterinary Medicine**
202. **Advanced Diagnosis, Therapeutics of Animal Diseases**
203. **Seminar**
204. **Medical Conference**

Department of Veterinary Obstetrics and Gynecology (VOBs)

Professor

Raimunds Zemjanis, D.V.M., Ph.D., *head*

Instructor

William F. Brown, D.V.M.

Assistant Professor

William F. Cates, D.V.M., Ph.D.

- 101. Veterinary Obstetrics.** Lectures covering physiology and pathology of pregnancy, obstetrics, and diseases of the newborn. Laboratory practices in manipulative obstetrics. (4 cr; prereq VMC 101, #)
- 102. Animal Reproduction.** Lectures covering physiology and pathology of reproduction, artificial insemination, and breeding management. (4 cr; prereq VMC 101, VMC 113, #)

For Graduate Students Only

- 201x. Advanced Diagnostic Methods**
- 204x. Special Problems in Animal Reproduction**
- 206x. Comparative Physiology of Reproduction**
- 210, 211, 212. Advanced Endocrinology of Reproduction**

Department of Veterinary Pathology and Parasitology (VPaP)

Professor

J. H. Sautter, D.V.M., Ph.D.
Henry J. Griffiths, D.V.M., Ph.D.
W. T. S. Thorp, D.V.M., M.S., *dean*

Assistant Professor

William J. Bemrick, Ph.D.
Victor Perman, D.V.M., Ph.D.

Instructor

John C. Schlotthauer, D.V.M.

- 101. Veterinary Parasitology.** Systemic and biological study of the protozoan and arthropod parasites of animals. Emphasis is placed on their relationships to disease and the principles of parasite control. (5 cr; prereq 151, #)
- 102. Veterinary Parasitology.** Helminth parasites and parasitic diseases of animals with emphasis on principles of control. (5 cr; prereq #)
- 103. Diseases and Parasites of Wildlife.** Economic and biological relationships of animal parasites and disease to regional wildlife. (3 cr; prereq #; offered 1965-66 and alt yrs)
- 151. General Veterinary Pathology.** Descriptions, discussions, gross and microscopic demonstrations of tissue reactions, including retrogressive and inflammatory changes, neoplasms, and reparative processes. (5 cr; prereq VBac 101, #)
- 152. Special Veterinary Pathology.** Systematic study of the diseases of the respiratory, cardiovascular, digestive, hemopoietic, urinary, genital, endocrine, nervous, locomotor systems. (5 cr; prereq 151, #)
- 153. Special Veterinary Pathology and Pathology of Infectious Diseases of Animals.** (5 cr; prereq 152 or equiv, #)
- 154. Veterinary Clinical Pathology.** Application and interpretation of laboratory tests used in clinical diagnosis in domestic animals. (2 cr; prereq 153, #)
- 156. Diseases of Fur-Bearing Animals.** Etiology, symptomatology, and treatment of diseases of fur-bearing animals. (2 cr; prereq 153, VMC 122, #)

157. **Veterinary Necropsies.** Necropsy, techniques, examinations of tissue sections, and preparation of records. (1-3 cr per qtr; prereq 153, #)
158. **Veterinary Surgical Pathology.** Neoplasms, surgical biopsies, necropsy material, together with a review of the pertinent literature. (1-3 cr; prereq 153, #)

For Graduate Students Only

- 201x.* **Advanced Veterinary and Poultry Pathology**
- 202x.* **Seminar: Veterinary Pathology**
- 203x.* **Neoplasms of Domestic Animals**
- 205x.* **Advanced Veterinary Clinical Pathology**
- 240x.* **Advanced Veterinary Parasitology**
- 241x.* **Problems in Veterinary Parasitology**

Department of Veterinary Physiology and Pharmacology (VPP)

Professor

Clarence M. Stowe, V.M.D., Ph.D., *head*
 Archie L. Good, V.M.D., Ph.D.
 Paul B. Hammond, D.V.M., Ph.D.

Assistant Professor

Harold E. Dziuk, D.V.M., M.S., Ph.D.
 Charles H. McGinnis, M.S., Ph.D.
 John P. Sullivan, D.V.M., Ph.D.

Instructor

Edward F. Jankus, D.V.M.

- 105-106-107-108. **Animal Physiology.** Physiology of circulation, respiration, digestion, kidney function, nervous system, and special senses in the domestic animals. (5 cr for 105 [lect], 2 cr for 106 [lab], 3 cr for 107 [lect], 2 cr for 108 [lab]; prereq VAna 153, MdBc 103, #)
109. **Physiology of the Endocrine and Reproductive Systems.** Function and regulation of the endocrine organs and reproductive system in domestic animals. (3 cr; prereq 108, #)
120. **Seminar: Animal Physiology.** (2 cr; prereq 109, #)
130. **Problems in Animal Physiology.** (Cr ar; prereq 109, or Phsl 106-107, #)
151. **Veterinary Pharmacology.** Local and general anesthetic, analgesic, antipyretic, analeptic, and autonomic drugs. (5 cr; prereq 108, or equiv, #)
152. **Veterinary Pharmacology.** Cardiovascular, chemotherapeutic, anthelmintic, and gastrointestinal drugs. (3 cr; prereq 151, or equiv, #)
153. **Veterinary Pharmacology.** Diuretics, fluid therapy, toxicology, and endocrine drugs. (3 cr; prereq 152 or equiv, #)
161. **Seminar: Veterinary Pharmacology.** (Cr ar; prereq 152 or equiv, #)
171. **Problems in Veterinary Pharmacology.** (Cr ar; prereq 152 or equiv, #)

For Graduate Students Only

205. **Physiological and Pharmacological Research Techniques in Large Animals**

Department of Veterinary Surgery and Radiology (VSR)

Professor

John P. Arnold, D.V.M., Ph.D., *head*
Francis A. Spurrell, D.V.M., Ph.D.
Edward A. Usenik, D.V.M., Ph.D.

Associate Professor

Donald H. Clifford, D.V.M., M.P.H., Ph.D.

Assistant Professor

I. M. Gary Gourley, D.V.M., Ph.D.
Griselda F. Hanlon, D.V.M., M.S.

- 101. Principles of Veterinary Surgery.** General fundamentals of surgery as applied to the systems of the body; discussion of inflammation with relation to tissue repair; principles of anesthesia, preoperative evaluation, and postoperative care. (5 cr; prereq VMC 101, #)
- 102. Special Veterinary Surgery.** Lectures in surgical procedures of small animals; laboratory exercises covering selected small animal operations. (5 cr; prereq 101, #)
- 103. Special Veterinary Surgery.** Lectures in surgical procedures of large animals; laboratory exercises covering selected large animal operations. (5 cr; prereq 101, #)
- 104. Lamenesses of Domestic Animals.** Etiology, diagnosis, and treatment of lamenesses of domestic animals. (1 cr; prereq 103, #)
- 121. Veterinary Radiology.** Preparation and interpretation of radiographs and fluoroscopic examinations in veterinary medicine, consideration of radiant energy as a therapeutic agent and discussion of protective measures against radiation hazards. (3 cr; prereq VMC 113, #)
- 131. Heredity in Animal Disease.** Application of genetic principles to animal disease problems with emphasis upon specific inheritable and familial conditions in domesticated species. (3 cr; prereq VMC 104, #)

For Graduate Students Only

- 210x.* **Advanced Veterinary Radiology**
219. **Fundamentals of Nuclear Medicine**
220. **Anesthesia**
225. **Advanced Small Animal Surgery**
230. **Advanced Large Animal Surgery**
235. **Radiation Biology**

Department of Veterinary Diagnostic Laboratories

Professor

John M. Higbee, D.V.M., *head*

Associate Professor

Glen H. Nelson, D.V.M.

Assistant Professor

Donald M. Barnes, D.V.M., Ph.D.

Instructor

Martin E. Bergeland, D.V.M.

Courses Primarily for Students in Other Colleges

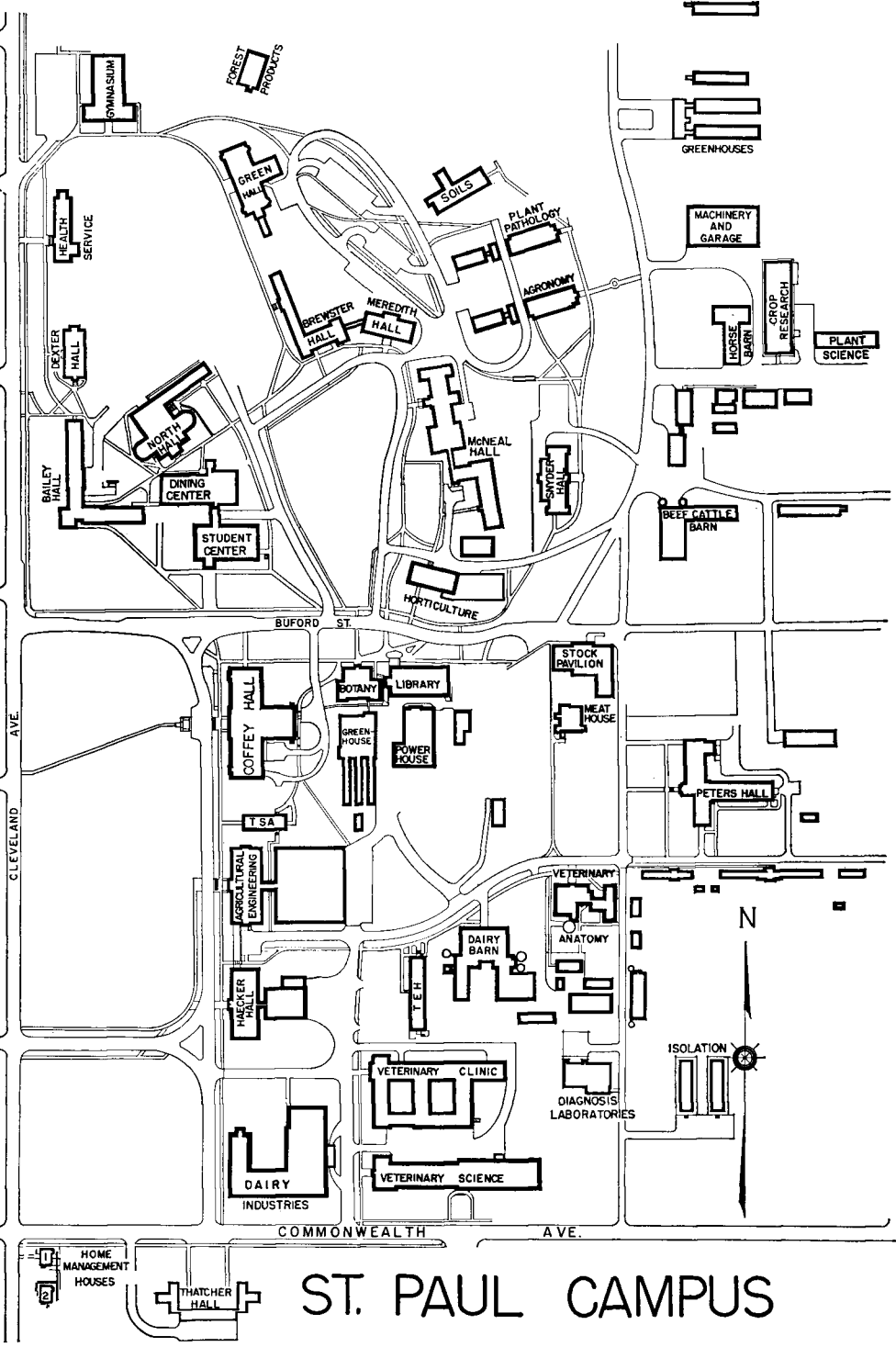
- VMC 52. Animal Hygiene.** Principles of animal health and disease, with emphasis on prevention, control, and eradication. (5 cr)
- VBac 53. General Microbiology.** The structure, physiology, and genetics of microorganisms. Applied microbiology in the areas of disinfection, chemotherapy, water, milk, and foods. Microorganisms responsible for infectious diseases of man and animals. Equivalent of MicB 53. (5 cr; prereq soph with C avg in prereq courses or jr, 10 cr chemistry, 4 cr biological sciences or #)

- VBac 130. Poultry Disease Control.** General anatomy of the fowl, physiology of digestion and reproduction, and prevention and control of the more important diseases affecting poultry. (3 cr; prereq Biol 2, Poul 1, MicB 53; offered 1965-66 and alt yrs)
- VPP 41. Systemic Mammalian Physiology I.** Lectures and demonstrations in general physiology, respiratory, cardiovascular, renal, and gastrointestinal physiology. (4 cr; prereq Biol 2, GeCh 5, OrCh 42, BioC 3 or ¶BioC 3)
- VPP 42. Systemic Mammalian Physiology II.** (Continuation of VPP 41) Emphasis on endocrinology and environmental physiology. (2 cr; prereq 41, BioC 6 or ¶BioC 6)
- VPaP 103. Diseases and Parasites of Wildlife.** Economic and biological relationships of animal parasites and disease to regional wildlife. (3 cr; prereq #; offered 1965-66 and alt yrs)

Courses Provided by Other Colleges

- AnHu 63. Swine Production.** Adaptability, breeding, feeding, care, and management of commercial and purebred swine. (3 cr; prereq 37, 37A, 62 or #)
- AnHu 65. Beef Cattle Production.** Adaptability, breeding, feeding, care, and management of commercial and purebred beef cattle. (3 cr; prereq 37, 37A, 62 or #)
- AnHu 71. Feeds and Feeding.** Nutrient requirements of farm animals. Characterization of feeds and their use in rations for cattle, sheep, swine, and horses. Lecture and laboratory. (3 cr; prereq regis in 3rd yr VMed)
- DyHu 120. Feeding and Management.** Status of dairy industry, cow population trends, breeds of dairy cattle, type classification, budgets, housing requirements, milking techniques and equipment, production records, dairy husbandry practices and methods. (3 cr; prereq Vet Med sr or #)
- Poul 61. Industry Feeding and Production Practices.** Current production standards and systems with emphasis on management and feeding practices, for commercial egg, broiler, and turkey operations. (3 cr, §57, §59; prereq Vet Med sr or Δ)





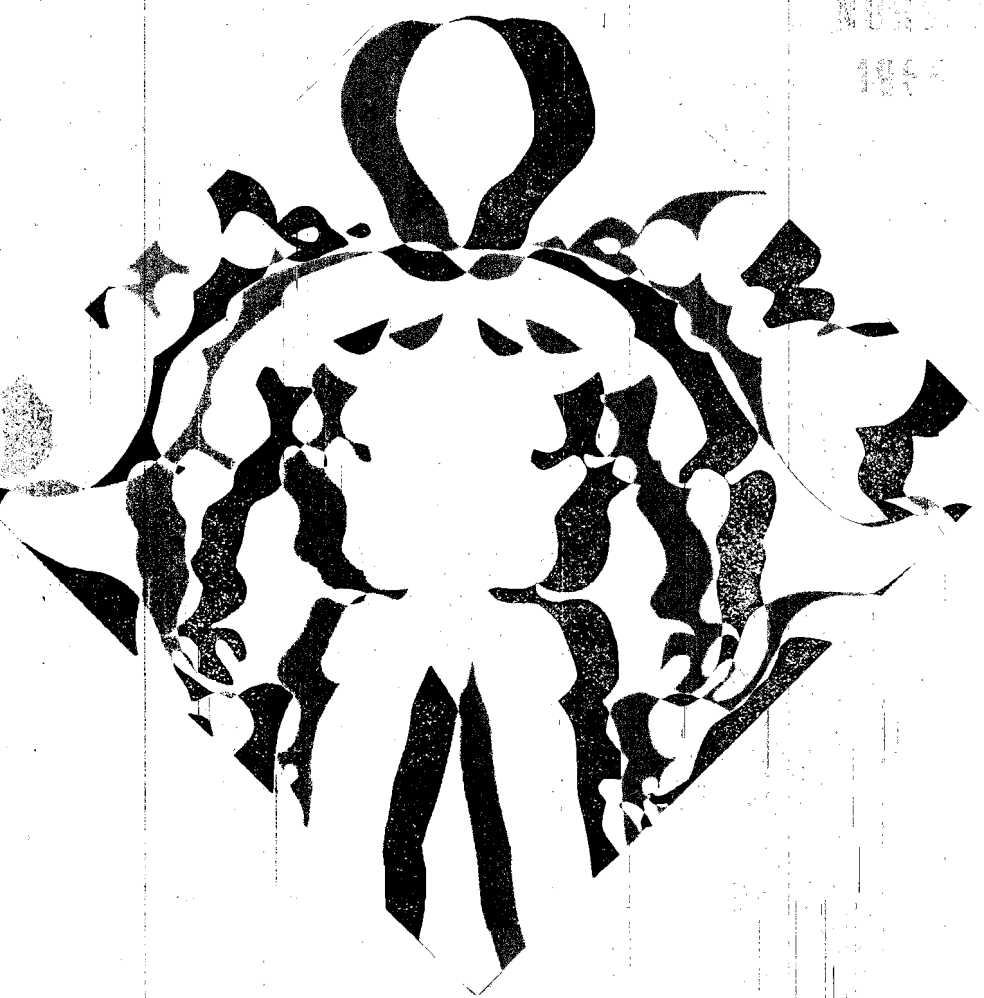
ST. PAUL CAMPUS

UNIVERSITY OF MINNESOTA BULLETIN

Date: 7-28-65

~~OK KIP~~

SCHOOL
NURSE
1965



UNIVERSITY OF MINNESOTA

Board of Regents

The Honorable Charles W. Mayo, M.D., Rochester, First Vice President and Chairman; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Bjarne E. Grottum, Jackson; The Honorable Albert V. Hartl, Fergus Falls; The Honorable Robert E. Hess, White Bear Lake; The Honorable Fred J. Hughes, St. Cloud; The Honorable Lester A. Malkerson, Minneapolis; The Honorable William K. Montague, Duluth; The Honorable George W. Rauenhorst, Olivia; The Honorable Otto A. Silha, Minneapolis; The Honorable Herman F. Skyberg, Fisher.

Administrative Officers

O. Meredith Wilson, Ph.D., President
William G. Shepherd, Ph.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President for Educational Relationships and Development
Robert Edward Summers, M.S. (Ch.E.), Dean of Admissions and Records
Edmund G. Williamson, Ph.D., Dean of Students
Robert B. Howard, M.D., Ph.D., Dean of the College of Medical Sciences

SCHOOL OF NURSING

Administration

Edna L. Fritz, Ed.D., Professor and Director
M. Isabel Harris, Ph.D., Associate Professor and Assistant Director
Helen B. Hansen, M.Ed., Assistant Professor and Chairman of Continuing Education Programs in Nursing
Florence J. Julian, M.N.A., Professor and Director of Nursing Services, University Hospitals
Eugenia R. Taylor, M.A., Assistant Professor and Chairman of Practical Nursing Program
Dorothy E. Titt, M.A., Assistant Professor and Chairman of Baccalaureate Program in Nursing
_____, Chairman of Masters' Programs in Nursing

Faculty

Professor

Edna L. Fritz, Ed.D.

Associate Professor

M. Isabel Harris, Ph.D.
Garland K. Lewis, M.N.

Assistant Professor

Marilyne R. Backlund, M.S.
Florence M. Brennan, M.A.
Nancy L. Cook, M.A.
Frances E. Dunning, M.Ed.
Margaret F. Grainger, M.A.

Volume LXVIII, Number 16

August 15, 1965

UNIVERSITY OF MINNESOTA BULLETIN

Published semimonthly January 1 to December 15 inclusive. Second-class postage paid at Minneapolis, Minnesota. Send change of address notices and other communications to Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

The contents of this bulletin and of other University bulletins, publications, or announcements are subject to change.

Helen B. Hansen, M.Ed.
Frances D. Moncure, M.Ed.
Helen J. Peterson, M.Ed.
Eugenia R. Taylor, M.A.
Dorothy E. Titt, M.A.
Elizabeth A. Whitney, M.A.

Instructor

Patricia H. Cano, M.S.
Agnes B. Dempster, M.Ed.

Edna H. Gilstad, M.Ed.
Joann R. Hubbard, M.S.
Muriel D. Hudak, B.S.
Ruth O. Leo, M.Ed.
Irene A. Martin, M.S.
Dorothy A. Parnell, Ed.M.
Grace M. Sarosi, M.S.
Marilyn Sime, M.S.
Bette R. Solheim, B.S.
Marian J. Town, M.Ed.

School of Nursing

GENERAL INFORMATION

Development of the School—The interest and effort of Dr. Richard Olding Beard led to the opening of the School of Nursing on March 1, 1909. Although the early educational offerings typified the then prevalent 3-year pattern of nurse training, it was the first preparatory program in nursing to be sponsored by a university in the United States. James Gray has portrayed the first 50 years of the school's history against a backdrop of changing times and evolving educational values in his book, *Education for Nursing*, published in 1960 by the University of Minnesota Press. In 1958 the University of Minnesota School of Nursing Foundation was established. Its purpose is the improvement of patient care through appropriate assistance to the school in carrying forward nursing education, research, and community service. This evidence of widespread interest and support for the school attests to the public's concern for quality in the preparation of personnel for such a needed service as nursing.

In 1919 a program in nursing leading to a baccalaureate degree was inaugurated. It was conducted concurrently with a shorter, nondegree program until discontinuance of the latter in 1947. Over the years the school has conducted various types of nursing programs designed to meet the community's need for nursing services and in keeping with transitions in the concepts of sound education for nursing. The first programs leading to professional Masters' degrees were initiated early in the 1950's.

Today preparatory programs are available for both practical and professional nursing. The basic nursing program is designed to prepare students for the beginning practice of professional nursing and, upon satisfactory completion, students are awarded the degree of bachelor of science in nursing. Students graduating from this program are eligible to write the licensing examination offered by the Minnesota Board of Nursing. Satisfactory performance on this examination entitles the applicant to practice as a registered nurse in Minnesota.

Graduate nurses who have completed an educational program in nursing leading to a diploma or an Associate degree may enroll for baccalaureate studies in nursing in a program with purposes and content similar to that of the basic program. Expanding knowledge in the practice of nursing now requires a broad preparation in nursing *per se* as a foundation for graduate preparation in specialized areas of functioning within nursing.

Preparation for the more expert practice of nursing, for teaching, and for administrative responsibilities in organized nursing services is made available in the several offerings that lead to an appropriate Master's degree. All of the school's professional programs are accredited by the National League for Nursing, the body recognized by the National Commission on Accrediting as having this responsibility in nursing education.

The School of Nursing is one of several units in the College of Medical Sciences of the University of Minnesota. The rich and varied resources of the University Hospitals are adjacent to the school and are utilized for student learning experiences in all nursing programs. Learning opportunities in public health nursing are made available in the several public health nursing agencies in the area. Faculty in various educational units of the University, such as the Graduate School, Medical School, School of Public Health, College of Education, College of Liberal Arts,

and General College, participate with the faculty in the School of Nursing as appropriate in program development.

School of Nursing Programs

Baccalaureate Programs in Nursing

The faculty in nursing believes that professional nursing provides a direct unique service to individuals which involves a relationship between the nurse and the patient. In the baccalaureate program the goal of this relationship is the achievement and maintenance of equilibrium as perceived by the patient. It is the faculty's belief that the achievement of this goal of equilibrium contributes to the patient's ability to utilize health care services that are designed to prevent and/or cure illness.

In addition to this unique service, the faculty believes that professional nursing participates in the provision of unique services of other health disciplines. The common goal of all health services is the achievement and maintenance of an optimum state of health for the individual.

The purpose of the baccalaureate programs in the School of Nursing is to provide opportunities for students to gain a body of knowledge, skill, and understanding appropriate to the practice of professional nursing. With the use of a systematic problem solving approach, the student learns to identify nursing problems, select and develop appropriate nursing intervention, and evaluate nursing care. The scope of these learnings and the degree of skill in their application are such that individuals are enabled upon completion of the programs to function in first-level positions in nursing.

Throughout the program the student has ample opportunity to develop individual interests and potentialities through elected study in other disciplines. The baccalaureate programs provide learnings which are foundational to graduate study in nursing and other disciplines.

In accord with the philosophy underlying the programs, learnings of progressive complexity are planned to help students attain the following objectives:

1. The ability to communicate effectively.
2. An understanding of human behavior and a sensitivity to the needs of others.
3. An ability to work effectively with others.
4. An understanding of the teaching-learning process and skill in its use.
5. An ability to understand and appreciate the scientific method and to use it in the solution of problems.
6. An appreciation of the value of research in the practice of nursing.
7. Competence in selected technical skills in nursing.
8. An ability to plan, initiate, perform, co-ordinate, and evaluate nursing care.
9. A continuing development of abilities in accordance with the individual's interest and potentialities.
10. A continuing development of self-awareness and personal satisfaction.
11. A sense of responsibility characteristic of a member of a profession devoted to the improvement of the health and welfare of individuals, families, and communities.

The preceding philosophy, purpose, and objectives apply to both undergraduate professional programs leading to the degree of bachelor of science in nursing. The School of Nursing offers:

1. *The Basic Professional Program* for qualified students who have completed 1 year's requirements of general education courses.
2. *The Baccalaureate Program for Graduates of Associate Degree or Diploma Programs.*

Masters' Programs

Students interested in pursuing the teacher preparatory program leading to the degree of master of education enroll in the College of Education. Faculty in the School of Nursing provide advisement for these students and instruction in those courses in nursing and nursing education essential to the accomplishment of the purpose stated.

Advanced preparation in medical-surgical or in psychiatric nursing leading to a master of science degree is offered through the Graduate School. School of Nursing faculty members holding Graduate School appointments serve as advisers and provide nursing instruction for these students.

Graduate education in nursing is based on sound undergraduate nursing with major courses at a senior college level and sound foundation in liberal education. All graduate education in nursing includes study of clinical content which takes the student further and deeper in knowledge, understanding, and skill in the practice of nursing. Extension of nursing expertness in practice and beginning competence in functional areas requires augmentation with studies in physical, biological, and behavioral sciences and humanities. Nursing programs should be developed in anticipation of probable roles of the professional nurse of the future. Graduate study assists the student to further define personal and professional goals.

Graduate education should foster creativity, opportunity for independent study, and knowledge of the need for flexibility to meet the health needs of society. Master's level study builds the foundation for research with emphasis on appreciation of the role of research, recognition of researchable problems, and introduction to research methodology. Masters' programs, while likely to be the last formal educational experience for the majority who complete them, are designed as foundational for doctoral study.

In accord with these beliefs, the masters' programs are developed to provide opportunity for students to grow toward achievement of the following objectives:

1. Ability to practice nursing with a degree of expertness that goes beyond the expectations held of beginning professional practitioners.
2. Functional knowledge and beginning competence in one of the following fields of nursing: clinical specialty, teaching, or administration.
3. Attitude of critical assessment of situations as a basis for formulation of judgments and decisions.
4. Ability to participate intelligently in research projects and to make discriminating use of research findings.
5. Commitment to a responsibility for health needs of society and beginning skill in discharging this professional obligation.
6. Increased understanding and ability to function interdependently as a professional person.
7. Assumption of responsibility and skill in utilization of resources for continuing growth.

Practical Nursing Program

The major purpose of this four-quarter program is to prepare the individual student to assume the responsibilities of a beginning practitioner in practical nursing. With supervision by registered nurses, the graduate of an approved practical nursing program is prepared to give nursing care to patients in situations relatively free of complexity. The graduate practical nurse also assists professional nurses in a close working relationship in giving nursing care to patients in more complex situations.

In order to accomplish its purpose in accord with the underlying philosophy, the curriculum provides opportunity for the practical nursing student to attain the following objectives:

1. The ability to communicate effectively.
2. An awareness of the principles of human behavior.
3. An increasing ability to perceive the needs of others and of self.
4. A general understanding of the nature, cause, and effects of any mental or physical stress on the person.
5. The ability to participate in the planning, implementation, and evaluation of nursing care with the supervision of professional nurses and physicians.
6. A recognition and appreciation of her role and responsibilities as a member of the health team.
7. An awareness of her responsibility to utilize opportunities for continued development as an individual and as a licensed practical nurse.

Having attained these objectives, the graduate of this program is granted a certificate and is eligible to write the appropriate licensing examination offered by the Minnesota Board of Nursing. Satisfactory performance on this examination entitles the graduate to practice as a licensed practical nurse (LPN) in Minnesota.

Summer Session

The University of Minnesota offers courses during 2 terms of the Summer Session during which students may take as many as 18 credits of study in prerequisite or major courses. It is customary also to offer courses not usually available during the academic year that are of special interest to practicing nurses. Students are encouraged to seek advisement from faculty in the School of Nursing if they plan summer study as a means of meeting degree requirements in any of the school's programs. A special summer announcement describing these courses may be had upon request to the Summer Session Office, University of Minnesota, Minneapolis, Minnesota 55455.

Short Term Courses

Noncredit, short-term courses are offered from time to time at the Center for Continuation Study. These courses vary in length, but are less than a University quarter. They are made available to interested groups within the field of nursing. Information about such courses is communicated to interested groups well in advance of any given offering. Instructors are recruited from the regular University staff, supplemented as desirable by guest lecturers.

General Extension Division Offerings

The School of Nursing offers through the General Extension Division certain evening classes to meet the needs of employed registered nurses. These are of neces-

sity taught chiefly in Minneapolis and St. Paul. It is only occasionally possible for faculty to make such opportunities available beyond the Twin Cities because of the limitations imposed by the need to travel. No professional courses are offered by correspondence.

A limited number of credits in general education courses earned through the General Extension Division may be applied toward meeting degree requirements. Students are urged to consult a faculty adviser in the School of Nursing when working out their plans for study through the General Extension Division. (See *Bulletin of Evening and Special Classes* and the *Bulletin of Correspondence Study Courses*.)

Admission—General Information

1. Application forms for admission or transfer to any of the nursing programs are procured from and returned completed to the Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

2. Applicants for admission to the School of Nursing must meet the general requirements for admission to the University as well as the special requirements established by the School of Nursing. Applications are accepted from men and women, married or single.

All applications are individually reviewed by the Admissions Committee of the School of Nursing after initial evaluation by the Office of Admissions and Records. The processing of records may require 12 weeks. Prospective students should submit applications by April 15 if they wish to enroll the following fall quarter.

3. Official transcripts of any prior college work taken for credit in another educational institution should accompany applications. The University accepts for transfer a maximum of 4½ quarter credits for religion courses.

Graduates of nursing programs leading to an Associate degree or a diploma should request the nursing school to submit a record of their completed studies to the Office of Admissions and Records at the time the application is submitted. Instructions for submitting these are on the application form.

Advanced standing will be determined upon review and evaluation of these records by the Office of Admissions and Records and the Admissions Committee of the School of Nursing.

4. Applicants may be requested to submit additional information or take additional tests. Instructions will be sent to the applicant by the Office of Admissions and Records or by the Admissions Committee of the School of Nursing.

5. Applicants will receive notification of action on their applications and information about initial enrollment procedures from the Office of Admissions and Records.

Admission—Specific Program Information

Basic Professional Nursing Program

1. High school students interested in preparing for the practice of professional nursing at the University of Minnesota will need to fulfill requirements for admission to the College of Liberal Arts of the University of Minnesota or those of another accredited college or university and complete 45 quarter credits in general education. (See first year course requirements, on pages 16-17.)

2. Upon completion of first year requirements, qualified applicants are admitted to the nursing major each fall quarter.

3. Students planning to transfer to the School of Nursing must submit application to the Office of Admissions and Records by April 15. Consideration of applications is begun at this time. However, any action by the Admissions Committee of the School of Nursing will be provisional, pending receipt of evidence that all freshman year requirements have been met.

4. Any substitutions or exceptions in prerequisite courses are determined by the Admissions Committee.

5. The selection for admission is based on previous scholastic achievement and performance on tests of academic ability. A grade point average of 2.00 (C average) is the minimum accepted for admission. When the number of qualified applicants exceeds the number to be admitted, preference is given to those with highest previous scholastic achievement and academic ability test scores.

6. Each applicant must submit a physical examination form completed by her physician. The form is sent from the Office of Admissions and Records with application materials.

Baccalaureate Program for Graduates of Associate Degree or Diploma Programs in Nursing

1. Students are admitted in fall quarter. Applications should be submitted to the Office of Admissions and Records by April 15.

2. Until fall 1968, 45 advanced standing credits for a diploma program in nursing will be granted without recognition of specific courses.

3. Advanced standing for graduates of Associate degree programs in nursing are determined on an individual basis.

4. The applicant must have achieved a C average for any college work taken prior to application for admission and have ranked in the upper one-third of her school of nursing class.

5. Applicants who are, or have recently been, employed full time or not less than half time should request the employer to submit a written recommendation to the Office of Admissions and Records at the time of application.

Masters' Programs

(Master of Education and Master of Science in
Medical-Surgical or Psychiatric Nursing)

1. The desirable time to begin any program is the fall quarter. Applicants who wish to begin study at another time should consult a faculty adviser prior to submitting an application. Prospective students are encouraged to submit application for admission to the Office of Admissions and Records by April.

2. Scholastic achievement considered minimal for admission to these programs includes a rank in the upper one-third of the class in the nursing program from which an applicant graduated, and a B average in prior undergraduate college work.

3. Post-baccalaureate credits earned in other universities will generally not be granted transfer credit toward meeting the requirements for these degrees.

4. Applicants admitted to the medical-surgical or psychiatric nursing program will be enrolled in the Graduate School. School of Nursing faculty will serve as advisers to these students. (See *Bulletin of the Graduate School, Plan B.*)

Applicants admitted to the nursing education major will be enrolled in the College of Education. School of Nursing faculty serve as advisers to these students. (See *Bulletin of the College of Education.*)

Practical Nursing Program

1. Applications for admission to the class that will begin the program in the fall of 1966 must be submitted to the Office of Admissions and Records by April 15, 1966. The program will be discontinued upon the graduation of this class. Students previously enrolled in other colleges of the University must submit official request for transfer by April 15. All requirements, including report of physical examination and written reference from employers which is to be sent to the School of Nursing Admissions Committee, must be met before final action can be taken on applications.

2. Application is open to high school graduates or to those non-high school graduates who meet the requirements for admission to the University by special examination. The ACT (American College Testing Program) is required of all students entering the University as freshmen. Minimum age is 17 years; there is no established maximum age limit.

3. Selection for admission to this program is based on consideration of achievement in high school and any post-high school education, scholastic aptitude test scores, general health, previous work record, and potential for success and satisfaction in vocational nursing.

Adult Special Students

1. By special consideration, selected registered nurses may be admitted to the School of Nursing as adult special students. This is reserved for individuals who have particular professional needs which cannot be met through one of the regular program offerings. Adult special students will generally be unable to complete major course sequences.

2. Applicants should arrange to consult with a faculty member about special needs prior to submitting an application.

3. Applicants will be considered individually by the Admissions Committee of the School of Nursing in the light of the individual's needs, previous scholastic records, work experience.

4. Upon request, academic records of adult special students are reviewed by the Admissions Committee to determine eligibility for transfer to degree candidacy.

Foreign Students

1. Applicants from countries other than the United States should submit formal application and credentials to the Office of Admissions and Records, University of Minnesota, Minneapolis, Minnesota 55455.

2. Based on past experience it has been found that a minimum of 4 years of study is usually necessary to earn a baccalaureate degree, while a minimum of 2 additional years is generally necessary to meet requirements for a Master's degree.

3. Admission of students from other countries is contingent upon (a) superior previous academic achievement and nursing performance; (b) the ability to read, write, speak, and understand English; (c) a certification of good health; and (d) possession of a student visa or other appropriate visa.

Requirements for Continuance and Graduation

Student Scholastic Standing

A faculty Committee on Student Scholastic Standing reviews the progress of students each quarter and makes recommendations concerning their continuance in and graduation from the programs in which they are enrolled.

Grading System

The grading system is described in the *Class Schedule* that is published and made available to students during registration for each quarter of study. Every student is held accountable for the information contained in this *Class Schedule* as well as that contained in the *Bulletin of the School of Nursing*.

A mark of F is given when a student does not complete successfully the work of a course. All courses in majors in the School of Nursing must be successfully completed before the student can proceed in the given program. A recommendation by the Student Scholastic Standing Committee is necessary to enable a student to repeat a nursing course which she has failed.

Probation

When the grade point average in a given quarter falls below 2.00 (C average) for students enrolled in any nursing program, scholastic probation is used to alert students to the need for substantially improving their performance. The receipt of grade reports shall constitute initial notice of probation, although written notification of action will usually be forwarded to students by the Committee on Student Scholastic Standing. A second quarter of study on probationary status is permitted only when such recommendation is made following a review of student's progress by the Scholastic Standing Committee.

Continuance and Graduation

See also the *Bulletin of General Information*. The nature of a nurse's responsibilities to patients and others requires that candidates for graduation from the school's programs have evidenced to the faculty those personal and behavioral characteristics considered suitable to the discharge of such responsibilities. Medical evidence of unsuitability for nursing may necessitate that students withdraw from nursing programs. In addition, students in given programs must have met the requirements described in the following sections.

Baccalaureate Nursing Programs

For continuance in and graduation from these programs, students must have received a passing grade in each required course, maintained an over-all grade point average of 2.00, and maintained a grade point average of 2.00 in the nursing major.

Program Leading to the Degree of Master of Education

For continuance and graduation from this program students must have satisfactorily completed a minimum of 45 credits in resident study. Satisfactory completion of course work, field experience, projects, and examinations is required for the granting of degrees. A grade point average of 3.00 (B average) is required in the 45 credits of work taken in courses numbered 100 and above.

A health examination must be taken at the University Health Service within 1 year of the date on which the degree is to be granted.

During the last quarter of study each student must apply for the degree through the Office of Admissions and Records and pay the requisite graduation fee. Each student will be issued a Balance Sheet which is an official statement of the extent to which the requirements for the degree are being met.

Master of Science Program in Medical-Surgical or Psychiatric Nursing

For requirements related to continuance in and graduation from these programs, see the *Bulletin of the Graduate School*, Plan B programs.

Practical Nursing

For continuance in and graduation from this program, students must have received a passing grade in each required course. A grade of D in any required course will be considered a basis for probationary status. A student who receives more than two final grades of D in nursing courses will not be allowed to complete the program.

Honors, Certificates, and Degrees

Degrees—When students satisfactorily complete requirements in any of the programs described in this bulletin, the conferring of the appropriate degree is recommended by the faculty to the Board of Regents of the University of Minnesota. Completion of the baccalaureate nursing programs leads to the degree of bachelor of science in nursing.

Students enrolled in the College of Education are recommended for degrees by the faculty of that college; those students in Graduate School are recommended by graduate faculty.

Certificate—Students satisfactorily completing the requirements of the practical nursing curriculum are issued a certificate.

Graduation with Distinction or with High Distinction—These honors are not automatic, but are conferred on eligible students earning their first Bachelor's degree upon favorable recommendation by the faculty. Application by the student is not necessary. In addition to certain residence and performance stipulations that may vary with programs, students recommended for graduation "with distinction" or "with high distinction" must have attained an over-all grade point average of at least 3.00 (B average) or 3.5 (B+ average) respectively.

Expenses

For details regarding tuition, fees, maintenance, and other costs, see the current *Bulletin of General Information*.

All students provide their own uniforms as necessary and are responsible for having them laundered. Students in the basic program pay approximately \$40 for

their uniforms, and those in the practical nursing program pay approximately \$20. These are ordered and paid for during the first or second quarter of study in the School of Nursing. Each student is responsible for the labeling of uniforms and caps for purposes of identification.

Students in all programs are expected to be in appropriate uniform when having experiences in patient care settings. The uniform of students in either the practical or basic nursing programs is to be worn by them only during those experiences that are a part of the educational programs.

All students are responsible for meeting transportation costs to and from off-campus locations where learning experiences are provided, and to and from classes or practice opportunities during off-campus experiences. Certain additional expenses are incurred for books, health care or hospitalization insurance, graduation fees, and School of Nursing pins as necessary.

Student Personnel Services

(See also *Bulletin of General Information*)

Student Orientation—The University's orientation program gives new students an opportunity to become acquainted with one another and with the campus. Usually this involves a 2-day period and includes activities necessary for enrollment. A notice giving dates for orientation is sent to each new student soon after admission. Welcome Week is an allied program for students entering in the fall quarter. Students are urged to participate in its varied activities which include helpful sessions concerning study skills. New students should also avail themselves of the opportunity to tour the main library and the Bio-Medical Library located in Diehl Hall.

All-University Personnel Services for Students—Several specialized personnel services are provided by the University for all students. Students may avail themselves of such services as the following:

Student Activities—Student Activities Bureau, 4 TNM.

Financial Help—Bureau of Student Loans and Scholarships, 104 Wesbrook Hall.

Part-time Employment—Student Employment Bureau, 30 Wulling Hall.

Improvement of Study Skills—Educational Skills Clinic, 101 Eddy Hall.

Problems of Speech or Hearing—Speech and Hearing Clinic, 215 Shevlin Hall.

Off-Campus Housing—Student Housing Bureau, 209 Eddy Hall.

Health Needs—University Health Service building.

Legal Concerns—Legal Aid Clinic, 133 Fraser Hall.

Counseling—Academic advisement is available to students from members of the School of Nursing faculty. Each student is assigned to an adviser at the time of entrance into the School of Nursing.

Employment—Students are urged to consult with faculty advisers before seeking part-time employment. The schedules carried by students make it desirable for them to think seriously about whether or not part-time employment is compatible with deriving maximal benefit from their studies and participating in over-all University activities.

Part-time employment in nursing is sometimes available for registered nurse students in Minneapolis or St. Paul hospitals. Inquiries about such opportunities can be made directly to the nursing services of these hospitals or through the Counseling and Placement Service of the Minnesota Nurses Association, 2395 University Avenue, St. Paul, Minnesota, by association members. The University of Minnesota Hospitals (on the Minneapolis Campus) can usually arrange for a limited number of students to do special or general staff nursing during evening or weekend hours.

Students seeking other employment opportunities are advised to consult with the Student Employment Bureau.

Residence Accommodations—All students meet their own maintenance costs throughout their stay at the University. Students living within commuting distance of the Minneapolis Campus of the University may elect to live at home, while others may want to live in University-maintained residence halls or approved rooming houses. For students who are married (or over 21 years of age), University approval of residence is not required. Information concerning residence halls for women may be obtained by writing to the Director of Housing, 100 Westbrook Hall, University of Minnesota, Minneapolis, Minnesota 55455, or consulting the *Bulletin of General Information*.

Health—The School of Nursing in conjunction with the University of Minnesota Health Service maintains a program of periodic health examinations and immunizations for students in its programs. A schedule of health requirements is issued to every student when she first enters the nursing program. It is her responsibility to fulfill the requirements for each quarter before she can register for the next quarter. Those students paying a quarterly incidental fee have available to them the health services described in the *Bulletin of General Information*. Further information is given in the booklet, *Your Health Service*, that is made available to students by the University Health Service.

All students, but especially those in the basic nursing programs, are encouraged to purchase the optional plan for supplemental Blue Cross-Blue Shield insurance coverage that is made available at a low rate through the University Health Service. This provides payment for certain services not available at the University Health Service and extends protection to students during off-campus learning experiences or vacation periods.

Married students who become pregnant are asked to notify their faculty advisers as early as possible to provide adequate time for educational planning in view of the individual's needs and adherence to maternity policies existing in institutions or agencies where students participate in planned learning experiences.

Student Loans—School of Nursing students enrolled in the professional programs are eligible for a loan from funds established by the Nurses' Training Act of 1964. The maximum amount available to an individual borrower in an academic year is \$1,000. Application blanks for, and additional information about, these loan funds may be obtained from the Bureau of Student Loans and Scholarships, Minneapolis Campus.

The Bureau of Student Loans and Scholarships administers University loan funds that have been set up to help students who are making satisfactory progress toward an educational objective. Students pay partial interest on a loan while in school and repay the principal, together with interest payments, after graduation. They are eligible to submit an application for a loan after completion of 2 quarters at the University. This eligibility requirement may be waived in cases of emergency.

The Minnesota Nurses' Association administers the Sarah T. Colvin Loan Fund for registered nurses who are members of the association and are enrolled in Bachelors' or Masters' degree programs. Information and application forms may be obtained from the Minnesota Nurses Association, 2395 University Avenue, St. Paul, Minnesota.

Freshman Scholarships—Scholarships for entering freshmen, chosen from among top graduates of Minnesota high schools, are offered through the Bureau of Student Loans and Scholarships, Minneapolis Campus. Scholarships which range in amounts from tuition and incidental fee to \$600 are awarded on the basis of high school academic scholarship, leadership, character, vocational promise, and financial need. One application assures consideration for all freshman scholarships offered by the

University. Application blanks should be obtained through high school senior class counselors or principals by December 15.

University students enrolled in the general education courses prerequisite to the nursing major in the baccalaureate programs are eligible to apply for general scholarship funds after completion of 2 quarters at the University. Application forms and information about scholarships may be obtained from the Bureau of Student Loans and Scholarships. Information about these awards is also announced through the Official Daily Bulletin.

Direct blood descendants of World War I veterans who were in the service 6 months before the Armistice may be eligible for the LaVerne Noyes Resident Tuition Scholarship after completing 2 quarters of satisfactory work at the University. Application must be filed each quarter before September 1, December 1, or March 1. Grants are limited to a maximum of 6 quarters.

School of Nursing Scholarships—University scholarship funds for School of Nursing students in the professional programs are administered by the Bureau of Student Loans and Scholarships. Recommendation of students to receive scholarships is made by the Scholarships, Honors, and Awards Committee of the faculty of the School of Nursing. Students are eligible to apply for these scholarships after completion of 1 quarter in the School of Nursing. This eligibility requirement may be waived in case of financial difficulty. Information concerning application for these scholarships appears in the Official Daily Bulletin the first or second week of fall, winter, and spring quarters. Applications should be submitted to the Bureau of Student Loans and Scholarships early in these quarters. Application for summer and fall quarters are acted upon during the preceding spring quarter by the scholarship committee.

The School of Nursing extends appreciation to all who contribute for scholarships and wishes to acknowledge the assistance of the following individuals and groups for their contributions to the support of on-going scholarships.

Hennepin County Tuberculosis Association (Dr. E. S. Mariette Memorial Scholarship)

National Association of Railway Business Women—Twin Cities Chapter

Sigma Theta Tau—Zeta Chapter

University of Minnesota School of Nursing Foundation:

Husband and friends of Ruth Thomas Brinker (Ruth Thomas Brinker Scholarship in Nursing)

Joseph E. Dahl Company (Joseph E. Dahl Scholarship in Nursing)

Grace B. Dayton (Grace B. Dayton Scholarship Fund)

Alumni, staff, and friends of the School of Nursing (Katharine J. Densford Scholarship)

Family and friends of Suzanne J. Doehring (Suzanne Doehring Memorial Scholarship in Nursing)

Children, relatives, and friends of Freda Kantor (Freda Kantor Scholarship in Nursing)

Women's Auxiliary to the Minnesota State Medical Association (Margaret Wahlquist Memorial Scholarship)

Other Scholarships and Traineeships—The Minnesota State Legislature has enacted a law which provides scholarship funds for residents of Minnesota enrolled in basic professional and practical nursing programs. Students accepting scholarships must agree to practice in the field of nursing in Minnesota for 1 year immediately after graduation. Application forms are available from the School of Nursing, 125 Owre Hall, or the Minnesota Board of Nursing, 530 Minnesota Building, St. Paul. These forms must be submitted to the Minnesota Board of Nursing after application for admission to the school has been approved and not later than May 15. Scholarship payment will not begin until the third quarter of the nursing major for students

enrolled in the baccalaureate program. Students in the practical nursing program will receive their scholarship prior to, or during the fall quarter of the year in which they are enrolled in the School of Nursing.

The Professional Nurse Traineeship Program of the United States Department of Health, Education, and Welfare provides awards to qualified registered nurses enrolled in baccalaureate and Master's degree programs. Eligibility for these traineeships may not exceed 24 months for an individual, including a maximum of 12 months in an undergraduate program, 18 months in a Master's program, or 12 months of post-Master's study. Information and application forms may be obtained from the School of Nursing, 125 Owre Hall.

Students planning to pursue a career in psychiatric nursing may write to the School of Nursing, 125 Owre Hall, for information related to psychiatric and mental health traineeships.

Nurses' Educational Funds provide a limited number of scholarships, fellowships, and loans to registered nurses enrolled in baccalaureate and Master's degree programs. Applicants must be members of the American Nurses' Association and have had at least 1 year of successful nursing experience. Information and application forms may be obtained from Nurses' Educational Funds, Inc., 10 Columbus Circle, New York, New York 10019.

The United States Army has three financial assistance programs for nursing students: (a) The Army Student Nurse Program for selected students enrolled in basic nursing programs leading to a baccalaureate degree. Participants must agree to serve, upon graduation, on active duty as an Army Nurse Corps officer for a period determined by the time spent under this program. Students may apply for appointment at the beginning of their junior year. (b) The Army Student Nurse Program for selected registered nurses enrolled in baccalaureate programs. They must have completed their diploma program within the past 30 months and be able to complete the requirements for a degree within 24 months. Participants must agree to serve on active duty as an Army Nurse Corps officer for a period determined by the time spent under this program. (c) The Registered Nurse Student Program for registered nurses enrolled in baccalaureate or Master's degree programs who can complete their program within 12 months. Participants must agree to serve as an Army Nurse Corps officer for at least 3 years. This period includes the time spent in school. Information about these programs may be obtained from the Army Nurse Corps counselor at Army recruiting offices.

The United States Navy has one financial assistance program for nursing students: The Navy Nurse Corps Candidate Program is for selected students enrolled in baccalaureate programs in basic professional nursing. Participants must agree to serve, upon graduation, on active duty as a Navy Nurse Corps officer for a period determined by the time spent in the program. Students may initiate application at any time after completion of the first quarter of the sophomore year, until completion of the first quarter of the junior year of study. Information about this program may be obtained from the Navy Nurse Corps counselor in Navy recruiting offices.

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, and Zonta. Many of the district and state nursing associations have established scholarship and loans funds for registered nurses wishing further education. Interested students can explore these resources.

Student Organizations—There are many University-wide student organizations emphasizing social, cultural, social service, recreational, and religious interests. Within the School of Nursing the student government association is the Nursing College Board, which centralizes student activities and serves as an intermediary board in working with the faculty on matters of mutual interest and concern. Any student in the School of Nursing is eligible to become a member.

PROGRAMS OF STUDY

I. Programs Leading to Bachelor of Science Degree in Nursing

Basic Professional Nursing Program

Qualified students are admitted to this program after completing the first year of general education requirements in the College of Liberal Arts of the University of Minnesota or at another accredited college or university. (See pages 7-8 of this bulletin for information about admission requirements.)

First-Year Course Requirements

(Quarter credits shown in parentheses)

The minimum quarter-credit requirement for the first year is 45 plus a current Red Cross First Aid Certificate for the standard course. These 45 credits must include:

Group A—Freshman English (one academic year)

Group B or E—Foreign Language or Humanities (8) (Credits for the literature portion of Freshman English courses may be used to fulfill this requirement)

Group C—Social Science (8) (A course in cultural anthropology required††)

Group D—Natural Science: GeCh 4 and 5; and NSci 3**

Any remaining credit requirement must be fulfilled by selections from any of the Groups B, C, D, and E described below.

A. Freshman English

Engl A-B-C—Freshman Literature and Composition (composition portion) (6)

(or) Engl 1A-2A-3A—Freshman English (composition portion) (6)

(or) Engl 1B-2B-3B—Freshman English (composition portion) (9)

(or) Comm 1-2-3—Communication (12)

(or) Exemption from requirement

(All students are required to have an English Classification Card before registration for one of these courses)

B. Foreign Language

C. Social Science

- | | |
|---|--|
| 1. Anthropology | 4. Geography |
| 2. Child psychology (CPsy 80, 81, 88, 132, 140, 180, 181, 182, and 216 only) | 5. Political science |
| 3. Economics and business administration (except accounting, typewriting, shorthand, and office procedures) | 6. Psychology |
| | 7. Sociology |
| | 8. Social science (inter-departmental courses) |

** Students who transfer from another college may substitute 8 quarter credits of general chemistry for GeCh 4 and 5; 5 quarter credits of biology for NSci 3.

†† Students who have not taken cultural anthropology will need to complete this requirement through summer enrollment or through Extension Division by end of winter quarter, sophomore year.

D. Natural Science

1. Biological sciences: botany, zoology, general biology (Biol 1-2, or 1A-2A)
2. Physical sciences: astronomy, chemistry, geology, physics, Physical World (NSci)
3. Mathematics (except higher algebra and mathematics of investment)

E. Humanities

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Art 2. English literature 3. Foreign literature 4. History 5. Humanities | <ol style="list-style-type: none"> 6. Music 7. Philosophy 8. Speech and theatre arts (except Spch 6, 6A, 9, and 39) |
|---|--|

(A maximum of 4½ quarter credits of religion will be accepted to meet Group E requirement)

Course Requirements for the Nursing Major

The total credit requirement maintains a balance between credits in general education and credits in the nursing major and courses related thereto. During most of the quarters of the second, third, and fourth years, the students enroll for courses in both general and professional education. One summer of study follows the third academic year.

Second-, Third-, Fourth-Year Course Requirements

(Credits shown in parentheses)

- | | |
|---|--|
| Psy 1-2—General Psychology (6)
Psy 4-5—Laboratory Psychology (4)
CPsy 80—Child Psychology (3)
Psy 144-145—Abnormal Psychology (6)
Anat 3—Elementary Anatomy (4) •
MicB 53—General Bacteriology (5)
MdBc 50—Physiological Chemistry (4)
Phel 9—Pharmacology (3)
Phsl 51—Human Physiology (5) | NPsy 172—Human Behavior in Threatening Situations (3)
PubH 53—Introduction to Public Health (5)
Nurs 30—Nursing in Perspective (3)
Nurs 40—Study of Patient Behaviors (4)
Nurs 54-55-56—Pathophysiology of Illness (6)
Nurs 57-62—Nursing Diagnosis (12)
Nurs 72-82 A,B—Nursing Intervention (14)
Nurs 92 A-B, 102—Nursing Synthesis (18) |
|---|--|

Second-, Third-, Fourth-Year Electives

The remainder of the total minimum credit requirement (194) must be fulfilled by selections from any of Groups B, C, D, or E described above. Twenty (20) of these elective credits must be earned in Upper Division courses.

Suggested Plan of Enrollment

SOPHOMORE YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Anat 3 (4)	Phsl 51 (5)	MicB 53 (5)
MdBc 50 (4)	Psy 2 (3)	CPsy 80 (3)
Psy 1 (3)	Psy 5 (2)	Nurs 40 (4)
Psy 4 (2)	Nurs 30 (3)	NPsy 172 (3)
Electives (2-3)	Electives (2)	

JUNIOR YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	<i>Summer I</i>
Nurs 54 (2)	Nurs 55 (2)	Psy 145 (3)	Nurs 82A (4)
Nurs 57 (5)	Psy 144 (3)	Nurs 56 (2)	Electives (3)
Phel 9 (3)	Nurs 62 (7)	Nurs 72 (6)	
Electives (5)	Electives (3)	Electives (4)	<i>Summer II</i>
			Nurs 82B (4)
			Electives (3)

SENIOR YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Nurs 92A (6)	Nurs 92B (6)	Nurs 102 (6)
Electives (9)	PubH 53 (5)	Electives (9)
	Electives (9)	

Baccalaureate Program for Graduates of Associate Degree or Diploma Programs in Nursing

This program is planned for graduates of Associate degree or diploma programs who wish to secure education for the practice of professional nursing and to broaden their own cultural and scientific background.

Students admitted to this program at the start of fall quarter in a given year pursue concurrent general and professional education throughout. A minimum of 194 quarter credits is necessary for graduation.

The nursing courses which are offered in sequence are planned to provide opportunity for further development of understandings and skills in nursing, as well as to permit integration of knowledge, skills, and attitudes accruing from general education courses.

Course Requirements

(Credits shown in parentheses)

Engl A-B-C—Freshman Literature and Composition (composition portion) (6)	A course in cultural anthropology
(or) Engl 1A-2A-3A—Freshman English (composition portion) (6)	NPsy 172—Human Behavior in Threatening Situations (3)
(or) Engl 1B-2B-3B—Freshman English (composition portion) (9)	PubH 53—Introduction to Public Health (5)
(or) Comm 1-2-3—Communication (12)	GeCh 4-5—General Principles of Chemistry (10)
(or) Exemption from requirement	NSci 3—Orientation in the Natural Sciences (5)
(All students are required to have an English Classification Card before registration for one of these courses)	Phsl 51—Human Physiology (5)
Psy 1-2—General Psychology (6)	Nurs 20—Nursing in Contemporary Society (3)
Psy 4-5—Laboratory Psychology (4)	Nurs 54-55-56—Pathophysiology of Illness (6)
CPsy 80—Child Psychology (3)	Nurs 65-75-85—Scientific Approaches to Nursing Care (18)
	Nurs 92A-B, 102—Nursing Synthesis (18)

Electives

The remainder of the total minimum credit requirement (194) must be fulfilled by selection from Groups B, C, D, and E described on pages 16-17 of this bulletin. Sixteen (16) quarter credits must be distributed as follows:

Group C—Social science (8)

Group E—Humanities (8)

(A maximum of 4½ quarter credits of religion will be accepted to meet Group E requirement)

An additional requirement is that in one of Groups B, C, and E the total credits must be 15. Twenty (20) elective credits in Groups B, C, D, and E must be earned in Upper Division courses.

Suggested Plan of Enrollment

SOPHOMORE YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	<i>Summer I</i>
Psy 1 (3)	Engl (4)	Engl (4)	CPsy 80 (3)
Psy 4 (2)	Psy 2 (3)	NPsy 172 (3)	Phsl 51 (5)
Nurs 20 (3)	Psy 5 (2)	NSci 3 (5)	
GeCh 4 (5)	GeCh 5 (5)	Elective (3)	<i>Summer II</i>
Elective (2-3)	Elective (2)		Elective (6)
			(Cultural Anth)

JUNIOR YEAR

Fall	Winter	Spring
Engl (4)	Nurs 75 (6)	Nurs 85 (6)
Nurs 65 (6)	Nurs 55 (2)	Nurs 56 (2)
Nurs 54 (2)	Elective (5-8)	Elective (5-8)
Elective (3)		

SENIOR YEAR

Fall	Winter	Spring
Nurs 92A (6)	Nurs 92B (6)	Nurs 102 (6)
Elective (9)	PubH 53 (5)	Elective (9)
	Elective (4)	

II. Program Leading to Master of Education Degree

Candidates for this program will have completed a baccalaureate degree with satisfactory scholastic record. The content of the undergraduate program will be reviewed and recommendations regarding the student's graduate program made on the basis of the general and professional education therein. In general, transfer credit for postbaccalaureate courses completed in other universities will not be granted toward requirements for a degree from this University. All transcripts presented by the applicant will, however, be considered in evaluating qualifications for admission and in individual program planning.

Students should be prepared, if necessary, to accept assignment for field experience outside the Twin Cities.

The course of study is so organized as to provide a central group of courses in nursing education with opportunity for study in related fields. Emphasis is placed on development of increased understanding of human behavior, skill in guidance of learning, and effective functioning as a faculty member of a school of nursing. 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. Final comprehensive examinations in education are required.

The program requires a minimum of 45 credits distributed as follows:

(Credits shown in parentheses)

Nursing (6)	Field experience in teaching (9)
Nursing education (12)	Electives (9)
Education (9)	
	Total (45)

Variation in distribution of credits requires approval of the major adviser and the College of Education Committee on Student Scholastic Standing.

The following courses are required of all candidates and are arranged in a 3-quarter sequence:

Nurs 190—Foundations of Nursing (3)	NuEd 197E, 198E—Advanced Teaching of Nursing (9)
EdCI 199E—Internship (9)	

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 have courses in educational psychology, educational philosophy, and supervised practice teaching in undergraduate programs will be required to include them in the master of education program. These courses do not constitute a part of the 45 required credits.

III. Programs Leading to Master of Science Degree

Nursing programs in the Graduate School provide the option of a field of concentration in either medical-surgical nursing or in psychiatric nursing. Candidates for admission must meet the general requirements for the master of science degree, Plan B, as listed in the *Bulletin of the Graduate School*. A program for the total course of study is submitted after completion of 9-15 credits. Approval of the program by the Medical Sciences Group Committee of the Graduate School constitutes acceptance for candidacy for the degree.

Medical-Surgical Nursing Major

This program places emphasis on the identification of components of health, the effect of selected diseases on states-of-health, and current and potential roles of nursing in assisting people toward optimal health goals. The curriculum includes a minimum of 56 credits distributed as follows:

Nursing (13)	Statistics (3)
Medical-Surgical Nursing (22)	Related Fields (18)

The following courses are required of all candidates and are arranged in a 5-quarter sequence:

Nurs 190—Foundations of Nursing (3)	Nurs 181 A, B—Research in Nursing (4)
Nurs 185A, B, C—Medical-Surgical Nursing (22)	Nurs 195—Problems in Nursing (6-9)

In addition, a minimum of 18 additional credits are selected from related fields including at least 6 credits in two areas. Appropriate related fields include anthropology, biochemistry, education, genetics, microbiology, philosophy, physiology, psychology, sociology, and zoology.

Psychiatric Nursing Program

Emphasis in this program is placed on concepts of mental health and exploration of the nursing role in community mental health as well as on development of competence in providing expert nursing care to mentally ill persons.

The program requires a minimum of 59 quarter credits distributed as follows:

Nursing (19)	Social work (3)
Seminar and field practice (16)	Related fields (18)
Public health (3)	

The following courses are required of all candidates and are arranged in a 5-quarter sequence:

Nurs 190—Foundations of Nursing (3)	Nurs 193—Seminar: Psychopathology (3)
Nurs 191—Foundations of Psychiatric Nursing (3)	Nurs 181 A, B—Research in Nursing (4)
Nurs 192 A, B, C—Seminar and Field	SW 275—Social Group Work (3)
	Nurs 195—Problems in Nursing (6-9)

Other courses are to be selected by the student in consultation with her adviser. Not less than 18 credits must be taken in at least two related fields with a minimum of 6 credits required in each.

IV. Program Leading to Certificate in Practical Nursing

Qualified applicants are admitted at the beginning of fall quarter for 4 consecutive quarters of full-time study, completing the program at the end of the

second summer term. Approximately one-third of the curriculum is general education.

Beginning winter quarter the practical nursing courses include approximately 18 hours per week of supervised laboratory experience in care of adults with medical or surgical conditions, care of mothers and babies, and care of children.

Required Courses

(Quarter credits shown in parentheses)

General College

- GC 10B—Human Biology (5)
- GC 2A—Psychology in Modern Society (5)
- GC 2C—Psychology of Human Development (3)
- GC 3B—Food Selection and Purchase (3)
- GC 32A—Oral Communications (3)
- Social studies area (5)

School of Nursing

- PN 1—Introduction to Practical Nursing (5)
- PN 7—Personal and Vocational Relationships (2)
- PN 15A-B-C—Survey of Nursing Needs (12)
- PN 16, 17, 18—Nursing (24)

A current Red Cross First Aid Certificate is required for graduation. If the student does not have one prior to admission, the certificate must be obtained before the end of winter quarter.

DESCRIPTION OF COURSES

The following courses are taught by members of the School of Nursing faculty and/or by co-operating faculty in other educational units of the University. Class hours, days, and rooms for these courses are listed in the quarterly *Class Schedule* or are made known to students by the School of Nursing faculty. For summer class schedule, see *Bulletin of the Summer Session*.

The description of the required courses and electives in the various curriculums which are taught by other departments of the University are found in the bulletins of the respective educational units. Most of such courses will be in the *Bulletin of the College of Liberal Arts*, the *Bulletin of the College of Education*, the *Bulletin of the General College*, and in the all-University *Class Schedule*.

Explanations

Course Numbering—A course is designated by a departmental prefix and number, and sometimes followed by a letter. It will have the same number regardless of the quarter in which it is offered.

Course Prefixes in Use in the School of Nursing

PN—Practical Nursing
Nurs—Nursing
NuAd—Nursing Administration
NuEd—Nursing Education

The course number, unless otherwise noted, indicates class standing requirements as follows: 1 to 49 for freshmen and sophomores; 50 to 99 for juniors and seniors; 100 to 199 for juniors, seniors, and graduate students; 200 and over for graduate students only.

Symbols—The following symbol code, applicable to all University of Minnesota bulletins, is used throughout the course descriptions and will not carry any page footnotes:

‡ All courses after the single dagger must be completed in order to receive credit.

§ No credit is given if credit has been received for equivalent course listed after the section mark.

¶ Means "concurrent registration" in (i.e., must be taken simultaneously).

A sharp sign means that students must obtain the consent of the instructor before attempting to register for the course.

△ Consent of the School of Nursing must be obtained.

Nursing (Nurs)

20. **Nursing in Contemporary Society.** Exploration of philosophies of nursing and their development in a changing society; implications for individual nurse's growth and contribution to society. (3 cr; prereq regis in Nurs, †† Psy 4 or ¶Psy 4)
30. **Nursing in Perspective.** Study of relationship of nursing philosophy to nursing practice; goals of nursing and their differentiation from those of other health disciplines. (3 cr; prereq regis in Nurs, §§ Psy 5 or ¶Psy 5)

†† Registration in Baccalaureate Program for Graduates of Associate Degree or Diploma Programs.

§§ Registration in Basic Professional Nursing Program.

40. **Study of Patient Behavior.** Identification of behavior as a guide to individual differences in patients. Behavioral data collection. (4 cr; prereq 30, Anat 3, MdBc 50, Phsl 51, cultural anthropology, ¶NPsy 172)
- 54-55-56. **Pathophysiology of Illness.** Pathologic conditions which stimulate alterations in physiologic behaviors, the body's attempt to control these conditions, and the rationale of medical intervention. (2 cr per qtr; prereq Phsl 51, ¶Nurs 57, 62, 72 or ¶65-75-85)
57. **Nursing Diagnosis.** Formulation and testing of hypotheses about a patient's perception of his discomfort. (5 cr; prereq 40, NPsy 172, CPsy 80, ¶Nurs 54)
62. **Nursing Diagnosis.** Derivation of inferences from appropriate generalizations; selection of most probable inference about the purpose the patient's behavior serves in reducing his discomfort. (7 cr; prereq 57, ¶Psy 144, ¶Nurs 55)
65. **Scientific Approaches to Nursing Care.** Development of observational skills, identification of patient behaviors, formulation of hypotheses about a patient's discomfort. (6 cr; prereq 20, Psy 2-5, CPsy 80, NPsy 172, Phsl 51, cultural anthropology, ¶Nurs 54)
68. **Nursing Care of Psychiatric Patients.** Classes, observation, and experience in care of psychiatric patients. (4 cr [open to registered nurses who have not had undergraduate psychiatric nursing preparation]; prereq Δ; offered when feasible)
72. **Nursing Intervention.** Development, application, and evaluation of nursing treatment based on nursing diagnosis and identified principles. (6 cr; prereq 62, MicB 53, ¶Psy 145, ¶Nurs 56)
75. **Scientific Approaches to Nursing Care.** Development of a nursing diagnosis based on validation of hypotheses and application of appropriate generalizations to a patient's behavior; identification of principles for selecting nursing treatment. (6 cr; prereq 65, ¶55)
- 82A. **B. Nursing Intervention.** Application, evaluation, and modification of nursing treatment. (4 cr each; prereq 72, Psy 145, Phcl 9)
85. **Scientific Approaches to Nursing Care.** Selection, application, and evaluation of nursing treatment. (6 cr; prereq 75, ¶56)
- 92A. **Nursing Synthesis.** Combination of all parts of nursing process into a design consistent with goal of maximum comfort for a patient. (6 cr; prereq 82B or 85)
- 92B. **Nursing Synthesis in the Community.** Study and application of principles underlying public health nursing designed to meet nursing needs of individuals and families in the community; emphasis on health and prevention of illness and disability. (6 cr; prereq 82B or 85)
102. **Nursing Synthesis.** Planning for and utilizing the help of nonprofessional participants in carrying out selected steps of the nursing process directed toward achievement of the goal of patient comfort. (6 cr; prereq 92A or 92B)
111. **Special Educational Experiences in Nursing.** Various learning experiences planned to meet individual needs. (1-6 cr; for persons registering for irregular dates of attendance; maximum of 12 wks; prereq grad nurse and Δ)
- 151A. **B. Clinical Nursing.** Identification of nursing needs of patients; application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr)
- 181A. **B. Research in Nursing.** Exploration of needs for research and discussion of possible ways in which selected research efforts might be undertaken. Development of a study design. (2 cr per qtr; prereq PubH 140 or §)
- 185A. **B. C. Medical-Surgical Nursing.** Analysis of phenomena of health; identification of the impact of disease on man's movement to health goals; exploration of new dimensions of clinical nursing. Selected laboratory experiences. (6 cr for A, 8 cr for B and C; prereq advanced physiology and mental health courses)
190. **Foundations of Nursing.** Investigation of the role of nursing in promotion of health and care of the ill or helpless. (3 cr)

- 191. Seminar: Foundations of Psychiatric Nursing.** Changing role of the psychiatric nurse in society. Current trends related to education and functions of psychiatric nurses. Historical development of personality theories and influence of relative research and social organizational patterns affecting present-day psychiatric care and treatment. (3 cr; prereq 190 or ¶190)
- 192A. Psychiatric Nursing Seminar and Field Practice with Individual Patients.** Nurse-patient relationships; examination of effective and ineffective interpersonal relationships. Intensive individually supervised clinical experience working with individual patients, planning dynamic nursing care and participation on the interdisciplinary team. (8 cr; prereq 191)
- 192B. Psychiatric Nursing Seminar and Field Practice with Groups.** Group relationships. Experience working with groups, looking at individual's role within the group; identification of behaviors and therapeutic functioning within the group setting. These processes examined via work or recreational activities. (5 cr; prereq 192A or #)
- 192C. Psychiatric Nursing Seminar and Field Practice in the Community.** Community mental health problems, community resources and psychiatric nurse's role in the community. Collaborative study with public health nursing. (4 cr; prereq 192B or #)
- 193. Seminar: Psychopathology.** Eclectic approach to psychopathology as related to observed patient behavior in clinical setting. Student presentation and discussion of psychopathology of specific patients. (3 cr; prereq ¶192A)
- 195. Problems in Nursing.** Individual study of a problem in the field of nursing. (1-9 cr; prereq regis in grad program and Δ)

Nursing Administration (NuAd)

- 110. Field Practice in Nursing Administration.** Individually planned experiences for selected students. (Cr ar; prereq Δ)
- 160. Ward Administration.** Principles of administration applied to a nursing unit; analysis and maintenance of nursing service; planning and assisting in clinical teaching programs. (3 cr; offered when feasible)
- 170. Foundations of Nursing Service Administration.** Principles of administration as applied to hospital nursing service. (3 cr; offered when feasible)
- 173. Fundamentals of Education in Nursing.** Identification of learning situations; selection and planning of learning experiences; methods of instruction for individuals and groups; evaluation. (3 cr; offered when feasible)

Nursing Education (NuEd)

- 171. The Curriculum of the School of Nursing.** Principles of curriculum development applied to educational programs in nursing. (3 cr; offered when feasible)
- 175. Educational Administration in Nursing.** General orientation to the functions involved in administering educational programs in nursing; responsibilities of faculty members. (3 cr; prereq #)
- 195. Problems in Nursing Education.** Individual study of a problem in the field of nursing education. (1-9 cr; prereq regis in grad prog and Δ)
- 197E. Advanced Teaching of Nursing.** Investigation of research in learning and teaching; implications for nursing. (3 cr; prereq regis in MEd program, Nurs 190 or #)
- 198E. Advanced Teaching of Nursing.** Identification of problems of learning. Individual and group methods of problem solving. (6 cr; prereq 197E and ¶EdCI 199E)
- EdT 51 A-B. Teaching of Nursing.** Principles underlying the teaching of nursing; planning and evaluation of instruction; observation and study of teaching in nursing school situations; supervised practice in teaching of nursing subjects. (4 cr for 51A, 6 cr for 51B; prereq regis in MEd program)

EdCI 199E. Internship. Advanced supervised teaching and practice work for candidates for the master of education degree. (9 cr; prereq regis in MEd program, 197E)

Practical Nursing (PN)

1. **Introduction to Practical Nursing.** Orientation to role of practical nurse as a member of the health team; basic needs of people; basic principles and skills in assisting in the total care of patients. (5 cr)
7. **Personal and Vocational Relationships.** Consideration of total responsibility of licensed practical nurse in hospital, home, and community. (2 cr)
- 15A-B-C. **Survey of Nursing Needs.** Based on use of scientific method in solving nursing problems common to all patients; selected nursing problems are discussed with emphasis on the way in which they are encountered in care of hospitalized patients. During the summer, emphasis on care of individual and family in home and community; consideration of nursing problems arising in situations other than general hospital. (4 cr per qtr; prereq 1)
- 16, 17, 18. **Nursing.** Solutions to selected nursing problems common to all patients discussed as they apply to the patient found in medical, surgical, orthopedic, neurological, obstetric, pediatric, or other clinical areas. During clinical experience, student is guided in defining and meeting nursing needs of individual patients. (8 cr per qtr; prereq 1, ¶15A, or ¶15B, or ¶15C)