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Graduate Programs in
Medicine, Dentistry, Pharmacy

1961-1963



*“ . . . dedicated to the
advancement of learning
and the search for
truth . . . ”*

Bulletin

of the UNIVERSITY of MINNESOTA

How to Use This Bulletin

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

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

Symbols and Explanations

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

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, all courses listed before dagger must be completed.

‡ 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."

x After a course number indicates course is offered more than 1 quarter.

f,w,s,su. These letters following a course number indicate fall, winter, spring, or summer quarter.

Courses numbered between 100 and 199 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 Foundation. The prefix M is added to courses offered at the Mayo Foundation.

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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. 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 advanced medical science through original investigation.

Laboratory Equipment—Laboratory equipment for graduate work in medicine is located in the several buildings on the campuses at Minneapolis and St. Paul and at Rochester.

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, and the University Health Service.

Minneapolis 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 certain 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 the Mayo Foundation in 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 Foundation 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 around 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. Work which receives a grade below B is not acceptable for graduate credit in the major field, nor if below C, in the minor. Students with unsatisfactory records will not be permitted to continue.

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

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

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 visitor's 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 Foundation. 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. For the last-named period registration "For Thesis Only" will be permissible.

2. All persons appointed under trainee programs shall be registered full-time during the tenure of their appointments.

3. Postdoctoral 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 graduate resident rate.

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

Fellowships and Assistantships—Medical fellowships and assistantships offer stipends ranging up to \$3,600 per year and higher in special cases. 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 Minneapolis General Hospital and at Ancker Hospital (St. Paul). At the Minneapolis 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), bacteriology, pharmacology, physiology, physiological chemistry, physiological hygiene, and public health. There are 6 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 pharmaceutical chemistry, pharmaceutical technology, and pharmacognosy.

The Mayo Foundation carries the following laboratory science and clinical fellowships-residencies: 15 in anesthesiology, 2 in biochemistry, 15 in dermatology and syphilology, 180 in internal medicine, 27 in neurologic surgery, 28 in neurology and psychiatry, 2 in nutrition, 15 in obstetrics and gynecology, 19 in ophthalmology, 44 in orthopedic surgery, 6 in otolaryngology and rhinology, 2 in parasitology, 20 in pathology, 18 in pediatrics, 9 in physical medicine and rehabilitation, 3 in physiology, 10 in plastic surgery, 6 in proctology, 24 in radiology, 80 in surgery, 15 in urology, and 12 in dentistry. The fellowships carry stipends of \$2,400 each year on a 12-month basis 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 Foundation 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 Dean of the Graduate School, University of Minnesota, Minneapolis 14, or for fellowships on the Mayo Foundation to the Director of the Mayo Foundation, Rochester, Minnesota.

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

Fellows who have satisfactorily completed 3 years of residence at the Mayo Foundation 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, Bacteriology, Pathology, Pharmacology, Physiological Chemistry, 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 Medical Sciences, University of Minnesota, Minneapolis 14.

REQUIREMENTS FOR ADVANCED DEGREES IN MEDICINE

A member of the staff of instruction with rank of assistant professor and above may not take a graduate degree at this University.

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

Master's Degree

Residence—Upon entrance to the Graduate School, the student, with the approval of the dean, will select his adviser in the field of his major work. With the

approval of his adviser and the dean, he will outline a study program for the year and if possible for the period of residence.

For the *Master's degree (M.S.) in clinical subjects*, 2 or 3 years are required. For the *Master's degree without special designation in the basic sciences* a minimum of 1 year (3 quarters) of residence is required. For the *Master's degree with field named (M.S. in Path. or Rad.) in pathology or radiology*, 3 calendar years are required. The longer term of 3 years is required in all cases where the *Master's degree is granted in clinical subjects with field named*. This implies clinical proficiency in the special field. For the ordinary *Master's degree without special designation*, the length of residence in clinical fields may be reduced to 2 years. This rule should be noted also when the M.S. oral examination is taken concurrently with the preliminary examination for the Ph.D. in clinical subjects.

Language Requirements—For the *Master's degree in the preclinical sciences*, a reading knowledge of one foreign language is required, which must be certified before the candidate may be admitted to the written and oral examinations required for the degree. The certificate must be signed by a representative of the appropriate foreign language department.

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

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

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

For the *Master's degree in the clinical branches*, students should apply for candidacy after 1 calendar year of graduate work.

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

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

Mayo Foundation 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.

After approval of candidacy, and before the final quarter, the plan for the thesis for the Master's degree should be filed with the dean of the Graduate School. A blank for reporting the thesis plan may be obtained in the Graduate School office. The subject must be approved by the adviser and by the Medical Graduate Group Committee. The topic should be within the field of the major. The thesis must be written in acceptable English. It must give evidence of independent investigation and thought by the candidate in perceiving the problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the special field and correct citation of authorities are expected.

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

The Master's thesis must be typewritten in quadruplicate, 2 copies on 20-pound linen stock of 75 per cent rag content, the others on 13-pound bond paper. Samples of the paper required should be examined in the dean's office. The original and first copy must contain all illustrative material. Ample margins should be left for binding purposes. The body of the thesis should be double spaced, but footnotes may be single spaced. A copy of the thesis, certified by the adviser as complete, must be registered in the dean's office at least 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 will include 2 representatives of the major field and 1 representative of the minor field. Unanimous approval by the thesis committee is necessary for the acceptance of the thesis, and a record of this approval must be filed in the Graduate School office on the appropriate form before the candidate may be admitted to the final written and oral examinations. The Graduate School in any case should be informed, on the appropriate blank, of the action of the thesis committee.

If the thesis is accepted, the candidate must deposit with the Office of Admissions and Records, at least 5 weeks before the commencement in which he wishes to take his degree, the sum of \$2.50 for binding 2 copies of the thesis, which will be catalogued and deposited in the University Library.

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

The final *written examination* will be held prior to the oral examination. It will cover the major field and may include any work fundamental thereto. (There will be no special examination in the minor.) The final written examination will be ar-

ranged by the adviser as chairman of the thesis committee, the questions to be prepared with the co-operation of the faculty of the major department. The chairman will report the results of the examination to the Graduate School office on the appropriate form. A majority vote of the committee is required for approval of the written examination.

The final *oral examination* is held when all other requirements for the degree have been met, including the final written examination and the acceptance of the thesis. The final oral examination for the M.S. degree in medicine will in general include questions from both major and minor fields. If a written qualifying examination covering the minor field has been taken successfully, the final oral examination need not include questions on the minor field. The oral examination shall not exceed 2 hours. At the close of the examination, the committee will vote upon the candidate's performance, and a majority vote is required for approval. The chairman of the committee will then report the result of the vote to the Graduate School office on the appropriate form.

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

Recommendation by the Faculty—The dean of the Graduate School will report to the Executive Committee of the graduate faculty the names of those who have completed the requirements for the Master's degree, and those duly approved will be recommended by the faculty to the Board of Regents of the University.

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

Requirements	Under the Direction of	Date
Program, major and minor	Adviser and dean of the Graduate School or director of Mayo Foundation	On entrance
Approval of candidacy	Committee, normally from the major department, division, or college, and dean	After completion of 9 to 15 credits for basic science majors After 1 calendar year for majors in clinical fields
Approval of thesis plan and degree program	Adviser and group committee	After approval of candidacy and at opening of quarter preceding final quarter
Language requirement	Adviser and language department	Before admission to written and oral examinations
Licensure	State Board	6 months after beginning graduate work
Registering of thesis	Graduate School office	Consult Graduate School office for date
Approval of thesis	Thesis committee	Before admission to final oral examination

Requirements	Under the Direction of	Date
Final written examination in major	Major adviser and committee	} Consult Graduate School office for date
Final oral examination on all work	Committee	
Filing of thesis	Graduate School office	
Graduation fee and fee for binding thesis	Office of Admissions and Records	
		Not later than 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.

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

General Regulations

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

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

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

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

5. In meeting either the foreign language requirements or the requirements of a special research technique, credits earned or proficiency demonstrated in other approved institutions are transferable to the Minnesota record if these have been completed within a 3-year period immediately prior to entering this Graduate School. To meet the requirements of a collateral field of knowledge, credits earned in other approved institutions are transferable to the Minnesota record in accordance with existing regulations governing transfer of credits for the Ph.D. degree.

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

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

8. In no case may the special research technique subject or the collateral field of knowledge be one that has regularly or traditionally been included in the major or minor fields of study of similar candidates in the past. The special research technique subject should represent the acquisition of any special skill that will effectively contribute to the research proficiency of the candidate. The collateral field of knowledge is expected to broaden the candidate's scholarly and scientific background by permitting exploration of knowledge in fields related to the major and minor. The collateral field of knowledge may include in this sense any work now available or to be developed in the preparation for college teaching, including supervised instruction at the college level.

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

10. The foreign language or 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 options rests upon the candidate and his major adviser. In no case may English be submitted as a foreign language.

11. 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.

12. A collateral field of knowledge is defined as not less than 15 credits of work in courses numbered 100 or above (for dentistry, 200 or above) completed with a grade not lower than C.

Major Field Requirements

All but 8 of the departments or major fields listed in this bulletin permit the fulfillment of the language requirements by (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge. The 8 exceptions are:

Biophysics and *Pharmacognosy*, which require 2 foreign languages, 1 of which must be German;

Neurology and *Physiological Hygiene*, which require 2 foreign languages without further specification;

Biostatistics, *Epidemiology*, *Hospital Administration*, and *Sanitation*, which require either (a) 2 foreign languages or (b) 1 foreign language and the option of a special research technique or a collateral field of knowledge.

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

Ph.D. Study Program—The study program for the entire 3 years *should* be submitted at the beginning of the first year and *must* be submitted before beginning the second year. Doctoral program blanks may be obtained in the Graduate School office. This program requires approval by the student's adviser, by his minor department, by the Medical Graduate Group Committee, and by the dean of the Graduate School. The candidate is required to do enough independent investigation to show his grasp of the principles and methods of scientific research and to form the basis of an acceptable thesis. The preparation of a thesis is an exercise to develop investigative habits which the candidate may learn to apply to clinical as well as to purely investigational problems.

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

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 Foundation—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 Mayo Foundation administration.

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

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

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

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

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 minor department, 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 1 of 3 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 5-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 6 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 7 members, a unanimous 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 examinations must be scheduled in the Graduate School office 2 weeks in advance.

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

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

The thesis must be typewritten in quadruplicate to facilitate reading by the thesis committee. A copy, certified by the adviser as complete, must be registered in the dean's office and 4 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.) Unanimous approval of the thesis by the committee is necessary, and the chairman of the committee will report the results of the review of the thesis to the Graduate School office on the appropriate form, available in that office. Two copies of the thesis are to be bound and deposited in the Graduate School office.

When he submits his *thesis report form* and *final oral examination report*, the candidate will sign in triplicate a *Memorandum of Agreement* with University Microfilms, Ann Arbor, Michigan, under which the ribbon copy of the thesis will be micro-filmed 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 2 positive microfilm copies of his thesis, which will be deposited in the Library of Congress.

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

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

Final Oral Examination—After preliminary written and oral examinations, after acceptance of the thesis, and after successful completion of final written examinations, when required, the final oral examination shall be given. This examination shall be conducted by a committee consisting of the adviser, the other members of the thesis review committee, and at least two additional members of the graduate faculty, appointed by the dean, upon recommendation of the Graduate Group Committee in Medical Sciences. This examination (not to exceed 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.

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

Date for Completion of Requirements for Degrees—Because flexibility is necessary in scheduling final oral examinations in the medical fields, it is not feasible to publish definite times when these are held and when other requirements must be met. Each student should arrange such dates with the Graduate School office. If the student's name is to be included in the commencement program, however, *all the requirements for his degree must be completed at least 5 weeks before the commencement in which he expects to take the degree.*

Reports—Special blanks are provided for signed reports on the written examination in the major, the preliminary oral examination, the review of the thesis, and the final oral examination. All of these must be filed with the Graduate School office: the 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.

Recommendation by the Faculty—The dean of the Graduate School will report to the Executive Committee of the graduate faculty the names of those who have completed the requirements for the Doctor's degree, and those duly approved will be recommended by the faculty to the Board of Regents of the University.

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
First Year		
Selection of major	Adviser and dean of the	
Selection of minor	Graduate School	
Second Year		
Doctoral program	Adviser, Medical Graduate Committee, and dean of Graduate School	Before beginning work of second year
Thesis plan	Adviser, Medical Graduate Committee, and dean of Graduate School	} Before admission to prelimi- nary examination
Completion of minor	Course instructors	
Languages	Adviser and language depart- ments	
Written examination	Graduate faculty of the major department	Prior to preliminary oral or to final oral examination or to both
Preliminary examination, oral	Committee	At least 1 academic quarter before degree is to be con- ferred
Third Year		
Registering of completed thesis certified by ad- viser	Graduate School office	Consult Graduate School office for date
Approval of thesis	Thesis committee	Before admission to final oral examination
Final oral examination.....	Committee. Date of exami- nation fixed by Graduate School	Consult Graduate School office for date
Two bound copies, ab- stract of thesis, and payment of \$25 for mi- crofilming of thesis.....	Graduate School office	} Not later than 5 weeks before commencement in which student takes his degree
Office of Scientific Person- nel Survey Form	Graduate School office.....	
Release card	Graduate School office	
Graduation fee	Office of Admissions and Rec- ords	

VETERANS' INFORMATION

Veterans who plan to use training benefits for work in graduate medicine should arrange an appointment with the counselor at 102 Administration Building.

FIELDS OF INSTRUCTION

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

For Graduate Training in the Basic Medical Sciences and Clinical Specialties

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

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

Anatomy (including hematology, histology, and embryology)	Pathology
Anesthesiology	Pediatrics
Bacteriology	Pharmaceutical Chemistry
Biophysics	Pharmaceutical Technology
Biostatistics	Pharmacognosy
Cancer Biology	Pharmacology
Dentistry	Physical Medicine and Rehabilitation
Hospital Administration	Physiological Chemistry (Biochemistry)
Medicine (including Divisions of Internal Medicine, and Dermatology)	Physiological Hygiene
Nutrition	Physiology
Obstetrics and Gynecology	Psychiatry and Neurology
Ophthalmology	Public Health
Otolaryngology, Otolology, Rhinology, and Laryngology	Radiology
	Surgery (including Divisions of General Surgery, Neurosurgery, Orthopedic Surgery, Plastic Surgery, Proctology, and Urology)

ANATOMY

OFFERED AT THE MEDICAL SCHOOL

Professor

Arnold Lazarow, M.D., Ph.D., *head*
J. Francis Hartmann, Ph.D.
Charles F. Morgan, Ph.D.
R. Dorothy Sundberg, Ph.D., M.D.
Lemen J. Wells, Ph.D.

Associate Professor

Anna Mary Carpenter, Ph.D., M.D.
William J. L. Felts, Ph.D.

Assistant Professor

Carl B. Heggstad, M.D., Ph.D.
Morris Smithberg, Ph.D.

Prerequisites—Prerequisite work for all majors or minors in the Department 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. For the Ph.D. degree, either (a) 2 foreign languages (preferred) or (b) 1 foreign language and the option of a collateral field of knowledge.

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

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

- 100f-101w.† **Gross Human Anatomy.** Dissection of the human body. (15 cr for both qtrs; prereq #; enrollment limited) Hartmann, Lazarow, Morgan, Wells
- 102s. **Anatomy of the Head and Neck.** Detailed dissection of the human head and neck. (6 cr; prereq 59) Felts
- 103f-104s.† **Human Histology.** Microscopic structure and cytochemical and functional aspects of cells, tissues, and organs. (7 cr for both qtrs; prereq #) Lazarow, Carpenter
- 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 102)
- 107w. **Human Embryology.** Development of the human body. (4 cr; prereq #) Wells
- 111s. **Human Neuroanatomy.** Structure of the nervous system including the organs of special sense. (5 cr; prereq 104 or Zool 150, #) Hartmann
131. **Biological Electron Microscopy.** (Cr and hrs ar; prereq #) Hartmann
132. **Experimental Study of the Fetus.** (Cr and hrs ar; prereq #) Wells
- 140f-141w. **Skeletal Tissue Biology.** Gross and microscopical anatomy of the skeletal tissues, their origin and development. Transplantation and biomechanical studies. 140: Lectures. 141: Student presentation of literature in their particular areas of interest. (2 cr; prereq medical or dental histology or equiv course in zoology) Felts
149. **Experimental Neurology.** 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 #) Carpenter, Felts, Hartmann, Heggstad, Lazarow, Morgan, Smithberg, Wells
160. **Introduction to Histological and Morphologic-Histochemical Techniques.** Fixation, embedding, and staining of cytological components and enzymes. (2 cr; prereq 103-104, #) Carpenter
161. **Experimental Cytochemistry.** (Cr and hrs ar; prereq 103-104, PhCh 100-101, #) Lazarow
- 165w-166w. **Hematology.** Blood and blood-forming organs; emphasis on blood and bone marrow from the standpoint of diagnosis and prognosis. (4 cr per qtr; prereq 103, or Zool 54 or #) Sundberg
- 167s. **Seminar in Hematology.** (1 cr; prereq 166) Sundberg
180. **Endocrinology of the Reproductive Tract.** Relationship of endocrines to reproduction studied by use of the experimental techniques of physiology, cytochemistry, and radioautography. (Cr and hrs ar; prereq 103, 104, PhCh 100-101, #) Morgan
- 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, Hartmann, Lazarow, Morgan, Wells
- 205, 206, 207. **Anatomical Seminar.** 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 THE MAYO FOUNDATION**

Professor

W. Henry Hollinshead, Ph.D., *head*

In co-operation with other departments at the Mayo Foundation, 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, and 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

** Enrollment in all of these courses is limited.

- M 253f. **Anatomy of the Orbit.** Lectures and laboratory work in the 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 255f,s. **Orthopedic Anatomy.** Lectures and laboratory work on the limbs and back. Hollinshead

ANESTHESIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Frederick H. Van Bergen, M.D., M.S., *head*

Associate Professor

Joseph J. Buckley, M.D., M.S.

Clinical Associate Professor

Ellis N. Cohen, M.D., M.S.

Assistant Professor

James H. Matthews, M.D., M.S.
Earl A. Schultz, M.D., M.S.

Instructor

Russell W. Bagley, M.D.
Charles E. Galway, M.D., M.S.
John R. Gordon, M.D.
Arthur J. Oswald, 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.

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 in 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:

- Med 202. Diseases of the Cardiovascular Apparatus
- Phcl 109. Pharmacological Problems
- Phcl 203. Research in Pharmacology
- Phsl 113. Problems in Physiology
- Phsl 203. Research in Physiology
- PhCh 205. Research in Physiological Chemistry

OFFERED AT THE MAYO FOUNDATION

Associate Professor

Albert Faulconer, M.D., M.S. in Anes., *head*
Thomas H. Seldon, M.D., C.M., M.S. in Anes.

Assistant Professor

Robert T. Patrick, M.D., M.S. in Anes.
Richard A. Theye, M.D.

Instructor

John T. Martin, M.D.
Emerson A. Moffitt, M.D.
John A. Paulson, M.D., M.S. in Anes.

Graduate training in anesthesiology at the Mayo Foundation combines opportunity for an advanced degree with realistic training in anesthesiology. The majority

of fellows in anesthesiology who seek a degree 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 are 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 wide clinical as well as theoretical 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. Several months devoted to lectures, demonstrations, and clinical work in related fields: neuroanatomy, 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)

BACTERIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Herman C. Lichstein, D.Sc.
William F. Scherer, M.D.
Dennis W. Watson, Ph.D.

Leroy C. McLaren, Ph.D.
Edwin L. Schmidt, Ph.D.
Newell R. Ziegler, M.D., Ph.D.

Associate Professor

S. Caylen Bradley, Ph.D.
K. Gerhard Brand, M.D.

Assistant Professor

Wendell H. Hall, M.D., Ph.D.
John D. Ross, Ph.D.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A.

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

- 100s.** Bacteriology for Dental Students.** Morphology; methods of staining; culture media; methods of identification; principles of sterilization and disinfection; antibiotics; bacteria and disease; fundamentals of immunology; the oral flora; bacteriology of oral infections, dental caries,

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

- alveolar abscess, and periodontal infection; the relationship of oral infections to other focal and general infections. (6 cr) McLaren
- 102s.** Medical Bacteriology.** Pathogenic bacteria, especially in their relationship to disease; principles of infection and immunity; microbiological techniques for laboratory diagnosis and antibiotic determinations. (4 cr; for other than med students; prereq 116) Watson, Brand
- 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 #) 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 qr; prereq Anat 103, PhCh 100 or 101, or AgBi 120) Scherer and staff
- 110w. Microbial Genetics.** Genetic mechanisms in the bacteria, bacteriophages, fungi, protozoa, and algae. Mutagenesis; selection; adaptation; cytoplasmic inheritance; patterns of genetic recombination; fine structure of genetic material. (3 cr; prereq 53 or #; offered 1962-63 and alt yrs) Bradley
- 111s. Advanced Laboratory.** Techniques employed in study of microbial genetics and mycology. Laboratory exercises illustrate recombination in bacteria and fungi, antibiosis, morphogenesis in bacteria and fungi, and other techniques. (3 cr; prereq 110 or 112 or #; offered 1962-63 and alt yrs) Bradley
- 112w. General Mycology.** Physiology; genetics; development; ecology; evolution; taxonomy; economic importance of the yeasts, molds, actinomycetes, and other fungi. (3 cr; prereq 53 or #; offered 1961-62 and alt yrs) Bradley
- 114f. Medical Mycology.** Pathogenic fungi and mycotic infections in man and animals; emphasis on diagnostic procedures. (3 cr; prereq 102; offered 1961-62 and alt yrs) Bradley, Krafchuk
- 116w. Immunology.** Interactions between host and parasite; serologic procedures; hemolysis; antigen and antibody; opsonins, serums, vaccines, toxin, antitoxin, complement fixation, neutralization, precipitative and agglutinative reactions, blood grouping, atopy, anaphylaxis. (4 cr; prereq 53) Watson
- 121f. Physiology of Bacteria.** Chemical and physical structure; staining; growth; influence of environment on growth; nutrition; enzymes; metabolism. (3 cr; required of all bacteriology majors; prereq 53, 8 cr in organic chemistry or biochemistry) Lichstein
- 122w. Physiology of Bacteria Laboratory.** Techniques employed in study of bacterial physiology and metabolism. (3 cr; required of all grad students in bacteriology, open to others by consent; prereq 121) Lichstein
- 123s. Bacterial Metabolism.** Advanced treatment of metabolism: enzymes; biological energy; fermentation; respiration; nitrogen metabolism. (3 cr; required of all grad students in bacteriology, open to others by consent; prereq 122 or equiv, introductory biochemistry; offered 1961-62 and alt yrs) Lichstein
- 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 and 116 or 105 and 106) McLaren, Ross
- 152f,w,s. Special Problems.** (Cr ar; prereq #)
- 153f,w,s. General Bacteriology.** Lectures, demonstrations, and laboratory exercises in morphology, physiology, taxonomy, and ecology of bacteria. Practical application of these fundamental principles in other phases of science and industry. (3 cr; prereq 10 cr in chemistry, 4 cr in biological sciences, #) Schmidt
- 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 bacteriology, #) Scherer, Bridges
- 203f,w,s. Seminar.** (1 cr) McLaren
- 204w-205s. Advanced Bacteriology.** (Cr ar; prereq 121-122, or ¶121-122, #)
- 206f.** 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 1962-63 and alt yrs) Ross, McLaren

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

207f.** Research Techniques in Virology and Animal Cell Culture. Quantitative procedures for study of the biology of viruses and animal cells. (3 cr; prereq ‡; offered 1961-62 and alt yrs) Ross, McLaren

Microbiology

OFFERED AT THE MAYO FOUNDATION

Professor

Lyle A. Weed, M.D., Ph.D., *head*

Assistant Professor

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

Associate Professor

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

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

- M 251f,w,s,su. Clinical Bacteriology.** Making and examining of cultures. Serodiagnostic tests; special laboratory methods in clinical bacteriology; bacteriology of surgical material. Research in bacteriology. Weed, Needham, Ulrich, Karlson
- M 252f,w,s,su. Experimental Bacteriology.** Research in bacteriology of normal and diseased tissues, the blood, secretions and exudates. Experimental inoculation of animals and immunological studies. So far as possible work limited to study of pathogenesis and to development of specific methods of prevention and treatment of various diseases presumably of infective origin. Weed, Karlson
- M 253f,w,s,su. Medical Mycology.** Experience in examination and diagnosis of specimens from cases with superficial and systemic mycotic disease. Ulrich

BIOPHYSICS

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

Advisers:

Professor

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

Staff:

Professor

Edward J. Baldes, Ph.D.
Kenneth N. Ogle, Ph.D.
A. Glenn Richards, Ph.D.
Otto H. Schmitt, Ph.D.
Marvin M. D. Williams, Ph.D.

Associate Professor

Eugene Ackerman, Ph.D.

Assistant Professor

Robert M. Benolken, Ph.D.
Alan L. Orvis, Ph.D.

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

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

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

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

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

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

105. **Review of Elementary Physics.** For medical students by arrangement with instructor. (1 cr) Loken
- 138x. **Seminar in General Physiology and Biophysics.** (Cr ar) Staff
- 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 general 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.* **Research in Biophysics and Physiology of Radiation.** (Cr ar) Loken
- 218x. **Radiobiology Seminar.** Discussion of research problems and current literature on the biological effects of ionizing radiations. (1 cr; prereq #)
- 221x* -222x* -223x.* **Research in Biophysics.** (Cr ar) Schmitt
- Rad 236. **Radioisotope Seminar.** (1 cr; prereq #) Loken
- 296* -297* -298.* **Seminar in Biophysics.** (Cr ar) Schmitt, Benolken

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

- Bot 118. **Extranuclear Cytology.** (3 cr) Dahl
- Bot 119. **Nuclear Cytology.** (3 cr) Dahl
- Bot 140. **Advanced Survey of Plant Physiology.** (3 cr without lab, 5 cr with lab) Brown
- PCh 101-102-103. **Physical Chemistry.** (4 cr per qtr) Crawford, Livingston
- PhCh 100x-101x. **Physiological Chemistry.** (7 cr, 6 cr) Armstrong and staff
- PhCh 209. **Histochemistry.** (3 cr) Glick
- Phsl 106-107.† **Human Physiology.** (15 cr) Visscher, Gellhorn, others
- Phys 100-102-104. **Mechanics and Electromagnetism.** (4 cr per qtr)
- Phys 107* -109* -111.* **Modern Physics.** (3 cr per qtr)
- Phys 108-110-112. **Principles of Atomic and Nuclear Physics.** (3 cr per qtr)
- Phys 120.* **Atomic Physics.** (3 cr) Blair
- Phys 121.* **Experimental Nuclear Physics I.** (3 cr) Blair
- Phys 122. **Experimental Nuclear Physics II.** (3 cr) Blair
- Phys 144. **Electrical Measurements.** (4 cr) Blair
- Phys 146.* **Physics of Vacuum Tubes and Associated Circuits.** (4 cr) Blair
- Phys 148. **Applications of Electronic Circuits.** (4 cr) Blair
- Phys 171-172-173. **Theoretical Physics.** (3 cr per qtr)
- Phys 181* -183* -185.* **Atomistics and Elementary Quantum Mechanics.** (3 cr per qtr) Williams
- Phys 222-223-224.* **Principles of Mathematical Physics.** (3 cr per qtr) Hill
- Zool 100, 101, 102. **Zoological Techniques.** Course content is subject to the direction of major adviser. (Cr ar, not to exceed 3 cr per qtr)
- Zool 109. **Sense Organs.** (3 cr) Stephens
- Zool 112* -113.* **Advanced General Physiology.** (3 cr per qtr) Brokaw
- Zool 140. **Biological Microscopy.** (4 cr) Richards
- Zool 160-161. **Cytology.** (3 cr per qtr) Gall
- Zool 182. **Experimental Embryology.** (5 cr) Spratt

Zool 242-243. Insect Physiology. (4 cr per qtr) Richards

Zool 291-292-293. General Seminar.

OFFERED AT THE MAYO FOUNDATION

Professor

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

Associate Professor

Eugene Ackerman, Ph.D.

Assistant Professor

Alan L. Orvis, Ph.D.

Advanced work in biophysics at the Mayo Foundation 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. 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. A series of seminars and lectures is presented from time to time in optics with emphasis on ophthalmic optics and physiological optics.

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 251f,w,s,su. Special Research in Biophysics. Baldes, Williams, Ogle, Orvis, Ackerman

M 252f,w,s,su. Physiologic Optics. Ogle

BIOSTATISTICS

OFFERED AT THE SCHOOL OF PUBLIC HEALTH

Professor

Jacob E. Bearman, Ph.D., *head*
Joseph Berkson, M.D., D.Sc.

Assistant Professor

Byron W. Brown, Jr., Ph.D.
Marian W. Thornton, Ph.D.

Associate Professor

Richard B. McHugh, Ph.D.
I. Richard Savage, Ph.D.

Prerequisites—For major work, completion of the premedical curriculum. Acceptable alternatives include the equivalent of an undergraduate major in 1 of the following 2 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 2, the candidate should be interested in application in 1.

Language Requirement—For the M.S. degree, none. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a special research technique or a collateral field of knowledge.

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

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

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 for 111, ¶110...for 121, ¶120) Keenan, Knatterud

PubH 120. Biostatistics II. Continuation of 110. (3 cr; prereq 110 with grade not lower than C, ¶121)Brown

PubH 130s.* Biostatistics III. Principles and methods of analysis of components of variance and effects in surveys and experiments; 1-way, 2-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) Brown

PubH 131s. Biostatistics Laboratory II. Practical exercises associated with 130. (2 cr; prereq ¶130) Knatterud, Keenan

PubH 140f. Vital Statistics I. Official sources; population changes; rates; trends; significant differences. (3 cr) Bearman, 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 #)

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 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 designs. (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 in 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 #)

PubH 217f°-219w.* Theory of Biomedical Measurement Problems, Assays. (2 cr per qtr; prereq ¶216-218 and #)

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 THE MAYO FOUNDATION**Professor**Joseph Berkson, M.A., M.D., D.Sc., *head***Assistant Professor**

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

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

M 251f,w,s,su. Research Problems in Biometry. Berkson, Gage

CANCER BIOLOGY**OFFERED AT THE MEDICAL SCHOOL****Professor**

John J. Bittner, Ph.D.
James R. Dawson, Jr., M.D.
Franz Halberg, M.D.

Associate Professor

Herbert M. Hirsch, Ph.D.

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

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

Language Requirement—For the Master's degree, reading knowledge of one foreign language. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

Master's Degree—The master of science degree in cancer biology requires at least 2 academic years in residence and satisfaction of substantially the same basic course requirements in the fundamental fields as are listed for the Ph.D.

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

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

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

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

CLINICAL LABORATORY MEDICINE**OFFERED AT THE MEDICAL SCHOOL****Professor**

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

Assistant Professor

Robert A. Bridges, M.D.
Esther F. Freier, M.S.
Lorraine M. Gonyea, M.S.
Verna L. Rausch, M.S.

Associate Professor

Ruth F. Hovde, M.S.
Newell R. Ziegler, M.D., Ph.D.

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

Besides gaining experience with the principal techniques and their interpretation, fellows are assigned special problems and reading courses. Recourse to the fundamental sciences and to current literature in investigative medicine is stressed.

There is no graduate major in this area. Students will do their major work in anatomy (hematology), bacteriology, physiological chemistry, or pathology, and their minor work in 2 of the remaining 3 fields.

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

180f. Problems in Fluid and Electrolyte Metabolism A. (Cr ar; offered 1961-62 and alt yrs) Evans and staff

181w. Problems in Fluid and Electrolyte Metabolism B. (Cr ar; prereq 180; offered 1961-62 and alt yrs) Evans and staff

182s. Topics in Endocrinology and Metabolic Disease. (Cr ar; offered 1961-62 and alt yrs) Evans and staff

183f. Topics in Immunology. (Cr ar; offered 1962-63 and alt yrs) Evans, Bridges, Ziegler

184. Problems in Clinical Laboratory Medicine. (Cr ar) Evans and staff

185s. Topics in Hematology. (Cr ar; prereq Anat 165-166; offered 1961-62 and alt yrs) Evans, Sundberg, Nelson

235f,w,s,su. Advanced Clinical Laboratory Medicine. General rotation as above described. (Cr ar; prereq Anat 165-166) Evans and staff

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

DENTISTRY

OFFERED AT THE SCHOOL OF DENTISTRY

Professor

William H. Crawford, D.D.S., *dean*
Mellor R. Holland, D.D.S., M.S.D., *assistant dean*
Wendell L. Bartholdi, Ph.D., D.D.S.
Anand P. Chaudhry, B.D.S., M.S., Ph.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.
Harold C. Wittich, D.D.S.
Douglas H. Yock, D.D.S., M.S.

Clinical Professor

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

Associate Professor

Andrew T. Morstad, D.D.S., M.S.
Leon Singer, Ph.D.

Assistant Professor

Edward E. Anderson, D.D.S., M.S.

Clinical Assistant Professor

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

Graduate work in dentistry is offered to meet needs in two areas—the training of well-qualified teachers and investigators in the various branches of dentistry, and the preparation of fully trained specialists for the various fields of dentistry. The course of study leads to the degree of M.S. in dentistry, a combination of the normal work for the M.S. degree plus achievement of proficiency in some phase of clinical dentistry. Hence, a minimum of 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, bacteriology, biochemistry, pathology, 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 suitable 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.

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) Bartholdi

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

232f,w,s,su. **Research Problems in Oral Medicine.** (Cr and hrs ar) Bartholdi

261f,w,s,su. **Advanced Dental Radiographic Technique.** 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

Oral Pathology

260f. **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

262f,w,s,su. **Research in Oral Pathology.** (Cr and hrs ar) Gorlin

263f,w,s. **Dental Research Seminar.** (1 cr) Gorlin

264f,w,s. **Clinical Oral Pathology Conference.** (1 cr) Bartholdi, Clark, Gorlin

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; offered 1962-63 and alt yrs) Gorlin

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

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

201f,w,s,su. **Treatment Procedures in Orthodontics.** (Cr and hrs ar) Steadman, Simpson

- 202f,w,s,su. **Case Analysis.** (Cr and hrs ar) Steadman, Simpson
- 203f,w,s,su. **Treatment Planning.** (Cr and hrs ar) Steadman, Simpson
- 204f,w,s,su. **Advanced Clinical Orthodontics.** (Cr and hrs ar) Steadman, Simpson
- 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 and staff
- 207f,w,s,su. **Comparative Odontology.** (Cr and hrs ar) Steadman
- 208f,w,s,su. **Seminar in Orthodontics.** (Cr and hrs ar) Steadman and staff
- 209f,w,s,su. **Problems and Research in Orthodontics.** (Cr and hrs ar) Steadman
210. **Principles of Orthodontic Retention.** (1 cr) Steadman, Simpson
211. **Advanced Clinical Orthodontic Retention.** (2 cr) Steadman, Simpson, staff
212. **Principles of Orthodontic Prognosis.** (1 cr) Steadman, Simpson
213. **Advanced Clinical Orthodontic Prognosis.** (1 cr) Steadman, Simpson, staff
214. **Advanced Orthodontic Seminar.** (1 cr) Steadman

Periodontics

- 280f,w,s,su. **Advanced Periodontics Clinic.** Practical work in the clinic in examination, diagnosis, treatment planning, and various phases of treatment of patients with periodontal disease. Practice of curettage, gingival resection, splinting of teeth, and balancing the occlusion. (Cr and hrs ar) Schaffer and staff
- 281f,w,s,su. **Advanced Periodontics Lectures.** Consideration of tissues involved in periodontal disease. Etiology and treatment of periodontal disease. (3 cr) Schaffer 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) Schaffer and staff
- 283f,w,s,su. **Seminar in Periodontics.** Etiology of periodontal disease, histopathology of periodontal symptoms, treatment of periodontal disease, research in periodontics. (1 cr) Schaffer and staff
- 284f,w,s,su. **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) Schaffer 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 the theories of indeterminate stresses to more complex problems of tooth morphology. (Cr and hrs ar) Jensen, Wittich, Yock
- 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
- 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) Crawford, Jensen, Wittich, Yock

OFFERED AT THE MAYO FOUNDATION

Associate Professor

Stanley A. Lovesteadt, D.D.S., M.S., *head*

Instructor

Robert J. Gores, D.D.S.

Assistant Professor

Joseph A. Gibilisco, D.D.S., M.S.
R. Quentin Royer, D.D.S., M.S.

The Mayo Foundation offers fellowships in oral surgery to a limited number of graduates of approved dental schools who have bachelor of science degrees or the equivalent. An internship, while not required, is desirable.

The Foundation program is approved by the Council on Dental Education of the American Dental Association and provides the training required for certification by the American Board of Oral Surgery. One fellow is appointed each quarter, about a year in advance, and the residency requirement is 3 years. Services include oral roentgenology, oral diagnosis, oral surgery, surgical pathology, anatomy of the head and neck, anesthesiology, and hospital medical residency. Fellows, under staff supervision, care for the oral surgical patients in the Rochester State Hospital. Fellows may take work also in some of the divisions of physiology.

An orthodontic and prosthetic service helps provide care for patients with jaw fractures, cleft palates, and other congenital or acquired oral defects. A speech therapist works closely with the dental service.

For graduate students in the field of oral surgery, the surgical service at the Mayo Clinic is supplemented by a period of training at the Rochester State Hospital, Methodist Worrall Hospital, and St. Marys Hospital. Through special arrangements, each fellow may spend a quarter in oral surgery in residency at Detroit Receiving Hospital, Detroit, Michigan.

Seminars and conferences are held regularly, and in addition, fellows attend seminars relating to their quarterly assignments.

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

M 251f,w,s,su. Dental Roentgenology. Staff

M 252f,w,s,su. Oral Diagnosis. Staff

M 253f,w,s,su. Oral Surgery. Staff

M 254f,w,su. Oral Pathology. Staff

Anat M 252s. Anatomy of the Head and Neck. (See Department of Anatomy)

Anes M 253f,w,s,su. Anesthesiology. (See Department of Anesthesiology)

Path M 255f,w,s,su. Surgical and Fresh Tissue Pathology. (See Department of Pathology)

Pl Surg M 253f,w,s,su. Plastic Surgery. (See Department of Plastic Surgery)

EPIDEMIOLOGY

Work leading to the Ph.D. degree with a major in epidemiology is offered in the School of Public Health. For a list of faculty and course work see section on Public Health in this bulletin.

HOSPITAL ADMINISTRATION

OFFERED AT THE SCHOOL OF PUBLIC HEALTH, THE SCHOOL OF BUSINESS ADMINISTRATION, AND THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

The American hospital has become an important focal point of health care. It is part of a complex of institutions and ideas—medical, religious, charitable, and civic. Full understanding of this complex requires intensive and broad education.

Prerequisites—Ordinarily the professional degree master of hospital administration (administered by the School of Public Health) will serve as a first step in acquiring the Ph.D.

Programs for the Ph.D. Degree—The Ph.D. program in hospital administration is interdepartmental and is designed to produce scholars, teachers, and research workers who possess thorough knowledge not only of the problems of the hospital but also of the hospital's role within the wider community. Work toward the Ph.D. will be

done under a dual advisership. The second adviser shall be in one of the relevant departments such as anthropology, business administration, economics, political science, psychology, or sociology. Use of a double major rather than a major and minor is permitted for students who choose this alternative. Programs will be submitted to the Social Science Graduate Group Committee.

For a more complete statement concerning requirements, fellowships, and recommended courses of study, see the special bulletin published by the Program in Hospital Administration, the School of Public Health.

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

Language Requirement—Either (a) 2 foreign languages, or (b) 1 foreign language and the option of a special research technique or a collateral field of knowledge.

MEDICAL TECHNOLOGY

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

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, bacteriology, biochemistry, 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 THE MEDICAL SCHOOL

Professor

Cecil J. Watson, M.D., Ph.D., *head*
Ivan D. Frantz, M.D.
Frederick W. Hoffbauer, M.D., M.S.
Robert B. Howard, M.D., Ph.D.
Wesley W. Spink, M.D.

Clinical Professor

Thomas Lowry, M.D.

Associate Professor

Paul S. Hagen, M.D.
Wendell H. Hall, M.D., Ph.D.
Byrl J. Kennedy, M.D., M.Sc.
Alvin L. Schultz, M.D., M.S.
Samuel Schwartz, M.D.
Louis Tobian, Jr., M.D.
Leslie Zieve, M.D., Ph.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.
Ragnvald S. Ylvisaker, M.D.

Assistant Professor

J. B. Carey, Jr., M.D., Ph.D.
Frederick C. Goetz, M.D.
Murray J. Murray, M.D.
Naip Tuna, M.D., Ph.D.
C. Paul Winchell, 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 out-patient departments of University of Minnesota Hospitals, Minneapolis 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, bacteriology, biochemistry, immunology, pathology, pharmacology, and physiology all have their laboratories and teaching centers on the campus, and the pursuit of a minor subject may be carried on simultaneously and in intimate relation with more definitely clinical studies. The large autopsy material of the Department of Pathology provides experience in this field as well as control of clinical diagnosis.

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

In general, fellowships are planned for 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) 2 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.

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 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, Spink, Hoffbauer, Hall, 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

OFFERED AT THE MAYO FOUNDATION

Professor

Edgar V. Allen, M.D., M.A., M.S. in Med.
 Nelson W. Barker, M.D., M.S. in Med.
 Howard B. Burchell, M.D., Ph.D. in Med.
 Hugh R. Butt, M.D., M.S. in Med.
 Frank J. Heck, M.D., M.S. in Path.
 Edgar A. Hines, M.D., M.A., M.S. in Med.
 F. Raymond Keating, M.D., M.S. in Med.
 Arthur M. Olsen, M.D., M.S. in Med.
 Howard F. Polley, M.D., M.S. in Med.
 Edward H. Rynearson, M.D., M.S. in Med.
 Herbert W. Schmidt, M.D., M.S. in Med.
 Charles H. Slocumb, M.D., M.S. in Med.
 Randall G. Sprague, M.D., Ph.D. in Med.
 Charles H. Watkins, M.D., Ph.D. in Med.
 Eric E. Wollageger, M.D., M.S. in Med.

Associate Professor

John M. Berkman, M.D., M.S. in Med.
 Alex E. Brown, M.D., M.S. in Med.
 James C. Cain, M.D., M.S. in Med.
 David T. Carr, M.D., M.S. in Med.
 William H. Dearing, M.D., M.A., Ph.D. in Med.
 Earl E. Gambill, M.D., M.S. in Med.
 Albert B. Hagedorn, M.D., M.S. in Med.
 Malcolm M. Hargraves, M.D.
 Corrin H. Hodgson, M.D., M.S. in Med.
 Walter F. Kvale, M.D., M.S. in Med.
 William M. McConahey, M.D., M.S. in Med.
 Carl G. Morlock, M.D., M.S. in Med.
 Donald R. Nichols, M.D., M.S. in Med.
 Robert L. Parker, M.D., M.S. in Med.
 Louis E. Prickman, M.D., M.S. in Med.
 Robert M. Salassa, M.D., M.S. in Med.
 R. Montgomery Shick, M.D., M.S. in Med.
 Lucian A. Smith, M.D., M.S. in Med.
 J. Minott Stickney, M.D., M.S. in Med.
 L. Emmerson Ward, M.D., M.S. in Med.

Assistant Professor

Howard A. Andersen, M.D., M.S. in Med.
 Milton W. Anderson, M.D., M.S. in Med.
 Lloyd G. Bartholomew, M.D., M.S. in Med.
 Edwin D. Bayrd, M.D., M.S. in Med.
 Charles M. Blackburn, M.D., M.S. in Med.
 Robert O. Brandenburg, M.D., M.S. in Med.
 James C. Broadbent, M.D., M.S. in Med.
 Donald C. Campbell, M.D., M.S. in Med.
 Haddon M. Carryer, M.D., Ph.D. in Med.
 Earl T. Carter, M.D., Ph.D. in Physiol.
 Norman A. Christensen, M.D., M.S. in Med.
 Talbert Cooper, M.D., M.S. in Med.
 Guy W. Daugherty, M.D., M.S. in Med.
 William T. Foulk, Jr., M.D., M.S. in Med.
 Clifford F. Gastineau, M.D., Ph.D. in Med.
 Joseph E. Geraci, M.D., M.S. in Med.

John B. Cross, M.D., M.S. in Med.
 David G. Hanlon, M.D., M.S. in Med.
 Llewelyn P. Howell, M.D., M.S. in Med.
 Giles A. Koelsche, M.D., Ph.D. in Med.
 William J. Martin, M.D., M.S. in Med.
 R. Drew Miller, M.D., M.S. in Med.
 Thomas W. Parkin, M.D., M.S. in Med.
 Gustavus A. Peters, M.D., M.A., M.S. in Med.
 Raymond V. Randall, M.D., M.S. in Med.
 Randolph A. Rovelstad, M.D., Ph.D. in Med.
 William G. Sauer, M.D., M.S. in Med.
 Donald A. Scholz, M.D., M.S. in Med.
 Harold H. Scudamore, M.D., Ph.D.
 Ralph E. Smith, M.D.
 Maurice H. Stauffer, M.D., M.S. in Med.
 Charles F. Stroebel, M.D., M.S. in Med.
 William H. J. Summerskill, M.D., M.A.
 Jan H. Tillsch, M.D., M.S. in Med.
 Laurentius O. Underdahl, M.D., M.S. in Med.
 William E. Wellman, M.D., M.S. in Med.

Instructor

Richard W. Achor, M.D., M.S. in Med.
 Kenneth G. Berge, M.D., M.S. in Med.
 John A. Callahan, M.D., M.S. in Med.
 Daniel C. Connolly, M.D., Ph.D. in Med.
 G. Roy Diessner, M.D., M.S. in Med.
 Matthew B. Divertie, M.D., M.S. in Med.
 Francis E. Donoghue, M.D., M.S. in Med.
 Bruce E. Douglass, M.D., M.S. in Med.
 John F. Fairbairn II, M.D.
 Robert S. Fontana, M.D., M.S. in Med.
 Paul A. Green, M.D., M.S. in Med.
 Norbert O. Hanson, M.D.
 Lowell L. Henderson, M.D., M.S. in Med.
 Norman G. G. Hepper, M.D., M.S. in Med.
 John A. Higgins, M.D., M.S. in Med.
 Richard W. Hill, M.D., M.S. in Med.
 David L. Hoffman, M.D.
 Harry N. Hoffman II, M.D., M.S. in Med.
 Kenneth A. Huizenga, M.D., M.S. in Med.
 James C. Hunt, M.D., M.S. in Med.
 John L. Juergens, M.D., M.S. in Med.
 Joseph M. Kiely, M.D., M.S. in Physiol.
 Harold T. Mankin, M.D., M.S. in Med.
 William E. Mayberry, M.D., M.S. in Med.
 Wallace A. Merritt, M.S. in Med.
 Charles G. Moertel, M.D., M.S. in Med.
 George D. Molnar, M.D., Ph.D. in Med.
 Jamie Paris, M.D., M.S. in Med.
 Don C. Purnell, M.D., M.S. in Med.
 Donald E. Ralston, M.D., M.S. in Med.
 Richard J. Reitemeier, M.D., M.S. in Med.
 Alexander Schirger, M.D., M.S. in Med.
 Sheldon G. Sheps, M.D.
 John A. Spittel, Jr., M.D., M.S. in Med.
 Louis D. Vaughn, M.D., M.S. in Med.

Clinical work in internal medicine at the Mayo Foundation consists of diagnostic work in the clinic or in the hospital medical services, includes history taking, physical examinations, recommendation of patients for special examinations with correlation of the results thereof, and formation of independent judgments concerning diagnoses and indications and recommendations for medical and surgical treatment. This work is under the immediate direction of the consulting physicians of the section in which the fellow is working.

There are 20 general diagnostic sections in which the fellow may work in the clinic and 22 medical hospital services. Each diagnostic section contains four or

more consulting physicians. Each of the general diagnostic sections is general in the sense that any patient may be referred to any one of them. Many of them, however, are special in that they have intensive interest in the following fields: allergy, infectious diseases, rheumatology, cardiovascular and renal diseases, diseases of the chest, acute medical diseases, metabolic diseases, and endocrinology, hematology, and gastroenterology.

Satisfactory completion of at least 2 services of 6 months each in these sections is required for an advanced degree. When he is sufficiently competent in clinical work the fellow may be appointed to a first assistantship at the Mayo Clinic.

The Medical Department has available 500 beds in the several hospitals.

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

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

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

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

Language Requirement—For the Ph.D. degree, either (a) 2 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—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 Physiological Chemistry)

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 THE MEDICAL SCHOOL

Professor

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

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

Clinical Associate Professor

 Robert W. Goltz, M.D.
 John G. Rukavina, M.A., M.D.

Clinical Assistant Professor

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

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, Minneapolis 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) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

225f,w,s,su. Clinical Dermatology. Wards and out-patient departments of University Hospitals, Veterans Hospital, Minneapolis 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. Minneapolis General Hospital. (Cr ar) Laymon 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

OFFERED AT THE MAYO FOUNDATION

Professor

 Louis A. Brunsting, M.D., M.S. in Derm.
 and Syph., *head*

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

Assistant Professor

 Harold O. Perry, M.D., M.S. in Derm. and
 Syph.

 Richard K. Winkelmann, M.D., Ph.D. in
 Derm. and Syph.

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

A dermato-histopathologic laboratory with a comprehensive collection of slides is augmented by more than 1500 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.

Language Requirement—For the Ph.D. degree, either (a) 2 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. **Histopathology of the Skin.** Laboratory and lectures. Winkelmann
- M 252f,w,s,su. **Diagnosis with Special Reference to Dermatology and Syphilology.** Daily seminar. Clinical conference. Brunsting, Kierland, Perry, Winkelmann
- M 253f,w,s,su. **Hospital Residence.** Care of hospitalized patients. Seminar. Brunsting, Kierland, Perry, Winkelmann

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.

NUTRITION

OFFERED AT THE MAYO FOUNDATION AND THE SCHOOL OF HOME ECONOMICS

Professor

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

The fellowship program offers experience in clinical dietetics and an introduction to the principles and procedures required for research in problems of metabolism and nutrition as well as experience in carrying out a modest research problem in one of these areas. The fellowship may lead to an M.S. degree through integration with a graduate degree program in home economics (nutrition) in the Graduate School of the University of Minnesota, of which the Mayo Foundation is a part.

The fellowship appointment is customarily made for 1 year. The program of the fellow has considerable flexibility although it is usually arranged to provide experience in clinical dietetics, in research studies with patients having metabolic diseases, and in a problem of research in basic nutrition.

Generally 3 months of the fellowship are devoted to clinical dietetics during which the fellow makes daily hospital rounds with the medical staff, attends the associated seminars and conferences, and is responsible for the dietary care of the patients on the medical service assigned. This period of work is done under the supervision of the Department of Dietetics, St. Marys Hospital.

The nutrition fellow spends 3 months in the Metabolism Unit (Nutrition Laboratory). There instruction is given in the general organization of the Unit and in the procedures employed in conducting research of a metabolic or nutritional nature. The fellow learns the dietary principles and techniques involved in the planning and executing of balance studies and other types of metabolic and nutrition research, and is further afforded the experience and responsibility of planning such studies with direction as to selection, storage, and preparation of food. Work in the Metabolism Unit is conducted under the supervision of the Departments of Medicine and Physiology of the Mayo Clinic and Mayo Foundation.

During the next 6 months of the fellowship, the fellow is encouraged to carry out an individual research project, which may be concerned with a problem in human or animal nutrition or in physiologic or biochemical nutritional problems, dependent on the particular interest of the fellow. This research project may be offered as a thesis problem in partial fulfillment for the M.S. degree in home economics (nutrition).

Following the year's fellowship program at the Mayo Foundation, most of the nutrition fellows take course work, usually in the School of Home Economics, on the St. Paul Campus of the University of Minnesota. They usually carry a minor in some related field such as education, biochemistry, physiology, or economics. When the above plan is followed, a period of 1½ to 2 years is generally needed to complete a Master's program.

Appointments carry a stipend of \$250 per month.

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

M 251f,w,s,su. Nutrition. Code, Sprague

HE 272f,w,s,su. Human Metabolic Studies in Health and Disease. Experience in a metabolic research unit; conferences and group discussion. (4 cr; prereq HE 173 or equiv, ‡; offered at Mayo Foundation, Rochester) Code

HE 273f,w,s,su. Advanced Diet Therapy. Lectures, conferences, and experience in the dietary care of patients. (4 cr; prereq HE 173 or equiv, ‡; offered at St. Marys Hospital, Rochester) Victor

OBSTETRICS AND GYNECOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Clinical Assistant Professor

Leonard A. Lang, M.D.
William P. Sadler, M.D.
Mancel T. Mitchell, M.D.

Language Requirement—For the Ph.D. degree, either (a) 2 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.

201f-202w-203s-204su. Advanced Obstetrics and Gynecology, I. Includes service in the University Hospitals or Minneapolis General Hospital with ample experience in diagnosis, care and treatment (operative and nonoperative) of patients. Facilities for study of problems and cases of unusual interest. (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 Out-Patient Department of University Hospitals. (Cr ar; required of teaching fellows) McKelvey and staff

OFFERED AT THE MAYO FOUNDATION

Professor

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

Associate Professor

Joseph H. Pratt, M.D., M.S. in Surg.
Robert B. Wilson, M.D., M.S. in Obst. and Gyn., *head*

Assistant Professor

Edward A. Banner, M.D., M.S. in Obst. and Gyn.
David G. Decker, M.D., M.S. in Obst. and Gyn.

Instructor

Leonard Aaro, M.D., M.S. in Obst. and Gyn.
John E. Faber, M.D., M.S. in Obst. and Gyn.
Carl E. Johnson, M.D., M.S. in Obst. and Gyn.
M. Elizabeth Mussey, M.D., M.S. in Obst. and Gyn.
Reginald A. Smith, M.D., M.S. in Obst. and Gyn.
Richard E. Symmonds, M.D., M.S. in Obst. and Gyn.
John S. Welch, M.D., M.S. in Surg.

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 surgical sections concerned with gynecologic conditions. Seminars and conferences are held regularly.

Language Requirement—For the Ph.D. degree, either (a) 2 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

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

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

Anatomy for General Surgeons. (See Department of Anatomy)

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

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

OPHTHALMOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Clinical Professor

Walter Fink, M.D.

Clinical Associate Professor

Walter L. Hoffman, M.D., M.S.
John P. Wendland, M.D., M.S.

Clinical Assistant Professor

Edward P. Burch, M.D.
Richard C. Horns, M.D., M.S.
Bruce L. Kantar, M.D., M.S.
Robert H. Monahan, M.D.
Virgil J. Schwartz, M.D.

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, Minneapolis 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, bacteriology and immunology, 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 in Ophthalmology.** (Cr ar) Harris and staff
 205f,w,s. **Neuro-ophthalmology.** (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) Hoffman 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 THE MAYO FOUNDATION

Professor

C. Wilbur Rucker, M.D., M.S. in Ophth.,
head

Associate Professor

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

Assistant Professor

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

Instructor

John A. Dyer, M.D., M.S. in Ophth.
 Thomas J. Kirby, Jr., M.D., M.S. in Ophth.

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

Language Requirement—For the Ph.D. degree, either (a) 2 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. 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 THE MEDICAL SCHOOL

Professor

Lawrence R. Boies, M.A., M.D., *head*

Clinical Professor

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

Associate Professor

Frank M. Lassman, Ph.D.

Clinical Associate Professor

Conrad J. Holmberg, M.D.

Language Requirement—For the Ph.D. degree, either (a) 2 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—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 THE MAYO FOUNDATION

Professor

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

Associate Professor

Kinsey M. Simonton, M.D., M.S. in Otolar.,
head

Assistant Professor

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

Instructor

John C. Lillie, M.D., M.S. in Surg.
 James B. McBean, M.D.

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

Language Requirement—For the Ph.D. degree, either (a) 2 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. Clinical Otolaryngology and Rhinology. Theory and practice with differential diagnosis of diseases of the ear, nose, paranasal sinuses, pharynx, and larynx, and their relation to general diagnosis. Williams, Simonton, Hallberg, Brown, Lake, McBean

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

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. Williams, Simonton, Hallberg, Brown, Lake, McBean

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

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

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

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

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

PATHOLOGY**OFFERED AT THE MEDICAL SCHOOL****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.
 John F. Noble, M.D.

Associate Professor

Paul H. Lober, M.D., Ph.D.
 Lee W. Wattenberg, M.D.

Assistant Professor

John I. Coe, 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) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered only under Plan A.

Master's Degree with Designation in Pathology—Given only after 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. (3 cr; prereq 102) Staff
- 110x. Seminar in 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, 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
118. Intracranial Neoplasms. (2 cr, §NPsy 211) Baker
119. Survey of Neuropathology. Examination of specimens from current autopsies. (Cr ar, §NPsy 151 and 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 PhCh 100 or equiv) Wattenberg
- 201x. Research. (Cr and hrs ar; grad students with necessary preliminary training may elect research, either as majors or minors in pathology)

OFFERED AT THE MAYO FOUNDATION

Professor

Archie H. Baggenstoss, M.D., M.S. in Path.
Malcolm B. Dockerty, M.D., C.M., M.S. in Path.
James W. Kernohan, M.B., B.Ch., D.P.H., M.A., M.D.

Associate Professor

David C. Dahlin, M.D., M.S. in Path.
Alfred G. Karlson, D.V.M., M.S., Ph.D.
George P. Sayre, M.D., M.S. in Path.
Lewis B. Woolner, M.D., M.S. in Path.

Assistant Professor

Robert C. Bahn, M.D.
Edith M. Parkhill, M.D., M.S. in Path.
Edward H. Soule, M.D.

Instructor

Arnold L. Brown, Jr., M.D.
Edgar G. Harrison, Jr., M.D., M.S. in Path.

Opportunities for advanced work in anatomic pathology are offered in three different sections of the Mayo Foundation as follows:

1. Pathologic Anatomy—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 post-mortem examinations and studies the microscopic sections of these post-mortems and engages in weekly conferences and seminars concerned with general and special subjects in pathologic anatomy. Each fellow is expected to work on a problem and to present his findings to the group. Microscopic and gross demonstrations are held at frequent

intervals, and the work throughout is carefully supervised. Collateral reading and study are encouraged, and there is ample opportunity for thesis studies or special lines of research. Available for study is a large collection of operative and post-mortem specimens, both gross and microscopic, cross-indexed as to organ and disease. In addition there are over 45,000 photomicrographs and photographs of gross specimens illustrating various phases of pathologic anatomy.

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.

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.

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

- M 254f,w,s,su. Necropsy Service.** Junior assistant 3 months; senior assistant 3 months; demonstrations in clinico-pathologic conferences; microscopic examination of fixed tissues removed at necropsy. Bacteriology and necropsy material. Research problems. Weekly seminars. Kernohan, Baggenstoss, Sayre, Bahn, Brown
- 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, Grindlay
- M 257f,w,s,su. Research Work on Selected Problems in Comparative Pathology.** Karlson
- M 258f,w,s,su. Cytology of Body Secretions.** Woolner
- M 259f,w,s,su. Pathology of the Eye.** Open to ophthalmology majors who have adequate preparation in general pathology. Kernohan, Parkhill
- M 260f,w,s,su. Neuropathology.** Open to majors in neurology and psychiatry or neurologic surgery who have adequate preparation in general pathology. Kernohan, Sayre

Clinical Pathology

Associate Professor

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

Assistant Professor

Don R. Mathieson, M.D., M.S., *head*
Gertrude L. Pease, M.D., M.S. in Path.

Instructor

Chris A. Pascuzzi, M.D., M.S. in Path.
Welby N. Tauxe, M.D., M.S. in Path.
John H. Thompson, Jr., Ph.D. in Parasitology

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 bacteriology, chemistry, parasitology, blood coagulation, blood grouping, urinalyses, gastric analy-

ses, 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. Clinical Bacteriology.** Making and examining of cultures. Preparation of autogenous vaccines. Special laboratory methods in clinical bacteriology; bacteriology of surgical material. Research in bacteriology. Weed, Needham, Ulrich, Karlson
- 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, Fleisher, Mattox, McKenzie, Rosevear, McGuckin
- M 251Cf,w,s,su. Clinical Pathology.**
 Immunological Tests Used as Aids in Diagnosis. Mathieson
 Procurement, Processing, and Administration of Blood. Mathieson
 Analyses of Gastric Contents, Urine, and Cerebrospinal Fluid. Mathieson
 Tests for Liver, Pancreas, Adrenal and Renal Function. Mathieson, Maher
 Radioactive Isotope Diagnostic Tests. Tauxe
 Problems in Blood Coagulation. Pascuzzi, 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 techniques. Pease

PEDIATRICS

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Clinical Professor

Hyman S. Lippman, M.D., Ph.D.
 Albert V. Stoesser, M.D., Ph.D.

Associate Professor

Paul Adams, M.D.
 Ray C. Anderson, M.D., Ph.D.
 William Krivit, M.D., Ph.D.
 Robert A. Ulstrom, M.D.

Clinical Associate Professor

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

Assistant Professor

Eleanor Colle, M.D.
 Richard B. Raile, M.D.
 Robert L. Vernier, M.D.
 Howard G. Worthen, M.D., Ph.D.

Clinical Assistant Professor

Paul M. Ellwood, M.D.
 Edward N. Nelson, M.D.
 W. Ray Shannon, 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, the clinical fellowships are planned for a 2-year period following completion of an internship. 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 out-patient and in-patient services of the University of Minnesota Hospitals and affiliated hospitals. The affiliated hospitals are the Minneapolis General Hospital, the Ancker Hospital of St. Paul, the Northwestern Hospital of Minneapolis and the Variety Club Heart Hospital. Extensive clinical experience in premature and newborn care, communicable and infectious diseases, heart disease, allergy, pathology, neurology, child psychiatry, and endocrinology and metabolism is provided.

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

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

Language Requirement—For the Ph.D. degree, either (a) 2 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—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 in-patient, out-patient, and special pediatric services of the University Hospitals, Minneapolis General Hospital, Northwestern Hospital, 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 1 or more of the following special fields: Allergy, neurology, cardiology, pathology, endocrinology and metabolism, hematology. Clinical training in these areas is obtained in the in-patient and out-patient 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, Ulstrom, Adams, R C Anderson, Raile, Wannamaker, Vernier, Krivit, Colle

OFFERED AT THE MAYO FOUNDATION

Professor

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

Associate Professor

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

Assistant Professor

Edmund C. Burke, M.D., M.S. in Ped.
Lloyd E. Harris, M.D.
Alvin B. Hayles, M.D., M.S. in Ped.
J. Gordon Millichap, M.D.
Stephen D. Mills, M.D., M.S. in Ped.
Patrick A. Ongley, M.D.

Instructor

E. Omer Burgert, Jr., M.D., M.S. in Ped.
Gunnar B. Stickler, M.D., Ph.D. in Ped.
William H. Weidman, M.D., M.S. in Ped.

The Section of Pediatrics of the Mayo Clinic and Mayo Foundation 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. Out-patient 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, 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) 2 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—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

Child Psychiatry. (See Department of Psychiatry and Neurology)

Pediatric Neurology. Staff

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

PHARMACEUTICAL CHEMISTRY

OFFERED AT 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.

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 of natural origin constitute the medicinal chemistry phase of the department's activities. Pharmaceutical chemistry is also 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. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 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, organometallics, etc. (3 cr per qtr; prereq OrCh 62) Gisvold, DiGangi, Hager, Soine

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) Soine, DiGangi

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

201-202-203.* Pharmaceutical Chemistry Seminar. (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 1961-62 and alt yrs) Gisvold, DiGangi, Soine

208.* Carbohydrates and Glycosides. Origin, isolation, characterization, and chemistry. (3-5 cr; prereq OrCh 63 or #; offered 1962-63 and alt yrs) Gisvold

209.* Alkaloids. Isolation, purification, and characterization. (3-5 cr; prereq OrCh 63 or #; offered 1962-63 and alt yrs) Soine

211.* Terpenes, Carotinoids, Tannins, and Anthocyanins. Discussion of their chemistry; experimental investigation of methods of isolation and characterization. (3-5 cr; prereq OrCh 63 or #; offered 1962-63 and alt yrs) DiGangi

212.* Fats, Waxes, Steroids, and Related Compounds. Origin, isolation, characterization, and chemistry. (3-5 cr; prereq OrCh 63 or #; offered 1962-63 and alt yrs) Gisvold

213x. 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 THE COLLEGE OF PHARMACY

Professor

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

Associate Professor

Robert H. Miller, Ph.D.

Assistant Professor

Edward G. Rippie, Ph.D.

Graduate work leading to the M.S. or Ph.D. degree in pharmaceutical technology is offered to students who wish to prepare for careers as teachers in colleges of pharmacy, hospital pharmacists, or pharmaceutical scientists in areas often designated as "new product development," "manufacturing pharmacy," "operative pharmacy," "pharmacy," etc.

Prerequisites—A degree from an accredited 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.

Minor—The choice of minor fields of study may vary considerably depending on the research and interests of the student, e.g., mathematics including statistics; engineering (industrial, chemical, electrical); economics and business administration; chemistry (physical, organic, analytical, pharmaceutical); pharmacology and other biological sciences. The selection of courses will be made after consultation with the student's adviser. All candidates for the Ph.D. degree must complete PCh 103.

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) 2 foreign languages or (b) with consent of adviser 1 foreign language and the option of the 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 in this department.

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
173. **Special Problems in Pharmaceutical Technology.** Problems in formulation, production, and evaluation of pharmaceutical products. (Cr ar; prereq #) Staff
- 201x. **Pharmaceutical Technology Seminar.** (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
- 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 up to and including 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. Required of all Ph.D. candidates in pharmaceutical technology. (3-5 cr; prereq PhmC 163, PCh 103 or #; offered when demand warrants) Hadley, Rippie
222. **Heterogeneous Systems in Pharmacy.** Application of physicochemical principles and processes to preparation, standardization, and therapeutic application of heterogeneous dosage forms. (3-5 cr; prereq 221; offered when demand warrants) Hadley, Rippie

PHARMACOGNOSY

OFFERED AT THE COLLEGE OF PHARMACY

Assistant Professor
Herbert Jonas, 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. For the Ph.D. degree, 2 foreign languages, 1 of which must be German.

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 in this department.

164. Insecticides, Fungicides, and Herbicides. Insecticides (and rodenticides), fungicides, and herbicides of natural and synthetic origins. Their application in cultivation of plants, storage of food and drug products, and general prevention of insect infestation, etc. (3 cr; prereq Phcl 56, PhmC 53, or #) Staff

173. Special Problems in Pharmacognosy. Problems dealing with botany, biochemistry, and physiology of medicinal plants, including their processing and utilization. (Cr ar; prereq #) Staff

201-202-203.* Advanced Pharmacognosy. Advanced studies in pharmacognosy and pharmacology of plant and animal drugs. Phytochemistry and physiology of medicinal plants. Detection and determination of medicinal constituents and adulterants in crude drugs. (3-5 cr per qtr; prereq 61 or #) Staff

204x. Research in Pharmacognosy. (Cr ar) Staff

206. Technical Microscopy and Microchemistry. Microscopy of plant and animal cells, fibers, tissues, and organs. (3-5 cr; prereq 61 or #) Staff

PHARMACOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Raymond N. Bieter, M.D., Ph.D., *head*

Wallace F. White, Ph.D.

Harold N. G. Wright, Ph.D.

Associate Professor

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

Assistant Professor

Elizabeth M. Cranston, Ph.D.

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

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

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

Language Requirement—For the Master's degree, one foreign language. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

Master's Degree—Offered under Plan A.

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

101x. Introduction to Pharmacology. (3 cr; prereq Phsl 106, 107 or equiv) Bieter, Wright, Cranston, White

102. **General and Experimental Pharmacology.** Detailed lecture and laboratory study of important drugs. (10 cr; prereq 101; this course runs as a single unit through spring qtr and 1st term of Summer Session) Bieter, Wright, Cranston, White
- 105x. **General and Experimental Pharmacology.** (Continuation of 101) Laboratory experiments and demonstrations. (6 cr; prereq 101; see 108 below) Bieter, Wright, Cranston, White
- 106x. **General Pharmacology.** (Lecture continuation of 105) (2 cr; see 108 below) Bieter, Wright, Cranston, White
- 108x. **Prescription Writing.** (1 cr; prereq 101, 105, 106 [101 and 102 are equiv to 101, 105, 106, and 108]) Wright
- 109x. **Pharmacological Problems.** (Cr and hrs ar; prereq #) Bieter, Wright, White, Cranston
- 110x. **General Toxicology.** (2 cr) Wright
111. **Advanced Toxicology.** Quantitative toxicological analysis. (Cr ar; prereq 110 or ¶110) Wright
112. **Forensic Toxicology.** (6 cr; prereq 110 or #) Wright
113. **Industrial Toxicology.** (2 cr; minimum registration, 6) Wright
123. **Special Topics in Pharmacology.** (2 cr; prereq #) Bieter, Wright, Cranston
- 124x. **Pharmacology of Special Systems.** More detailed pharmacology of special organ systems and the clinical applications thereof. (2 cr or ar; prereq #) Wright
- 162x. **Biological Assay of Drugs.** (3 cr; prereq 101 or #) White
- 203x. **Research in Pharmacology.** (Cr and hrs ar; prereq 101 and 102 or #) Bieter, Wright, Cranston, or White
- 204x. **Advanced Pharmacology.** (1 cr; prereq 101 or #) Bieter, Wright, Cranston
- 205x. **General Discussions in Pharmacology.** Seminar. (1 cr; prereq 101 or 102, #) Bieter, Wright, or Cranston
- 209x. **Problems in Pharmacodynamic Testing.** (Cr ar; prereq 109) White

OFFERED AT THE MAYO FOUNDATION

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

PHYSICAL MEDICINE AND REHABILITATION

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Clinical Professor

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

Assistant Professor

Ruby 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 Minneapolis General Hospital, Minneapolis Veterans Hospital, The Sheltering Arms, and the Kenny Institute. The student devotes full time to his training program and may not carry on outside practice. The 3-year pro-

gram fulfills the requirements of training for the American Board of Physical Medicine and Rehabilitation. As a part of the program, each graduate student is required to carry out a problem of independent research under the direction of his major adviser. For the minor field of study, anatomy, physiology, biophysics, or pathology are especially recommended.

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

Language Requirement—For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

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

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

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

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

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

211f,w, or s. **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, or 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) Kubicek

OFFERED AT THE MAYO FOUNDATION

Professor

Frank H. Krusen, M.D.

Assistant Professor

Donald J. Erickson, M.D., M.S. in Phys. Med.
G. Keith Stillwell, M.D., C.M.

Associate Professor

Earl C. Elkins, M.D., *head*
Gordon M. Martin, M.D., M.S. in Phys. Med.

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 out-patient 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. 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 out-patients 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) 2 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—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 CHEMISTRY

OFFERED AT THE MEDICAL SCHOOL

Professor

Wallace D. Armstrong, M.D., Ph.D., *head*
Cyrus P. Barnum, Jr., Ph.D.
Paul D. Boyer, Ph.D.
Ivan Frantz, M.D.
David Click, Ph.D.
Ralph T. Holman, Ph.D.

Associate Professor

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

Assistant Professor

William O. Caster, Ph.D.
John F. Van Pilsun, Ph.D.
Richard W. Von Korff, Ph.D.

Prerequisites—For a doctoral major in 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 this department 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 the department or those seeking a Ph.D. with a minor in 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) 2 foreign languages or (b) 1 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 this department 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: PhCh 100-101, 5 of the 7 physiological chemistry courses numbered 206, 207, 208, 209, 210, 211, or 214 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 PhCh 100-101 or its equivalent has been taken 5 years or more prior to the time the candidate is to appear for the preliminary oral examination, this course must be retaken.

- 100f,su-101w,su. Physiological Chemistry.** (7 cr per qtr; prereq physics, physical and organic chemistry) Armstrong, Barnum, Glick, Carr, Ungar
- 153f,w,s,su. Problems in Physiological Chemistry.** Special work arranged with qualified students. (Cr and hrs ar; may be taken 1 or more qtrs; prereq 100-101) Armstrong, Barnum, Boyer, Glick, Carr, Singer
- 200f,w,s. Seminar in Physiological Chemistry.** (1 cr) Armstrong, Barnum, Boyer, Glick, Carr, Caster, Singer, Von Korff, Ungar
- 205f,w,s,su. Research in Physiological Chemistry.** (Cr and hrs ar) Armstrong, Barnum, Boyer, Frantz, Glick, Carr, Von Korff
- 206f. Advanced Endocrinology and Steroid Chemistry.** (3 cr; minimum 8 students; prereq 100-101; offered 1961-62 and alt yrs) Ungar
- 207s. Radiotracers and Mineral Metabolism.** (3 cr; minimum 8 students; prereq 100-101; offered 1962-63 and alt yrs) Armstrong
- 208s. Advanced Laboratory Technique.** (3 cr; limited to 10 students; prereq 100-101 and #; offered 1961-62 and alt yrs) Staff
- 209w. Quantitative Histochemistry.** (3 cr; minimum 8 students; prereq 100-101 and histology or #; offered 1961-62 and alt yrs) Glick
- 210f. Metabolic Enzymology.** (3 cr; minimum 8 students; prereq 100-101 or #; offered 1962-63 and alt yrs) Boyer
- 211w. Nucleic Acid and Protein Metabolism.** (3 cr; minimum 8 students; prereq 100-101; offered 1962-63 and alt yrs) Barnum
- 212f,w,s,su. Quantitative Histochemistry Laboratory.** Problems to meet individual interests. (Cr and hrs ar; prereq 100-101 and #) Glick
- 213f,w,s. Clinical Physiological Chemistry.** (Cr and hrs ar)
- 214s. Kinetics and Mechanism of Enzymic Reactions.** (3 cr, §PCh 214; minimum 8 students; prereq PCh 101-102-103 and #; offered 1962-63 and alt yrs) Lumry
- 236f,w,s. Radioisotope Seminar.** (1 cr, §Rad 236) Loken, Armstrong, and staff

Physiologic Chemistry—Biochemistry

OFFERED AT THE MAYO FOUNDATION

Professor

Harold L. Mason, Ph.D., *head*
Eunice V. Flock, Ph.D.
Charles A. Owen, Jr., M.D., Ph.D. in Med.

Associate Professor

Gerhard A. Fleisher, Ph.D.
Vernon R. Mattox, Ph.D.

Assistant Professor

Bernard F. McKenzie, M.S.

Instructor

Warren F. McGuckin, M.S., Ph.D. in Chem.
John W. Rosevear, M.D., 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. In addition, advanced work is offered in the Department of Biochemistry to a limited number of well-prepared students majoring in physiological chemistry.

M 251f,w,s,su. Biochemistry. Research work in problems related to metabolism, chemistry of the blood, steroid hormones, enzymes, proteins, and lipides; training in the use of methods of organic and inorganic analysis. Mason, Flock, Fleisher, Mattox, McKenzie

Nutrition. (See Division of Nutrition)

Students majoring in physiological chemistry (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 physiological chemistry for a minor in physiological chemistry.

PHYSIOLOGICAL HYGIENE

OFFERED AT THE MEDICAL SCHOOL

Professor

Ancel Keys, Ph.D.
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, 2 foreign languages.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Members of the staff of Physiological Hygiene 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 for 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 PhsI 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 in 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 THE MEDICAL SCHOOL

Professor

Maurice B. Visscher, M.D., Ph.D., *head*
 Ernest B. Brown, Jr., Ph.D.
 Francisco Grande, M.D.
 Ancel Keys, Ph.D.
 Joseph T. King, M.D., 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.
 Herbert S. Wells, M.D.

Associate Professor

H. Mead Cavert, M.D., Ph.D.
 Charles Edwards, Ph.D.
 Eugene D. Grim, Ph.D.
 John A. Johnson, Ph.D.

Assistant Professor

Robert L. Evans, Ph.D.
 Irwin J. Fox, M.D.
 Lerner B. Hinshaw, Ph.D.
 Jui S. Lee, Ph.D.
 Laurence O. Pilgeram, Ph.D.
 Robert E. Swanson, Ph.D.

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

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

Language Requirement—For the Master's degree, German, French, Russian, or Spanish. For the Ph.D. degree, either (a) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

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

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

- 106-107.† **Human Physiology.** (15 cr; 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 106-107) Visscher and 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
- 210x. **Selected Topics in Permeability.** Advanced seminar. (Cr and hrs ar; prereq 106-107 or equiv, #) Lifson, Evans, Johnson, Grim
- 211x. **Selected Topics in Heart and Circulation.** One or more seminars in the advanced physiology of heart and circulation. (Cr and hrs ar; prereq 106-107 or equiv, #) Visscher, Evans, Lorber
- 212x. **Selected Topics in Respiration.** Advanced seminar. (Cr and hrs ar; prereq 106-107 or equiv, #) Brown
215. **Selected Topics in Intermediary Metabolism.** (Cr and hrs ar; prereq 106-107 or equiv, #) Pilgeram
216. **Selected Topics in Neurophysiology.** Advanced seminar. (Cr and hrs ar; prereq 106-107 or equiv, #) Terzuolo, Edwards
- 230s. **Topics in General Physiology.** Relatively systematic coverage of biological transport processes; kidney and G.I. tract. (3 cr; prereq 106-107 within past 8 yrs; offered 1961-62) Grim, Johnson, Lifson

- 231f. **Topics in General Physiology.** Continuation of 230. (2 cr; offered 1961-62) Grim, Johnson, Lifson
- 232w. **Immunological Basis of Tissue Transplantation and Related Phenomena.** (2 cr; prereq 106-107 within past 8 yrs; offered 1961-62) Martinez
- 233s. **Biophysics of Circulation.** (3 cr; prereq 106-107 within past 8 yrs; offered 1961-62) Evans, Fox
- 234f. **Respiration, Acid-Base Chemistry, and Electrolyte Metabolism.** (3 cr; prereq 106-107 within past 8 yrs; offered 1962-63) Brown
- 235w. **Bioenergetics of Cardiac Contraction.** (3 cr; prereq 106-107 within past 8 yrs; offered 1962-63) Cavert, Lorber
- 236s. **New Concepts in Physiology of Renal Function.** (3 cr; prereq 106-107 within past 8 years; offered 1962-63) Hinshaw, Swanson
- 237f. **Biophysical Aspects of Nerve Function.** (3 cr; prereq 106-107 within past 8 yrs; offered 1963-64) Edwards, Terzuolo
- 238w. **Neural and Humoral Control of Circulation.** (3 cr; prereq 106-107 within past 8 yrs; offered 1963-64) Grande

OFFERED AT THE MAYO FOUNDATION

Professor

Charles F. Code, M.D., Ph.D. in Physiol.,
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. in Physiol.
Victor Johnson, M.D., Ph.D. in Physiol.
Edward H. Lambert, M.D., Ph.D.
Khalil G. Wakim, M.D., Ph.D. in Physiol.
Earl H. Wood, M.D., M.S., Ph.D.

Associate Professor

Albert Faulconer, Jr., M.D., M.S. in Anes.
John T. Shepherd, M.D., D.Sc.

Assistant Professor

H. Frederic Helmholz, Jr., M.D.
Harold J. C. Swan, M.B., Ph.D.

Instructor

David E. Donald, D.V.M., Ph.D.

Much of the graduate work in physiology in the Mayo Foundation is carried out in conjunction with other departments, particularly medicine, surgery, and anesthesiology. In addition to these collaborative undertakings, opportunities for advanced work in physiology are offered in the department for those wishing to major in physiology. For those using physiology in partial fulfillment of the major or minor fields for an advanced degree, the following regular sessions are held: (a) *Review Discussions in Physiology* (1 hour a week for 3 quarters). Discussions on basic knowledge and recent advances in physiology are led by members of the department with fellows participating. (b) *Demonstrations in Physiology* (2 to 3 hours once a week during 3 quarters). Demonstrations of classical physiological experiments are conducted by the staff. (c) *Conferences on Problems in Physiology* (1 hour a week for 3 quarters). Graduate students and staff members present problems of research. (d) *Seminars in Clinical Physiology* (1 hour a week for 3 quarters). Graduate students present selected topics. (e) Weekly seminars on special topics and in the various subdivisions of physiology are held during the year by the staff for fellows and co-workers active in these areas. Examples are neurophysiology and muscle myography, pulmonary physiology, the cardiovascular system, endocrinology, and gastroenterology (G.I. Physiology). (f) Regular weekly seminars are also held in the department in special areas of physiology to aid fellows in their training in these subdivisions: (1) cardiovascular, (2) respiratory, (3) neurophysiology-cerebral function, (4) neurophysiology-neuromuscular physiology, (5) gastroenterologic and others.

M 251f,w,s,su. Research Work on Selected Problems in Physiology. Staff

M 258f,w,s,su. Basic Neurologic Sciences. Staff (See Departments of Neurology, Psychiatry, and Neurosurgery)

PSYCHIATRY AND NEUROLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Donald W. Hastings, M.D., *head*
 Abe B. Baker, M.D., Ph.D., *director of Neurology*
 Starke R. Hathaway, Ph.D., *director of Clinical Psychology*
 Reynold A. Jensen, M.D., *director of Child Psychiatry*
 Maynard M. Cohen, M.D., Ph.D.
 Royal C. Gray, M.D., Ph.D.
 Paul E. Meehl, Ph.D.
 Burtrum C. Schiele, M.D.
 William Schofield, Ph.D.
 Werner Simon, M.D.

David T. Lykken, Ph.D.
 Frank Morrell, M.D., M.Sc.
 Hildred Schuell, Ph.D.

Clinical Associate Professor
 Clifford O. Erickson, M.D.
 Gove Hambidge, M.D.
 Frank Kiesler, M.D.

Assistant Professor
 Michael Blaw, M.D.
 William Fleeson, M.D.
 Ian W. D. Gregory, M.D., M.A.
 Fernando Torres, M.S.
 David Webster, M.D.

Clinical Professor

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

Clinical Assistant Professor
 Paul M. Ellwood, M.D.
 Fred Gross, M.S.W.
 Virgil R. Zaring, M.D.

Associate Professor

Richard W. Anderson, M.D.
 Gordon Heistad, Ph.D.
 Robert G. Hinckley, M.D.

Instructor

James A. Moriarty, M.D.
 Erland R. Nelson, 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) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

- 201f-w-s. Clinical Seminar for Psychologists. (1 cr; prereq #) Schiele, Schofield
- 202f-w-s-su. Case Conference. (1 cr; prereq #) Staff
- 203f-w-s-su. Psychometric Clerkship. (Cr ar; prereq #)
- 204f-w-s. Intermediate Seminar. (1 cr; prereq #) Hathaway
- 205f-w-s. Advanced Seminar. (1 cr; prereq #) Hathaway
- 251f-w-s-su. Clinical In-patient Psychiatry. (Cr ar; prereq MD) Staff
- 252f-w-s-su. Clinical Out-patient Psychiatry. (Cr ar; prereq MD) Staff
- 253f-w-s-su. Clinical Child Psychiatry. (Cr ar; prereq MD) Staff
- 254f-w-s-su. Advanced Clinical In-patient Psychiatry. (Cr ar; prereq MD and 251, 252, 253 or equiv) Staff
- 255f-w-s-su. Advanced Clinical Out-patient 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 #) Jepson
- 264f. *Descriptive Psychopathology*. (1 cr; prereq MD or #) Schiele
- 265w-s. *Personality Development and Psychodynamics*. (1 cr; prereq MD or #) Anderson
- 266w,s. *Therapeutic Dynamics in Hospital Psychiatry*. (1 cr; prereq MD or #) Koutsky
- 269f,w,s. *Introduction to Psychotherapy*. (Same as Psy 271, 272, 273) (3 cr; prereq MD or #) Meehl
- 271f-w-s. *Basic Readings from Psychoanalysis I*. (1 cr; prereq MD or #) Hambidge
- 272f-w-s. *Reconstructive Psychotherapy*. (1 cr; prereq MD or #) Glueck
- 273f-w. *Survey of Psychosomatic Medicine*. (1 cr; prereq MD or #) Magraw
- 274f. *Introduction to Group Therapy*. (1 cr; prereq MD or #) Guzie
- 275w-s. *Introduction to Collaborative Therapy*. (1 cr; prereq MD or #) Gross, Hambidge
- 276f. *Current Research in Psychiatry*. (1 cr; prereq MD or #) Glueck
- 277f. *Psychophysiology for Psychiatrists*. (1 cr; prereq MD or #) Heistad
- 278f. *The Family and Community*. (1 cr; prereq MD or #) Gross
- 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
- 291f-w-s-su. *Seminar in 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 #) Kiesler
- 294f,w,s. *Seminar in Advanced Critical Examination of Systems and Theories*. (1 cr; 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 Out-patient Service, the student has access to Veterans Administration Hospital, Veterans Administration Mental Hygiene Clinic, and Minneapolis General Hospital.

The fellow is given a clinical assignment in the in-patient and the out-patient services of University Hospitals, Veterans Hospital, or Minneapolis 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.

- 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 1962-63 and alt yrs) Nelson
- 211f-w. **Intracranial Neoplasms.** (2 cr, §Path 118; offered 1961-62 and alt yrs) Cohen
- 212f-w-s-su. **Survey of Neuropathology.** (1 cr, §151 and Path 119) Nelson
- 213x. **Neuropharmacology.** (1 cr per qtr) Bieter and staff
214. **Child Neurology.** (1 cr) Staff
- 215w. **Neurological Complications of Internal Disease.** (1 cr) Staff
- 216s. **Clinical Neurochemistry.** (1 cr) Cohen
217. **Neuro-embryology.** (1 cr) Staff
- 218f. **Neurological Language Disorders.** (1 cr) Schuell
- 219s. **Electronics of Neurological Instrumentation.** (1 cr) 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) Cohen
- 222s. **Seizure Mechanisms.** (1 cr) Staff
- 223w. **Brain Tumors.** (1 cr) Staff
- 224s. **Infectious Diseases of the Nervous System.** (1 cr) Baker
225. **Neuro-ophthalmology.** Lectures on the field of ophthalmology as related to neurology. (2 cr; offered 1961-62 and alt yrs) Baker, Hanson
- 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, Peyton, Baker
- 227w-s. **Neurological Development.** (1 cr) Staff
- 228f-w-s-su. **Research in Neuropathology.** (Cr and hrs ar) Baker and Staff
- 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 Neuroroentgenology.** Experience in the actual reading of neuroroentgenological 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 1962-63 and alt yrs) Peterson
- 247f-w-s. **Neurological Speech Disorders.** (1 cr) Schuell
- 248f-w. **Applied Neurophysiology.** (2 cr per qtr; offered 1961-62 and alt yrs) Staff

OFFERED AT THE MAYO FOUNDATION

Psychiatry

Professor

Howard P. Rome, M.D., *head*
David A. Boyd, Jr., M.D., M.S. in
Neur. and Psych.

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. in
Neur. and Psych.
Shervert H. Frazier, Jr., M.D., M.S. in Psych.
Edward M. Litin, 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.

Ample facilities for basic behavioral and clinical research are available. The facilities of the Mayo Clinic and its affiliated hospitals are supplemented by those of the Rochester State Hospital, local nursery schools, and the Rochester Counseling Clinic.

Language Requirement—For the Ph.D. degree either (a) 2 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—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 Rochester State Hospital.** Residence. Boyd, Rome
 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.
 Clark H. Millikan, M.D.

Associate Professor

Joe R. Brown, M.D., M.S. in Neur. and Psych.
 David Daly, M.D., Ph.D. in Neur.
 Donald W. Mulder, M.D., M.S. in Neur.

Assistant Professor

Edward C. Clark, M.D.
 Norman P. Goldstein, M.D., M.S. in Biochem.
 Joseph G. Rushton, M.D., M.S. in Med.
 Robert G. Siekert, M.D., M.S. in Anat.
 Jack P. Whisnant, M.D., M.S. in Neur.
 Robert E. Yoss, M.D., M.S., Ph.D.

Instructor

James A. Bastron, M.D., M.S. in Neur.
 E. Douglas Rooke, M.D., C.M., M.S. in Neur.
 Juergen E. Thomas, M.D., M.S. in Neur.

The fellowship in neurology is normally for a period of 3 years, which is divided into approximately 1 year of out-patient assignments, 1 year of hospital experience, and 1 year in the laboratory sciences and other fields related to neurology. In both the out-patient department and the hospitals, fellows work in close collaboration with the faculty, who are available for consultation and guidance at all times. In the 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 and psychiatry are closely associated with one another and with other medical and

surgical sections of the Mayo Clinic as well as with the various clinical and research laboratories.

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)

Neuro-ophthalmology. (See Department of Ophthalmology)

PUBLIC HEALTH

OFFERED AT THE SCHOOL OF PUBLIC HEALTH

Professor

- Gaylord W. Anderson, M.D., Dr.P.H.
- Richard G. Bond, M.S., M.P.H.
- Herbert M. Bosch, M.P.H.
- Ruth E. Boynton, M.D., M.S.
- Ruth E. Grout, M.P.H., Ph.D.
- James A. Hamilton, M.A.
- Marion I. Murphy, M.P.H., Ph.D.
- Theodore A. Olson, M.A., Ph.D.
- Leonard M. Schuman, M.S., M.D.
- James W. Stephan, M.B.S.
- Stewart C. Thomson, M.D., M.P.H.

- George S. Michaelsen, M.S.
- Harold J. Paulus, M.S., Ph.D.
- Ruth von Bergen, M.P.H.

Assistant Professor

- Eleanor M. Anderson, M.P.H.
- Clare L. Blanchard, M.P.H.
- Nora F. Cline, M.L.N.Ed.
- George E. Williams, M.D.

Lecturer

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

Associate Professor

- Donald W. Cowan, M.D., M.S.
- Kathryn M. Fritz, M.S.
- Christian R. Klimt, M.D., Dr.P.H.
- Edith M. Lentz, 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 2 foreign languages or of 1 foreign language and option of a special research technique or a collateral field of knowledge.

Minor—For the Master's degree, PubH 100A, B, and C and courses in statistics and 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.

Doctor's Degree—Work leading to the Ph.D. degree is offered for a major in sanitation, epidemiology, or hospital administration. Applicants for the degree in sanitation 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. Students majoring in epidemiology will offer a minor in a

field other than a clinical specialty of medicine. Students will be admitted to the doctoral program in hospital administration only if they have had prior formal training and experience in hospital administration. For further information on this program, see the index reference to a special description of work in hospital administration.

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

- 100Af. 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) Anderson, Thomson, Schuman
- 100Bw, 100Cs. Elements of Public Health II and III.** Group work on selected public health problems. (1 cr per qtr; prereq 100A or #) Staff
- 102f. Environmental Sanitation.** Methods for promoting man's health and comfort by controlling environment. (3 cr; prereq 100A or ¶100A and #) Bosch, Olson
- 102As. Environmental Sanitation.** General principles of urban and rural sanitation; problems encountered by official health agencies. (2 cr; prereq 100A or ¶100A and #) Bosch, others
- 103f,w,s. Public Health Bacteriology.** Bacteriologic and serologic diagnosis, public health laboratory administration and methods. (Cr ar; prereq Bact 101-102, 116, #) Bauer
- 104w.* 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, Klimt
- 105s. Epidemiology II.** Extension of epidemiologic principles to detailed study of selected diseases. (3 cr; prereq 104) Schuman, Klimt
- 106w.* Public Health Administration.** Structure, basic functions, and activities of public health agencies. (3 cr; prereq 100A) Anderson, Hamilton
- 107f. 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)
- 107As. Maternal and Child Health Program.** Community programs for major maternal and child health problems. (1 cr, §107; prereq 106 or #)
- 109s. Institutional Sanitation.** Sanitation practices in hospitals and other institutions. (3 cr; prereq hospital administrators or # and 100A) Bosch, Bond
- 112.* Public Health Engineering—Plan Examinations.** 112Af: Water supplies. 112Bw: Waste disposal systems. 112Cs: Swimming pools and plumbing. (1 cr per qtr, §114; prereq engineering degree and 102, and #) Bosch
- 113.* Public Health Engineering—Field Investigations.** 113 Aw: Water supplies. 113Bs: Waste disposal. 113Cs: Swimming pools and plumbing. (2 cr per qtr, §114; prereq engineering degree and # and 102) Bosch
- 114f. Environmental Sanitation Programs.** Public health supervision of activities in urban and rural sanitation. (3 cr, §112, 113, or 116; prereq 100A or ¶100A and #) Bosch
- 115w.* 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
- 116s.* Public Health Engineering Administration.** Administrative organization of environmental sanitation activities. (2 cr, §114; prereq #) Bosch
- 117f-118w-119s.* 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
- 122s.* Public Health Administration Problems.** Budgeting, program planning, and appraisal of public health procedures. (3 cr; prereq 106) Anderson
- 123f,w,s. Topics in Public Health.** Selected readings and problems. (Cr ar; prereq #) Staff
- 125f,s. Public Health Education.** Planning educational aspects of community health programs; group procedures; public relations; selection, development, and use of mass media. (2 cr; prereq #) Grout
- 125As. Public Health Education.** Purposes; scope; methods and materials; planning, with special emphasis on hospitals. (1 cr; hospital administrators only) Grout
- 126s. Occupational Health Programs.** Professional, social, economic, and legal aspects; organization; technical aspects of specific health hazards. (3 cr; prereq 100A or ¶100 A, InCh 4-5 or equiv, or #) Foker

- 127s. **Occupational Health: Nursing Aspects.** Organization and administration of nursing service in industrial health programs. (1 cr; prereq ¶126)
- 132s. **Mental Health Program.** Community program for promotion of mental health and care of mentally ill persons. (1 cr; prereq 106 or #) Williams
- 133f,w,s. **Mental Health.** Emotional factors underlying wholesome family relations or interfering with successful adjustment in family and community. (3 cr; prereq #) Cline, Williams
- 135w. **Conservation of Hearing.** Detection, prevention, and amelioration of hearing impairments. (1 cr; prereq 62 or 62A) Boies and staff
- 137w. **Dental Health.** Conditions resulting in tooth decay and loss; preventive and corrective measures; mouth hygiene; community programs for dental health. (1 cr; prereq 62 or 62A) Jordan
- 139f,w,s. **Advanced Field Practice in Public Health Nursing—Block Placement.** Opportunity for concentration on public health nursing field practice under supervision of co-ordinator of mental health program. (Cr ar; prereq #) von Bergen
- 141s. **Social and Economic Aspects of Medical Care.** Social and economic forces affecting administration and financing of medical care; sickness insurance, group hospitalization; concern of government in provision of medical care. (3 cr; prereq #)
- 152w. **Industrial Hygiene Engineering.** Field and laboratory methods used by industrial hygiene engineers in study and control of occupational health hazards. (3 cr; prereq #) Michaelsen
- 153s. **The Hospital and the Community.** Functions and classifications of hospitals; organization and relation to health care and to public health agencies. (1 cr; prereq #) Stephan, Hamilton
- 154s.* **Control of Radiation Hazards.** Methods used in study and control of radiation hazards in laboratories, hospitals, and industrial plants. (Cr ar; prereq #) Graduate staff
- 155w.* **Introduction to Air Pollution Problems.** (3 cr; prereq #) Paulus
- 156s.* **Air Pollution Surveys.** Public health engineering phases of air pollution surveys. (2 cr; prereq 155 and #) Paulus
159. **Chemical Laboratory Safety.** Principles of accident and fire prevention in chemical laboratories. (1 cr; prereq #) Scheffler
- 170w. **Seminar in 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, Fritz
- 170Aw,s. **Public Health Nursing.** Scope; relationship to other aspects of public health. (1 cr, §170; prereq #) Murphy, Fritz
- 171f°-172w.* **Studies in Public Health Nursing.** Application of scientific method to selected topics; preparation of a study. (3 cr per qtr; prereq public health nurses only) Murphy
- 173su. **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, 174, 177 or #) Murphy, von Bergen, Cline
- 174Aw-174Bs. **Seminar in Administration, Supervision, and Consultation.** Analysis of selected aspects of administrative, supervisory, and consultant process in public health nursing situations. (2 cr per qtr; prereq public health nurse, 171, 175 or #) Murphy, Blanchard
- 175f-176w-177s. **Advanced Practice in Public Health Nursing.** Dynamics of human behavior; application to public health nursing practice on staff, supervisory, administrative, consultant levels through analysis of case material. (3 cr per qtr; prereq #) Williams, von Bergen, Cline
- 178f,w,s. **Seminar in Mental Health.** Opportunity for pursuit of topics of interest to individual students or groups. (Cr ar; prereq #) Williams
- 181f-182w-183s. **Principles and Methods in Public Health Education.** Role of public health educator; group procedures; communication theory; mass media; program planning and evaluation. (3 cr per qtr; prereq #) Grout
- 190f,w,s. **Field Work in Health Education.** Supervised field experience. (Cr ar; prereq 183, 227) Grout
- 191f. **Science of Human Nutrition.** Surveys; nutritional status; undernutrition; malnutrition; dietetics in social relief and medical practice. (3 cr; prereq #) J Anderson, Keys
- 195w. **Public Health Aspects of Cardiovascular Disease.** Etiology, incidence, problems of control, and relationship to mode of life. (3 cr; prereq #) Keys, Grande
196. **Public Health Nursing in Cardiovascular Disease.** Public Health nursing services for cardiovascular disease nursing patients. (3 cr; prereq #) Murphy

- 200f,w,s. **Research.** Opportunities will be offered by the School and by various co-operating organizations for qualified students to pursue research work. (Cr ar)
- 210f,w,s. **Seminar in Public Health.** (Cr ar)
- 212f,w,s.* **Seminar in Public Health Engineering and Sanitation.** (Cr ar; prereq #) Bosch
- 213f,w,s. **Seminar in Epidemiology.** (Cr ar; prereq #) Schuman
- 214w. **School Health Programs.** Review of major health problems among school children, methods of providing and evaluating school health services. (2 cr; prereq 107 or #)
- 215f,w,s. **Maternal and Child Health.** Administration of well-child and antepartum conferences; psychosomatic problems of children. (Cr ar; prereq MD, #)
- 227f,w,s.* **Problems in Public Health Education Programs.** Independent study and experimentation in health education. (Cr ar; prereq #) Grout
- 230w,s,su. **Field Practice in Environmental Sanitation.** (Cr ar; prereq #) Bosch
- 241s. **Epidemiology of Noncommunicable Diseases.** Application of basic epidemiologic principles to noncommunicable diseases and to trauma; selected disease examples. (3 cr; prereq 104) Schuman, Klimt

RADIOLOGY

OFFERED AT THE MEDICAL SCHOOL

Professor

Harold O. Peterson, M.D., *head*
Donn G. Mosser, M.D.

Clinical Professor

J. Richard Aurelius, M.D.
Oscar Lipschultz, M.D.

Associate Professor

Joseph Jorgens, M.D., Ph.D.

Clinical Associate Professor

Daniel L. Fink, M.D.

Assistant Professor

Marvin Loken, Ph.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 3 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 emphasis on fluoroscopy.

Medical fellows are expected to 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 Out-Patient Departments*—A general hospital of approximately 800 beds and a very active out-patient clinic together offer an unusual clinical material, largely of a chronic nature, including especially gastrointestinal, chest, bone, and urological cases. A very active surgical service permits critical appraisal of the results of roentgen examination.

There is, in addition, Variety Club Heart Hospital, which is connected directly with University Hospitals and offers approximately 80 beds for the study of 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 out-patient clinic that offers a wide variety of material for study of all types of tumors both from the diagnostic and therapeutic standpoints. It is fully equipped with the newest type of roentgen therapy machines, two cobalt 60 teletherapy units, an adequate radium supply, and a radium emanation plant. 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. *Minneapolis 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 Minneapolis General Hospital, there is abundant opportunity to observe both acute and chronic processes. In addition, the tuberculosis division of this hospital gives opportunity for the study of tuberculosis in its various forms. 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. 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) 2 foreign languages or (b) 1 foreign language and the option of a collateral field of knowledge.

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, physics, physiology, or anatomy.

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

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)
- 200f,w,s,su. Research in Roentgenology. Problems in Roentgen diagnosis. (Cr and hrs ar)
- 201f,w. 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 1962-63 and alt yrs)
- 202f,w,s,su. Cardiovascular Roentgenologic Conference. (1 cr per qtr)
- 203f,w,s. Radiological Physics I. Lectures and laboratory on physical principles in radiology. (2 cr per qtr; prereq 1st-yr residents)
- 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)
- 207f,w,s,su. Roentgen and Radium Therapy. Treatments of patients under supervision both with medium and high voltage machines and with radium. Problems in connection with these treatments will be thoroughly discussed. (Cr and hrs ar)
- 208f,w,s. 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)
212. Roentgen Diagnosis in Obstetrics and Gynecology. (1 cr)
213. Roentgen Diagnosis of Pulmonary Diseases. (1 cr)
215. Roentgen Diagnosis of Diseases of Urinary Tract. (1 cr)
216. Roentgen Diagnosis of Traumatic Lesions of the Skeleton. (1 cr)
- 217f,w,s. Roentgenologic Conference on Chest Diseases. (1 cr per qtr)
- 218f,w,s,su. Radiobiology Seminar. Discussion of research problems and current literature on biological effects of ionizing radiations. (1 cr per qtr; prereq #)
- 219w. Fundamentals of Nuclear Medicine. Lecture and laboratory exercises to orient the graduate student in medical sciences on principles and application of radioisotopes in medicine. (3 cr; hrs ar; prereq #)
- 220f,w,s,su. Urologic-Roentgenologic Conference. (1 cr per qtr)
- 236f,w,s. Radioisotope Seminar. (1 cr per qtr)
- 237f,w,s. Radiological Physics II. Lectures and laboratory on measurement of ionizing radiations. (2 cr per qtr; prereq 203)
- 240f,w,s,su. Radiation Therapy Conference. Discussion of details of treatments of specific patients. (1 cr per qtr)

OFFERED AT THE MAYO FOUNDATION

Professor

C. Allen Good, Jr., M.D., M.S. in Rad., *head*

Associate Professor

David G. Pugh, M.D.

Assistant Professor

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

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

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

Instructor

Hillier L. Baker, Jr., M.D., M.S. in Rad.

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

George D. Davis, M.D., M.S. in Rad.

Owings W. Kincaid, M.D., M.S. in Rad.

George E. Plum, M.D., M.S. in Rad.

Paul W. Scanlon, M.D., M.S. in Rad.

Martin M. Van Herik, 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 in radiology.

Approximately 30 fellowships in radiology are offered in the Mayo Foundation, 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 3 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 senior fellows 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) 2 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—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 18 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, Plum

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)

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.

SANITATION

Work leading to the Ph.D. degree with a major in sanitation is offered in the School of Public Health. For a list of faculty and course offerings see section on Public Health in this bulletin.

SURGERY

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

General Surgery

OFFERED AT THE MEDICAL SCHOOL

Professor

Owen H. Wangenstein, M.D., Ph.D., *head*
C. Walton Lillehei, M.D., Ph.D.
Richard L. Varco, M.D., Ph.D.

Clinical Professor

William C. Bernstein, M.D.
Orwood J. Campbell, M.D., Ph.D.
Lyle J. Hay, M.D., Ph.D.
Thomas J. Kinsella, 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

Joe Bradley Aust, M.D., Ph.D.
Claude R. Hitchcock, M.D., Ph.D.
William D. Kelly, M.D., Ph.D.
Lloyd D. MacLean, M.D., Ph.D.
Fletcher A. Miller, M.D., Ph.D.

Yoshio Sako, M.D., Ph.D.
Alan P. Thal, M.D., Ph.D.

Clinical Associate Professor

George S. Bergh, M.D., M.S.
Victor P. Hauser, M.D.
N. Kenneth Jensen, M.D.
Bernard G. Lannin, M.D., Ph.D.

Assistant Professor

Victor A. Gilbertsen, M.D., M.S.
Edward W. Humphrey, M.D., Ph.D.
Richard C. Lillehei, M.D., Ph.D.
John F. Perry, Jr., M.D., Ph.D.
Raymond C. Read, M.D., Ph.D.

Clinical Assistant Professor

Stuart W. Arhelger, M.D., Ph.D.
Samuel W. Hunter, M.D., M.S. in Surg.

Graduate work in surgery in the Medical School is designed to offer superior training to a limited number of fellows in 3 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, Bacteriology, Pathology, Pharmacology, Physiology, and Physiological Chemistry.) Opportunity for special investigative and research work is found in these departments. The minor subjects must be taken in one of the above departments. The proximity of the medical buildings and arrangement of courses afford opportunity for co-ordination of clinical and laboratory work.

Supervised work is offered by the Department of Surgery in the Experimental Laboratories of Research as well as in its hospital and out-patient departments in surgical diagnosis and operative surgery, and similar opportunities are available in some of the surgical specialties, such as 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 interns, and after his first year assists in the bedside teaching of the surgical clerks. He acts as first assistant in operations performed by the general surgical staff.

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

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

Language Requirement—For the Ph.D. degree, either (a) 2 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.

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

- 200f,w.s. **Out-Patient Clinic in Surgery.** Student is required to assist in the out-patient 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 Out-Patient Department as well as in the wards. (1 cr per qtr) Wangenstein and staff
- 208f,w.s. **Surgical Service.** The graduate student acts as house surgeon and in connection with the service is required to study the patients, preparing them for clinics and observing them after operations. (1 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. (1 cr per qtr) Wangenstein and staff
- 217f,w.s. **Surgical Seminar.** Conference for reports on surgical literature with presentation and discussion of especially interesting cases and problems as well as research work by members of the surgical staff. (1 cr per qtr) Wangenstein 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 per qtr) Wangenstein 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) Wangenstein 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) Wangenstein 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 THE MAYO FOUNDATION

Professor

B. Marden Black, M.D., M.S. in Surg.
 O. Theron Clagett, M.D., M.S. in Surg.
 John H. Grindlay, M.D., M.S. in Surg.
 George A. Hallenbeck, M.D., Ph.D. in Physiol.
 Edward S. Judd, M.D., M.S. in Surg.
 John W. Kirklin, M.D., M.S. in Surg.
 Charles W. Mayo, M.D., M.S. in Surg.
 James T. Priestley, M.D., M.S. in Exper.
 Surg., Ph.D. in Surg.
 John M. Waugh, M.D., M.S. in Surg.

Associate Professor

Oliver H. Beahrs, M.D., M.S. in Surg.
 Franklin H. Ellis, M.D., Ph.D. in Surg.

Deward O. Ferris, M.D., C.M., M.S. in Surg.
 Thomas T. Myers, M.D.
 Joseph H. Pratt, M.D., M.S. in Surg.

Assistant Professor

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

Instructor

Philip E. Bernatz, M.D., M.S. in Surg.
 Dwight C. McGoon, M.D.
 Richard E. Symmonds, M.D., M.S. in Obst.
 and Gyn.
 John S. Welch, M.D., M.S. in Surg.

Graduate training in general surgery at the Mayo Foundation combines the opportunities for advanced degree and surgical education. The usual 4-year program fulfills the requirements for the American Board of Surgery.

Fellows are appointed for 1 year with yearly reappointments contingent upon satisfactory performance. Schedules usually include 1 quarter of surgical diagnosis, 4 or 5 quarters of general operative surgery at the junior level, 2 or 3 quarters of a wide variety of surgical specialties, 2 quarters of surgical pathology, 6 quarters of general operative surgery at the senior level.

There is opportunity for alternate or supplemental assignments to include surgical research or physiology as well as surgical pathology. Requests for specific subspecialties during the fellowship may include anesthesiology, neurosurgery, orthopedic surgery, peripheral vein surgery, plastic surgery, proctology, radium and roentgen therapy, and urology.

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

One- or 2-year appointments, following the fellowship program, are made in certain cases for advancement in cardiopulmonary and gastrointestinal surgery.

Operative services are principally located in the Rochester Methodist Hospital and St. Marys Hospital. A total of 600 surgical beds offer wide exposure to general and special surgical diseases.

Integrated group seminars, lectures, and meetings are held during each week.

Language Requirement—For the Ph.D. degree, either (a) 2 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. Peripheral Vein Surgery. Treatment of complications, surgical and medical, and varicose veins. Staff

M 252f,w,s,su. Operative Surgery. Second assistantship in operating rooms; substitute service as first assistant. Residence. Seminar. Staff

Operative Surgery in All Specialties of Surgery. (See specific departments)

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

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

Anatomy for General Surgeons. (See Department of Anatomy)

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

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

Medical Hospital Residence. (See Department of Medicine)

Special Anesthesia. (See Department of Anesthesiology)

Neurosurgery

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Instructor

Shelley N. Chou, M.D., M.S.

Clinical Professor

Wallace P. Ritchie, 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 Out-Patient Department and in University Hospitals. (3 cr) French, Chou

308f,w,s,su. Neurosurgical Service. 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 THE MAYO FOUNDATION

Professor

J. Grafton Love, M.D., M.S. in Surg., *head*

Associate Professor

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

Assistant Professor

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

Instructor

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

Preparation for neurosurgery at the Mayo Foundation includes assignments in the Departments of Anatomy, Pathology, Psychiatry and Neurology, and General Surgery. The new training program is of 4-year duration preceded by 6 to 12 months of general surgery to complete the requirements of the American Board of Neurosurgery.

To acquire competence in neurologic surgery it is essential that the training in neurologic surgery itself be preceded by an adequate background in neurologic diagnosis, neuropathology, neuroanatomy, and neurologic ophthalmology. In addition it is highly desirable that some knowledge of other fields, such as neuroontology, neurophysiology, and electroencephalography, be obtained. To acquire a sound background in neurologic diagnosis, fellows in neurosurgery have opportunity to work as assistants in the diagnostic section on neurology and psychiatry and on the hospital services for periods of 6 months or more. For those who are qualified, opportunities to extend this training by acting as first assistants in neurology may be available. Training in neuropathology is under the supervision of the section on pathologic anatomy. During the period of at least 6 months in which fellows are assigned to this section they see not only the specimens obtained at necropsy but also the pathologic specimens obtained at operation. The vast amount of material in the pathologic museum as well as the clinical records of patients with neurologic disease are available for fellows who wish to carry out research problems in this phase. For those who wish to obtain a background in neurophysiology, opportunities are available in the Departments of Physiology both at the Mayo Foundation and at the Medical School to conduct research along these lines. Training in neuroanatomy is given in the Departments of Anatomy at the Mayo Foundation and at the Medical School. Experience in neurosurgical procedures and in the preoperative and postoperative care of patients is acquired on the neurosurgical services. Opportunities are available to act as first assistant to one or more of the members of the staff. All of these activities are so closely integrated that fellows in neurosurgery constantly have before them the relationship of the laboratory sciences to diagnosis and treatment in neurosurgery and allied fields.

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)

Neuro-ophthalmology. (See Department of Ophthalmology)

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

Orthopedic Surgery

OFFERED AT THE MEDICAL SCHOOL

Clinical Professor

John H. Moe, M.D., *director*
Edward T. Evans, M.D.
Harry B. Hall, M.D.

Clinical Associate Professor

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

Master's Degree—Three-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 Foundation. 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 in-patient or out-patient service. (Cr ar) Peterson, Moe, Arnesen, and staff
403. **Fractures.** The orthopedic fellow acts as house surgeon on the fracture service at Minneapolis General Hospital. (Cr ar) Nydahl and staff
405. **Orthopedic Diagnosis.** The orthopedic fellow assists in instruction of clinical clerks and interns and studies problems in diagnosis in the Out-Patient Department and in the University Hospitals. (Cr ar) Moe, Arnesen, and staff
407. **Pediatric Orthopedics.** The orthopedic fellow acts as house surgeon at Gillette State Hospital for Crippled Children. (Cr ar) Moe and staff
408. **Orthopedic Service.** The orthopedic fellow acts as house surgeon at the University Hospitals. (Cr ar) Moe, Arnesen, and staff
410. **Orthopedic Pathology.** Seminar for systematic review of pathology of ossified tissues and soft tissues of the extremities. (Cr ar) 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. (Cr ar) Moe, Arnesen, 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. (Cr ar) Moe, Arnesen, and staff
416. **Orthopedic Research.** Problems in experimental or clinical surgery. University Hospitals. (Cr ar) Moe, Arnesen, and staff

OFFERED AT THE MAYO FOUNDATION

Professor

William H. Bickel, M.D., M.S. in Orth. Surg.
Mark B. Coventry, M.D., M.S. in Orth. Surg.
Joseph M. Janes, M.D., M.S. in Orth. Surg.

Associate Professor

John C. Ivins, M.D., M.S. in Orth. Surg.
Paul R. Lipscomb, M.D., M.S. in Orth. Surg.
H. Herman Young, M.D., M.S. in Orth. Surg., *head*

Assistant Professor

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

Instructor

Anthony J. Bianco, M.D., M.S. in Orth. Surg.
Patrick J. Kelly, M.D., M.S. in Orth. Surg.
Lowell F. A. Peterson, M.D.
C. Roger Sullivan, M.D., M.S. in Orth. Surg.

Orthopedic surgery at the Mayo Foundation 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 spine 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 in-patients 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 Foundation is prepared to give the full 4 years of training in orthopedic surgery that is 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.

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 Foundation 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 13 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. Young and staff

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

ProfessorJohn B. Erich, M.D., D.D.S., M.S., *head***Assistant Professor**

Kenneth D. Devine, M.D.

Instructor

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

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

Thaddeus J. Litzow, M.D., M.S. in Pl. Surg.

James K. Masson, M.D., M.S. in Pl. Surg.

Fellowships in plastic surgery at the Mayo Foundation 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. Facilities are available for the observation and study of plastic problems related to the hand and to the genitourinary system.

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 Foundation meets the requirements of the American Board of Plastic Surgery and includes 3 years of resident training in general surgery and 2 or 3 years in plastic surgery. The applicant is encouraged to secure his general surgery training at the Mayo Foundation. 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

OFFERED AT THE MAYO FOUNDATION

Associate ProfessorRaymond J. Jackman, M.D., M.S. in Proc.,
*head***Assistant Professor**

John R. Hill, M.D., M.S. in Proc.

Instructor

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

The section on proctology of the Mayo Foundation offers opportunities for the study of diseases of the anus, rectum, and colon. Patients are referred to this sec-

tion from general diagnostic sections. The chief complaint of the patient may be limited to some proctologic disorder, but often proctoscopy is desired to determine the relationship of the proctologic condition to some general complaint. Therefore, opportunity is provided to study diseases of the colon and their relationship to systemic disorders. The major service in proctology extends over a period of 5 years and meets the requirements of the American Board of Rectal and Colon Surgery. It includes a minimum of 6 months in a minor, usually surgical pathology, approximately 2 to 3 quarters in general medical and surgical diagnosis with special reference to diseases of the intestines, 3 months in regional anesthesia with special reference to sacral anesthesia, in diagnostic roentgenology, in radium treatment of malignant and other conditions, and 6 to 8 quarters in diagnosis and surgical treatment of diseases involving the anus, rectum, and colon. In addition, 6 quarters are devoted to abdominal surgery in which special attention is given to conditions that involve the colon.

Master's Degree—Offered only under Plan A.

M 251f,w,s,su. Proctology. 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.

Urology

OFFERED AT THE MEDICAL SCHOOL

Professor

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

Clinical Associate Professor

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

Clinical Professor

Theodore H. Sweetser, M.D.

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 or Minneapolis Veterans 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 THE MAYO FOUNDATION

Professor

Gershon J. Thompson, M.D., M.S. in Urol.,

head

Edward N. Cook, M.D., M.S. in Urol.

John L. Emmett, M.D., M.S. in Urol.

Associate Professor

Ormond S. Culp, M.D.

Laurence F. Greene, M.D., Ph.D. in Urol.

Thomas L. Pool, M.D., M.S. in Urol.

Assistant Professor

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

Instructor

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

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 Foundation branch of the Graduate School may do so, thus extending the period of training to 4 years. A minimum of 1½ years is devoted to diagnosis and treatment of diseases involving the urinary tract. Surgical training includes at least 1½ years in all phases both open and transurethral. 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 all of 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 many 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.

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. Thompson, Emmett, Cook, Pool, Culp, Greene, DeWeerd, 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)

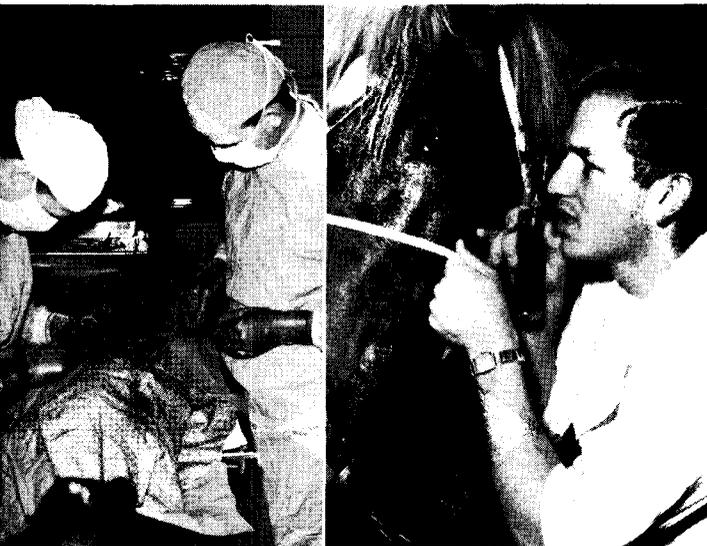
Fellows majoring in urology may also, if they wish, take work in anatomy, biochemistry, clinical pathology, physiology, and dermatology. For details, see these departments.

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College of Veterinary Medicine

1961-1963



VETERINARY HOSPITAL
Students learn principles
of surgery and medicine

Bulletin

of the UNIVERSITY of MINNESOTA

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.

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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 1.

Explanation of Symbols Used

The following symbols are used throughout the course description section and will carry no page footnotes:

- ‡ To receive credit, all courses listed before dagger must be completed.
- # A sharp mark means "consent of instructor."

UNIVERSITY OF MINNESOTA

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The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable Charles W. Mayo, M.D., Rochester, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Robert E. Hess, White Bear Lake; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

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COLLEGE OF VETERINARY MEDICINE

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Medicine (239C Veterinary Science)

College of Veterinary Medicine

GENERAL INFORMATION

The College of Veterinary Medicine at the University of Minnesota is located toward the south side of the St. Paul Campus, immediately north of Commonwealth Avenue, and west of the State Fair Grounds.

The Career of Veterinary Medicine—Veterinary medicine is the medical science dealing with the health and reproduction of domestic animals. Veterinary practice is concerned with the recognition, treatment, prevention, and eradication of animal diseases. The study of veterinary medicine embraces a thorough knowledge of the fundamental biologic sciences dealing with animal functions and disease. The veterinarian must also learn to integrate this knowledge and properly utilize it in his professional activities.

The veterinarian may choose one or more fields of work available to him upon completion of his training, graduation, registration, and accreditation. Many veterinarians are engaged in private practice. A private practice may be a general one, meaning that all types of animals are cared for, or it may be specialized and deal with only 1 or 2 species of animals. In the latter category, veterinary work may consist primarily of small animal practice, dairy cattle practice, poultry practice, sheep and range cattle practice, swine practice, horse practice, or reproduction management practice.

The work of the veterinarian engaged in general or specialized practice is divided into four categories: (1) prevention of animal diseases through use of his knowledge of the natural history of each specific disease; (2) medical and surgical treatment of animals; (3) protection and improvement of foods derived from animals, namely, meat, dairy products, and eggs; and (4) protection of the public from diseases which may be transmitted from animals to man.

In addition to private practice the veterinarian finds professional opportunities in several other fields. Many veterinarians are employed by the Agricultural Research Service of the United States Department of Agriculture where they are engaged in a wide variety of activities. Some of the responsibilities of this branch of the Federal Government are the supervision of quarantine regulations imposed on animals entering the United States, identification and eradication of such diseases as tuberculosis, brucellosis, foot and mouth disease, rinderpest, contagious pleuropneumonia, hog cholera, or any other serious threats to health of our livestock. They also carry on research pertaining to animal diseases of nation-wide importance.

In the armed forces veterinary officers are responsible for the wholesomeness of food supplies, and for defense against biological warfare. Others serve in similar capacity in the United States Public Health Service where they investigate and participate in the detection and control of diseases of animals which are transmissible to man.

At local levels veterinarians are active in state and municipal food inspection and disease control programs. They are the official representatives of the livestock sanitary boards or similar agencies of the various states and the local, county, and state health departments.

There are opportunities for veterinarians in production, sales, and administrative positions in commercial firms engaged in the development and production of pharmaceuticals, vaccines, and antisera.

An increasing number of veterinarians are taking advantage of graduate study for advanced degrees offered by the several colleges of veterinary medicine and veterinary science departments of universities. On completion of these programs they devote their lives to teaching and research. Research opportunities embrace all of the fields of medical science with a growing demand and importance in the role for veterinarians in public institutions, individual organizations, and commercial concerns which support both fundamental and applied research.

The future opportunities in veterinary medicine are reflected in studies of the economics of animal diseases. Estimated losses caused by a few of the common diseases of livestock are \$1 billion per year. The value of an adequate supply of palatable animal food products is inestimable in value to human health. The directory of the American Veterinary Medical Association for 1958 lists 19,347 veterinarians in the United States. This is an increase of 600 per year since the 1956 listing. In spite of this continued growth in the veterinary population each year, there are many more requests for veterinarians than there are available graduates. As veterinary service expands the demand will be ever increasing.

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. Only in comparatively recent years has veterinary medicine become established as a profession. 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 organized throughout the United States until they numbered 25 in 1916. Most of the colleges prior to 1916 were privately owned and financed. Since 1916 many of the privately owned colleges have become nonexistent because of the lack of financial support. Most of the present-day colleges are state supported.

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 a large number of students from this state were interested in obtaining an education in veterinary medicine. These students were unable to gain admission to the 10 colleges of veterinary medicine in existence at that time. 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 was admitted in the fall quarter of 1947 and received their degrees 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 became a separate unit of the Institute of Agriculture; in 1957 the College of Veterinary Medicine was established as a separate unit of the University of Minnesota.

When the School was first established, the Council on Education of the American Veterinary Medical Association placed it on probation as were all new schools of veterinary medicine. In 1956 the College of Veterinary Medicine at the University of Minnesota was fully accredited, subject to continued development and maintenance of standards comparable to other accredited colleges of veterinary medicine.

Facilities

The facilities of the College of Veterinary Medicine, University of Minnesota, are housed in four major and a number of minor buildings. Most of the formal classes are taught in the former; research equipment and research animals are housed in the latter. This College is well equipped in respect to facilities, scientific instruments, and teaching aids for student instruction. Some of the buildings and facilities will be briefly discussed in the following paragraphs.

Veterinary Anatomy—Anatomy of domestic animals is taught in the new addition of the Veterinary Science building. This structure contains one lecture room, dissecting rooms for gross anatomy, locker room, and rooms for teaching histology, embryology, and neuroanatomy. In addition, there are offices and graduate laboratories for the staff.

Veterinary Physiology and Pharmacology—Physiology and pharmacology of domestic animals are taught in a large temporary building adjacent to the Veterinary Clinic. The laboratories, preparation rooms, and animal quarters are on the first and second floors, and offices and graduate laboratories are on the third floor. Due to the recent completion of modern large and small animal student laboratory facilities in the Veterinary Science building, several of the laboratory classes in veterinary physiology and pharmacology meet in that building.

Veterinary Bacteriology and Public Health—Veterinary bacteriology and public health are taught in the Veterinary Science building; the lecture room is on the first floor; modern, well-equipped laboratories are located on the second floor. The offices, small laboratories, and facilities for preparing media and specimens also are located on the second floor.

Veterinary Pathology—Veterinary pathology is taught on the first floor of the Veterinary Science building, as well as in the Veterinary Clinic. Basic principles of pathology are taught in the laboratory, museum, and lecture room located in the

Veterinary Science building. Post-mortem studies, laboratory application, and more advanced classes are conducted in the Veterinary Clinic.

Veterinary Parasitology—Veterinary parasitology shares facilities with pathology in regard to lecture rooms, laboratories, and clinic facilities. Offices, office-laboratories, and preparation rooms for pathological and parasitological specimens also are on the first floor of the Veterinary Science building.

Veterinary Medicine and Clinics—The clinical services are taught principally in the third and fourth years of the professional curriculum in veterinary medicine. The primary fields of study are in medicine, obstetrics and reproductive health, surgery, and radiology. These are supported by application to cases treated in the veterinary clinic and to cases treated on farms through the ambulatory clinics.

The Veterinary Clinic is well equipped to provide for treatment and care of all classes of animals. Hospitalization is available for approximately 60 dogs, cats, or other small animals. Accommodations are also available for 50 cattle, horses, sheep, or swine. Supporting diagnostic procedures when needed are available through the best of X-ray equipment, well-equipped clinical laboratories, and the post-mortem laboratory.

Ambulatory Clinics—To supplement the training received in the clinic and to provide veterinary service for surrounding farm livestock, two ambulatory services are operated by the Veterinary Clinic. One service is from the clinic at the St. Paul Campus and provides service to University herds and herds on farms in the immediate area. Another service is located at Maple Plain, Minnesota, and provides veterinary service for farm animals on many of the fine farms in that area. Two or three students accompany the staff veterinarian on calls made by these ambulatory services. Here they are familiarized with the common problems encountered in farm livestock and the latest methods in their treatment

and care. The prevention of losses from disease in these herds is also stressed.

The training and experience the student obtains in his study and work with the clinician in the many phases of veterinary practice prepare him for any of the many fields of practice or service in veterinary medicine.

Other Facilities—Other facilities which are of obvious advantage and deserve mention are located on or near the St. Paul Campus. The veterinary library, located in the Veterinary Anatomy building, contains all recent veterinary literature and many other professional periodicals. The Veterinary Diagnostic Laboratory now located in a separate new

building, provides fourth-year students with the opportunity to observe the large number of specimens that are presented to the laboratory for examination and diagnosis.

The facilities of the meat-packing establishments in St. Paul are utilized for instruction in meat inspection and hygiene. Students are able to acquaint themselves with the functions of the State Livestock Sanitary Board through occasional contacts with its representatives located in St. Paul.

At the present time the College of Veterinary Medicine has facilities to provide students with an excellent professional education for a career in veterinary medicine.

Evaluation of Work

Grades—If a student is doing passing work in a course, he will be given 1 of 4 passing grades: A, B, C, D. The grade of C indicates that the work was 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 student and with his general progress. When the student has problems which need special attention, the adviser may refer him to other faculty members, to the appropriate college officer, or to a specialized counseling agency. The student is urged to consult his adviser on any matter pertaining to college work, or

on any other problem on which he would like advice.

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.

For professional help on a personal problem or vocational choice, a student may go to the Student Counseling Bureau, 101 Eddy Hall, Minneapolis Campus, or to the representative on the St. Paul Campus, 215 Coffey Hall.

To learn about student activities, a student may visit the Student Activities Bureau in the First Temporary South of Mines, Minneapolis Campus, or go to the St. Paul Campus branch office in 215 Coffey Hall. The director and the program consultant of the St. Paul Campus Student Center, and the Student Union program consultants in 229 Coffman Union, Minneapolis Campus, are good sources of information and assistance to students wishing to participate in University activities.

If a student is in need of financial help, he may apply at the Bureau of Student Loans and Scholarships, 201 Eddy Hall, Minneapolis Campus.

For help in finding a room or apartment, a student may consult the Student Housing Bureau, 209 Eddy Hall, or the representative in 215 Coffey Hall, St. Paul Campus.

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, 153 Temporary South of Folwell building, Minneapolis Campus.

For help in improving reading or other study skills, a student may consult the Rhetoric Department, 230 Agricultural Engineering building, St. Paul Campus, or the Educational Skills Clinic, 101 Eddy Hall, Minneapolis Campus.

For aid with speech difficulties, a student may consult the Rhetoric Department, or the Speech and Hearing Clinic, 205 Shevlin Hall, Minneapolis Campus.

For information about veterans' benefits, a student may go to 102 Administration building, Minneapolis Campus.

Foreign students should keep in contact with the Adviser for Foreign Students, 302 Eddy Hall, Minneapolis Campus.

For help with health problems, a student may go to the Health Service on either the St. Paul or Minneapolis Campus.

The office of the Co-ordinator of Religious Activities is in 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 and reaches decisions on 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, conduct 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 the faculty permits students to conduct the 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 concerned 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 and provides for great freedom of action on the part of students on this campus. 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 of certain 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 certain 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 may be found organized groups and facilities which satisfy the needs and inclinations of all.

College of Veterinary Medicine—Within the College itself there exist student organizations which are dedicated to the 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 new St. Paul Campus Student Center is the focal point for social life on the St. Paul Campus. A varied recreational program is pro-

vided 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 according to schedules posted in the men's locker room.

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.

Estimated Expenses per School Year

1. Tuition and incidental fee per school year	
Resident (\$112 per quarter)	\$390
Nonresident (\$257 per quarter)	795
2. Microscope, dissecting set, insurance on equipment (first year only)	410
3. Books and laboratory equipment	125

4. Housing	
Single men or women—Room and board in residence Halls, St. Paul Campus	774
Married students, St. Paul Campus	
1-bedroom apartment (per month)	70
2-bedroom apartment (per month)	80
Housing is also available in privately owned houses and apartments in the Twin Cities area.	

Awards and Scholarships

Caleb Dorr—Usually a sum of approximately \$200 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 G.P.A. in each class. As an example, for 1956-57 the breakdown was as follows: Senior Class, Gold Medal; Junior Class, \$75; Sophomore Class, \$58; Freshman Class, \$40.

Minnesota State Veterinary Medical Society—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 \$25 to the senior student for outstanding contributions to student activities on the campus.

Women's Auxiliary to Minnesota State Veterinary Medical Society—Award of \$25 to the

junior student in the College of Veterinary Medicine selected on the basis of need and scholarship.

Hilltop Laboratories Scholarship in Veterinary Medicine—\$200 is given on the basis of scholarship, professional promise, and financial need.

Beebe Laboratories Scholarship in Veterinary Medicine—\$200 is given on the basis of scholarship, professional promise, and financial need.

Twin City Obedience Training Club Scholarships—These are for junior and senior students who have shown an aptitude for investigations in the field of clinical care, clinical management, and the diseases of dogs.

In addition to the above-mentioned awards and scholarships, students in the College of Veterinary Medicine are in competition with other University stu-

dents on the St. Paul Campus for the following:

Danforth Foundation Leadership Training Scholarship—Available to freshmen in the College of Veterinary Medicine. This is given to a student who shows outstanding leadership qualities. Camp expenses for 2 weeks are paid.

Johnson Foundation Scholarship—Available to freshmen and sophomores. \$200-\$250 is awarded on the best G.P.A., general ability, activities, and personal qualities.

Alpha Zeta Traveling Scholarship—When a veterinary student receives this award, it is used to help defray expenses to the American Veterinary Medical Association Convention.

Undergraduate Sigma Xi—This is an award based on scholastic performance, general ability, and research potential.

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 background indicates 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. Payments may be deferred until 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. These loans bear an interest rate of 2 per cent per annum. Repayment of principal may be deferred until 2 years after graduation.

ADMISSIONS AND CURRICULUMS

Training in veterinary medicine includes 2 years of collegiate study in a preveterinary curriculum and 4 years of professional study in the College of Veterinary Medicine. The preveterinary curriculum may be completed at the College of Agriculture, Forestry, and Home Economics of the University of Minnesota or at another institution that offers the required courses.

Preveterinary Courses

Admission Requirements and Suggested Preparation

1. The student must fulfill the general requirements for admission as listed in the General Information section of the *Bulletin of the College of Agriculture, Forestry, and Home Economics*. High school units as follows must be presented for admission: 3 units in English, 2 units in mathematics (elementary algebra and plane geometry), and 1 or more units in natural science or agriculture.

2. A student completing higher algebra and trigonometry in high school (in addition to elementary algebra and plane geometry) will not be required to repeat them in the preveterinary curriculum at the college level, unless his background proves insufficient to permit him to complete the requirements in mathematics.

3. Prospective students are encouraged to include biology, chemistry, and physics in their high school program.

4. It is desirable that prospective students have farm experience prior to entering the College of Veterinary Medicine.

Curriculum

The following curriculum is presented in order that students registered in the preveterinary curriculum may satisfy the requirements for admission to the College of Veterinary Medicine.

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:

- English or Rhetoric (Communication) and Public Speaking—12 credits
- Chemistry—25 credits (general inorganic and qualitative, 12 credits; quantitative, 5 credits; and organic, 8 credits)
- Mathematics—must complete trigonometry and college algebra or their equivalent
- Biology—10 credits (general biology, zoology, or zoology and botany)
- Animal, Poultry, and Dairy Husbandry—10 credits
- Physics—8 credits including laboratory
- Electives—14-18 credits. Not less than 14 of these credits must be in at least 3 of the following areas: agricultural economics, anthropology, economics, geography, history, humanities, literature, philosophy, political science, psychology, social science, and sociology. Credits in a foreign language may be substituted for 1 of the 3 required areas.

For those students registered in the preveterinary curriculum in the College of Agriculture, Forestry, and Home Economics, University of Minnesota, the following courses will satisfy the preveterinary course requirements for admission to the College of Veterinary Medicine:

FIRST YEAR

- AnHu 1—Introductory Animal Husbandry (4)
- DyHu 1—Elements of Dairying (3)
- PoHu 1—Poultry Production (3)
- InCh 4-5—General Inorganic Chemistry (10)
- InCh 11—Semimicro Qualitative Analysis (4)
- Math Y-T-10—Higher Algebra, Trigonometry, College Algebra (13)
- Orie 1—College Orientation (1)
- Rhet—Freshman Communication requirement (9)

SECOND YEAR

- AnCh 57—Quantitative Analysis (4)
- MeAg 24-25—Agricultural Physics (8)
- OrCh 61-62—Organic Chemistry (8)

Rhet 22—Public Speaking (3)

Biol 1-2—General Biology (zoology, or zoology and botany) (10)

Electives—14-18 credits (no specific courses are designated in the areas previously listed)

To receive consideration for admission to the College of Veterinary Medicine, the candidate should present an above-average scholastic record. For residents of Minnesota, a grade point

average of 2.5 (C+) or better based on the required preveterinary courses is used as a standard when evaluating a candidate for admission into the College of Veterinary Medicine. Nonresident applicants should consult the *Bulletin of General Information*. For a discussion of grades and determining grade point averages see the General Information section of this bulletin.

Professional Courses

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 Aptitude 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 1.

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 schools 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 for-

warded 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 studies, their scores in the veterinary aptitude tests, their interest, character, and personal fitness for the practice of veterinary medicine. First choice is given to residents of Minnesota, second choice to residents of adjoining states which do not have veterinary medical schools, third choice to residents of other states.

Nonresidents are accepted only if their scholarship has been excellent and other qualifications indicate they have unusual promise for the study of veterinary medicine or a career in science.

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, dependent upon their satisfactory completion. In most instances no final decision will be made until a complete transcript of all 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

May 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 1. 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 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 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 1 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 1.5 and 2.0 shall be placed on probation.

A grade point average of 2.0 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 2.5 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 2.0 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 this College 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 2.0 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 2.0 or above and a minimum of 235 credit hours of work.

Required Courses

The courses listed below are required in the professional curriculum of the College of Veterinary Medicine:

FIRST YEAR

- VAna 100—Orientation for Veterinary Students (1)
- VAna 101—Anatomy of the Dog (7)
- VAna 102—Veterinary Comparative Anatomy (8)
- VAna 130—Veterinary Neuroanatomy (3)
- VAna 150—Comparative Prenatal Development of Domestic Animals (4)
- VAna 151-152-153—Microscopic Anatomy of Domestic Animals (12)

- VBac 101—General Veterinary Bacteriology and Immunology (5)
- PhCh 102-103—Physiological Chemistry (12)

SECOND YEAR

- VBac 102—Pathogenic Bacteria and Fungi (6)
- VBac 103—Veterinary Virology (4)
- VMC 101—Veterinary Physical Diagnosis (4)
- VPP 105-106-107-108—Animal Physiology (12)
- VPP 109—Physiology of the Endocrine and Reproductive Systems (3)
- VPP 151—Introduction to Pharmacology (4)
- VPaP 101-102—Veterinary Parasitology (10)
- VPaP 151—General Veterinary Pathology (5)
- VPaP 152—Special Veterinary Pathology (5)
- VPaP 153—Special Veterinary Pathology and Pathology of Infectious Diseases of Animals (5)

THIRD YEAR

- VAna 106—Veterinary Surgical Anatomy (1)
- VMC 102-103-104—Large Animal Medicine (15)
- VMC 110-111-112—Clinics (15)
- VMC 117A-117B-117C—Clinical Conference (1)
- VMC 121—Small Animal Medicine (4)
- VObs 101—Veterinary Obstetrics (4)
- VPP 152—General and Experimental Pharmacology (4)
- VPP 153—Veterinary Clinical Pharmacology (3)
- VPaP 154—Veterinary Clinical Pathology (2)
- VSR 101—Principles of Veterinary Surgery (5)
- VSR 102—Special Veterinary Surgery (5)
- VSR 103—Special Veterinary Surgery (4)
- AnHu 70 } Feeds and Feeding Practices (3)
- DyHu 70 }
- PoHu 53—Poultry Nutrition (2)

FOURTH YEAR

- VMC 113—Clinics (3)
- VBac 125-126-127—Veterinary Public Health (9)
- VBac 131—Poultry Diseases (4)
- VMC 114-115-116—Clinics (15)
- VMC 118A-118B-118C—Clinical Conference (1)
- VMC 119—Veterinary Jurisprudence and Business Methods (2)
- VMC 122—Small Animal Medicine (5)
- VMC 131-132—Infectious Diseases of Large Animals (10)
- VMC 141—Animal Diseases and Poisonous Plants (3)
- VObs 102—Animal Reproduction (4)
- VPaP 156—Diseases of Fur-Bearing Animals (2)
- VSR 104—Lamenesses of Domestic Animals (1)
- VSR 105—Special Surgery (1)
- VSR 121—Veterinary Radiology (3)
- VSR 131—Heredity in Animal Disease (3)

DESCRIPTION OF COURSES

Division of Veterinary Anatomy (VAna)

Professor

Ralph L. Kitchell, D.V.M., Ph.D., *head*
Alvin F. Weber, D.V.M., Ph.D.

Research Fellow

James E. Breazile, D.V.M.
Benjamin L. Hart, D.V.M.

Instructor

Raymond C. Callstrom, 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. Veterinary Comparative Anatomy.** Comparative gross anatomical study of domestic animals, including poultry. (8 cr; prereq 101, 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 #)
- 154. Morphology of Animal Cells and Intercellular Substances.** Detailed study of the components of the basic tissues of the animal body. (3 cr; prereq 151, #; offered 1961-62 and alt yrs)
- 160. Histological and Microscopic Techniques.** Principles and practices in preparing and observing animal tissues. (3 cr; prereq 151, #; offered 1962-63 and alt yrs)
- 190. Seminar in Veterinary Anatomy.** (1 cr; prereq 101, 151, #)
- 191. 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, #)

Division 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 Professor

Robert K. Lindorfer, Ph.D.

Assistant Professor

Keith I. Loken, D.V.M., Ph.D.

Instructor

Calvert T. Larsen, D.V.M.

Research Fellow

Harold N. Benson, M.S., Ph.D.
Richard E. Dierks, D.V.M.
Alan J. Kenyon, D.V.M.
Frank J. Siccardi, D.V.M.
Clarence A. Tervola, D.V.M., M.S.

Lecturer

David E. Evans, D.V.M.
 Jack G. Flint, D.V.M.
 Wallace C. Lawton, D.V.M., Ph.D.
 Robert B. Mericle, D.V.M.

James H. Steele, D.V.M., M.P.H.
 Kenneth E. Taylor, D.V.M.
 Calvin A. Ward, D.V.M.
 Daniel F. Werring, D.V.M.
 Ralph L. West, D.V.M.

- 101. General Veterinary Bacteriology and Immunology.** 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 in zoology, 13 cr in chemistry, #)
- 102. Pathogenic Bacteria and Fungi.** Studies of bacteria, actinomycetes, fungi, and spirochetes which cause animal diseases. (6 cr; prereq 101 or equiv, #)
- 103. Veterinary Virology.** Basic techniques of virology and of those viral and rickettsial agents which cause 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, #)

Division of Veterinary Medicine and Clinics (VMC)

Professor

Harvey H. Hoyt, D.V.M., Ph.D., *head*
 John N. Campbell, D.V.M.
 George W. Mather, D.V.M., Ph.D.
 Dale K. Sorensen, D.V.M., Ph.D.

Donald W. Johnson, D.V.M.
 William E. Moore, D.V.M.
 Wallace M. Wass, D.V.M.

Clinical Instructor

Fred W. Gehrman, D.V.M.

Associate Professor

Donald G. Low, D.V.M., Ph.D.
 Robert A. Merrill, D.V.M.

Research Fellow

LaRue W. Johnson, D.V.M.
 John K. King, D.V.M.
 Vaughn L. Larson, D.V.M.
 Eriks Martinsons, D.V.M.
 Ned E. Olson, D.V.M.

Instructor

William F. Brown, D.V.M.
 Stanley E. Held, D.V.M.

- 101. Veterinary Physical Diagnosis.** Fundamentals of clinical veterinary medicine, procedures in physical diagnosis and restraint of animals. (4 cr; prereq #)
- 102-103-104. Large Animal Medicine.** Diseases of large animals including diseases of the systems, metabolic diseases, nutritional deficiencies, and diseases caused by toxic agents. (5 cr per qtr; prereq #)
- 110-111-112. Clinics.** (For 3rd yr VMed) Medical, radiological, obstetrical, surgical, and ambulatory clinics and laboratory examinations in diseases of animals. (5 cr per qtr; prereq 101, #)
- 113. Clinics.** (3 cr)
- 114-115-116. Clinics.** (For 4th yr VMed) (5 cr per qtr; prereq 113, #)
- 117A-117B-117C.† Clinical Conference.** (For 3rd yr VMed) Group discussion of clinical cases. (1 cr per yr; prereq #)
- 118A-118B-118C.† Clinical Conference.** (For 4th yr VMed) (1 cr per yr; prereq #)
- 119. Veterinary Jurisprudence and Business Methods.** Acquaints student with fundamentals of the legal responsibilities of a veterinarian, public relations, jurisprudence, veterinary ethics, and regulatory procedures. (2 cr; prereq #)

121. **Small Animal Medicine.** Medical diseases of small animals. (4 cr; prereq #)
122. **Small Animal Medicine.** Continuation of 121. (5 cr; prereq #)
- 131-132. **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, emphasizing the pathogenesis, symptomatology, differential diagnosis, treatment, prevention, and control procedures. (5 cr per qtr; prereq #)
141. **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 #)

Division of Veterinary Obstetrics (VObs)

Professor

Raimunds Zemjanis, D.V.M., Ph.D., *head*

Instructor

William F. Cates, D.V.M.
Kenneth G. Magnuson, D.V.M.

101. **Veterinary Obstetrics.** Lectures covering physiology and pathology of pregnancy, obstetrics, and diseases of 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 101, VMC 113, #)

Division of Veterinary Pathology and Parasitology (VPaP)

Professor

J. H. Sautter, D.V.M., Ph.D., *head*
Henry J. Griffiths, D.V.M., Ph.D.
W. T. S. Thorp, D.V.M., M.S.

Instructor

Stanley M. Dennis, B.V.Sc., Ph.D.
N. Ole Nielsen, D.V.M.
Victor Perman, D.V.M.
John C. Schlotthauer, D.V.M.
Albert C. Strafuss, D.V.M., M.S.

Assistant Professor

William J. Bemrick, Ph.D.

Research Fellow

Roger A. Ball, D.V.M.
Darrel D. Joel, D.V.M.
Kenneth H. Johnson, D.V.M.
Bobby J. Payne, D.V.M.
Stanley D. Warner, D.V.M.

Research Associate

Nobuko S. Mizuno, Ph.D.

101. **Veterinary Parasitology.** Systematic 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 #)
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, #)

Division of Veterinary Physiology and Pharmacology (VPP)

Professor

Clarence M. Stowe, V.M.D., Ph.D., *head*

Associate Professor

Archie L. Good, D.V.M., Ph.D.
Paul B. Hammond, D.V.M., Ph.D.

Assistant Professor

Emmett N. Bergman, D.V.M., Ph.D.
John P. Sullivan, D.V.M., Ph.D.

Research Fellow

Arthur L. Aronson, D.V.M., M.S.
Shannon C. Whipp, 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, PhCh 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 in 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 anesthetics, analgesics, and antipyretics. (4 cr; prereq 108, or equiv, #)
152. **Veterinary Pharmacology.** Chemotherapeutic, autonomic, cardiovascular, and gastrointestinal drugs. (4 cr; prereq 151, or equiv, #)
153. **Veterinary Pharmacology.** Continuation of general pharmacology with emphasis on clinical aspects in domestic animals. (3 cr; prereq 152 or equiv, #)
161. **Seminar in Veterinary Pharmacology.** (Cr ar; prereq 152 or equiv, #)
171. **Problems in Veterinary Pharmacology.** (Cr ar; prereq 152 or equiv, #)

Division of Veterinary Surgery and Radiology (VSR)

Professor

John P. Arnold, D.V.M., Ph.D., *head*

Associate Professor

Francis A. Spurrell, D.V.M., Ph.D.
Edward A. Usenik, D.V.M., Ph.D.

Assistant Professor

Donald H. Clifford, D.V.M., M.P.H., Ph.D.

Instructor

I. Gary M. Gourley, D.V.M.
Griselda F. Hanlon, D.V.M., M.S.
Harold J. Kurtz, 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 as applied to domestic animals. (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. (4 cr; prereq 101, #)

- 104. **Lamenesses of Domestic Animals.** Etiology, diagnosis, and treatment of lamenesses of domestic animals. (1 cr; prereq 103, #)
- 105. **Special Surgery.** Training in advanced surgical techniques. (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 fauilial conditions in domesticated species. (3 cr; prereq VMC 104, #)

Veterinary Diagnostic Laboratories

Professor

Reuel Fenstermacher, D.V.M., *head*

Associate Professor

John M. Higbee, D.V.M.

Instructor

Donald M. Barnes, D.V.M.
Martin E. Bergeland, D.V.M.
Harley W. Moon, D.V.M.

Courses Primarily for Students in Agriculture

- VAna 143. Avian Gross and Microscopic Anatomy.** Gross and microscopic anatomy of the chicken and certain significant anatomical areas of other fowl. (5 cr)
- VBac 130. Poultry Hygiene.** 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 3, PoHu 1, Bact 53; offered 1961-62 and alt yrs)
- VMC 52. Animal Hygiene.** Principles of animal health and disease, with emphasis on prevention, control, and eradication. (5 cr)
- VPP 41-42. Systemic Mammalian Physiology.** Function of the heart, lungs, digestive tract, kidney, nervous system, and reproductive organs in domestic animals. (4 cr for 41, 2 cr for 42; prereq OrCh 41, 42, ¶AgBi 3 for 41, 41 for 42)

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Division of Medical Technology

1961-1963



Theory and technique are correlated through clinical experience.

Bulletin

of the UNIVERSITY of MINNESOTA

How to Use This Bulletin

The *Bulletin of the Division of Medical Technology* for 1961-1963 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 Science, Literature, and the Arts*. These bulletins are available at the information booth in the Administration Building or may be obtained by writing to the Office of Admissions and Records, University of Minnesota, Minneapolis 14.

Days and hours when classes meet and the place of meeting are contained in the *Class Schedule* published just before the registration period each quarter.

Information about classes during Summer Session can be obtained by writing the Summer Session Office, 135 Johnston Hall, University of Minnesota, Minneapolis 14.

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable Charles W. Mayo, M.D., Rochester, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Robert E. Hess, White Bear Lake; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

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Malcolm M. Willey, Ph.D., L.H.D., LL.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., LL.D., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President and Administrative Assistant
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

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Ellis S. Benson, M.D., Professor and Director, Division of Hospital Laboratories
Ruth F. Hovde, M.S., Associate Professor and Director, Division of Medical Technology
Verna L. Rausch, M.S., Assistant Professor; Training Co-ordinator
Jean E. Jorgenson, B.S., Instructor; Co-ordinator of Medical Laboratory Assistants
Kathryn R. Hammer, B.S., Instructor
Grace Mary Ederer, B.A., Assistant to the Director, Division of Hospital Laboratories

Faculty

Wallace Armstrong, M.D., Ph.D., Professor and Head, Department of Physiological Chemistry
Robert Bridges, M.D., Assistant Professor; Director of Clinical Microbiology
Frances Casey, B.S., Instructor, Veterans Administration Hospital
James R. Dawson, M.D., Professor and Head, Department of Pathology
Mary Delaney, M.S., Instructor, Microbiology Laboratory
Esther F. Freier, M.S., Assistant Professor; Hospital Chemist
Lorraine M. Gonyea, M.S., Assistant Professor, Hematology Laboratory
Patricia Hanauer, B.S., Instructor, Hematology Laboratory
Arnold Lazarow, M.D., Ph.D., Professor and Head, Department of Anatomy
Paul H. Lober, M.D., Ph.D., Associate Professor of Pathology; Hospital Pathologist
Elaine B. McMasters, M.S., Assistant Professor, Pathology Laboratory

Ann Peterson, B.S., Instructor, Chemistry Laboratory
 Betty Ruspino, B.S., Instructor, Blood Bank
 Arthur Sanders, B.S., Instructor, Veterans Administration Hospital
 R. Dorothy Sundberg, M.D., Ph.D., Professor of Anatomy; Hospital Hematologist
 Maurice Visscher, M.D., Ph.D., Professor and Head, Department of Physiology
 Franklin G. Wallace, Ph.D., Associate Professor of Zoology; Consultant in Parasitology
 Edmond Yunis, M.D., Instructor; Assistant Director of Blood Bank
 Newell R. Ziegler, M.D., Ph.D., Associate Professor of Bacteriology and Immunology;
 Consultant, Blood Bank
 _____, Professor and Head, Department of Bacteriology

Principal and Senior Medical Technologists and Student Technologist Supervisors

Microbiology Laboratory

Margaret Brevick, B.S.
 Ann Cihac, B.S.
 Joycelyn Duncan, B.S.
 Joanne Floeder, B.S.
 Doris Hansen, B.S.
 Marilyn Hopp, B.S.
 Carol Mueske, B.S.
 Carol Timmons, B.S.

Basal Metabolism and Electrocardiography Laboratory

Eloise Greenwood, B.S.
 Margaret Halsted, B.S.

Blood Bank Laboratory

Arlyce Anderson, B.S.
 Sandra Benson, B.S.
 Kathleen Dahle, B.S.
 Patricia Koors, B.S.
 Carole Sahlstrand, B.S.
 Lila Wengler, B.S.

Chemistry Laboratory

Joan Aldrich, B.S.
 Sharon Bastian, B.S.
 Karen Bisset, B.S.
 Kathleen Clayson, B.S.
 Barbara Cohen, B.S.
 Kay Draves, B.S.
 Solveig Gerstenkorn, B.S.
 Jessie Hansen, B.S.
 Mavis Hawkinson, B.S.
 Phyllis Hoffman, B.S.
 Helen Huber, B.A.
 Barbara Jackson, B.S.
 Sandra Johnson, B.S.
 Aija Kancitis, B.S.
 Alden Klungnes, B.S.
 Carol Nelson, B.S.

Ethel Schneider, B.S.
 Maija Strumbris, B.S.
 Livija Vilinskis, B.S.
 Marlene Wilke, B.S.
 Joan Yasmineh, B.S.

Hematology Laboratory

Audrey Christianson, B.S.
 Nancy Elstad, B.S.
 Kathryn Grave, M.S.
 Ruth Key, B.S.
 Dorothy Knutson, B.S.
 Norma Peterson, B.S.
 Ruth Rosendahl, B.S.
 Ella Spanjers, B.S.
 Elizabeth Stone, B.S.
 Marion Templeton, B.S.
 Jean Urbank, B.S.
 Betty Weisel, B.S.

Night Technologists

Ruth Cadwell, B.S.
 Gordon Herbst, B.S.
 Jean Hyslop, B.S.
 Helen Kennedy, B.S.
 Beverley Lawler, B.S.
 JoAnne Nelson, B.S.
 Inez Ness, B.S.
 Judith Schelde, B.S.
 Jennie Seaton, B.S.
 Joan Wetmore, B.S.

Pathology Laboratory

Jean Kubon, B.S.
 Clarice Olson, B.S.
 Joanne Samuelson, B.S.

Medical Laboratory Assistant Program

Ruth Brown, B.S.
 Elizabeth Lundgren, B.S.

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. This course aims to provide both a strong foundation in basic sciences and practical experience in the clinical laboratory.

A medical technologist is trained in the performance of various diagnostic procedures used by physicians. The work includes hematology, urinalysis, bacteriology, serology, electrocardiography, basal metabolism, parasitology, blood 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 pre-professional work of this course of study are the same as those for admission to the College of Science, Literature, and the Arts. For complete information consult the *Bulletin of General Information*. Qualified applicants, men or women, may enter at the beginning of any quarter, but the curriculum outlined is based on entrance in the fall quarter. If a student enters at any other quarter, Summer Session attendance may be necessary to make up the irregularities in the student's program.

It is recommended that prospective students take mathematics, physics, chemistry, and biology in high school.

Admission with Advanced Standing—After 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 a month or more before 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 credit but having course deficiencies should consult with advisers in the Medical Technology office regarding their status.

Students from other accredited colleges and universities may transfer to the University of Minnesota to complete the 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 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 a month 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, such as in bacteriology and chemistry by attending Summer Session classes. This would make them eligible for admission to the special 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 practical work. 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 Building, University of Minnesota, Minneapolis 14, before May 1 so that, if necessary, they may take courses during the Summer Session.

Admission as an Adult Special Student—Men and women with proper qualifications of education and experience who may want individual courses or groups of courses to meet special personal needs may be admitted as "adult special" students. In such cases credit earned as an adult special may be applicable toward a degree upon recommendation of the 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 the Administration Building before proceeding with registration at the Medical Technology office.

All students in either the preprofessional curriculum in the College of Science, Literature, and the Arts or in the 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 medical examination and necessary immunizations both before entering and after completing the senior year. This procedure is required as a protection for the student.

Residences

Information about residence halls may be obtained from the Director of University Housing, 108 Westbrook 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 the Greater University Fund. Applications should be made through Minnesota high school principals in January. There are also other scholarships and merit awards offered annually to students in recognition of outstanding achievement records.

For students needing financial assistance, loan funds have been established to help any student who is making normal progress toward an educational objective.

In addition to general University loan and scholarship funds, there are two funds especially for students in medical technology, the William A. O'Brien Scholarship Fund and the W. K. Kellogg Foundation Loan Fund.

Complete information about obtaining assistance through scholarships and loans is available from the Bureau of Student Loans and Scholarships, 201 Eddy Hall.

For students needing part-time employment to meet school expenses, the Student Employment Bureau, 153 TSF, is maintained for this purpose. It should be pointed out that each of the first 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 Science, Literature, and the 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 Science, Literature, and the Arts, and are subject to the regulations of that college. For full information about these regulations, consult the *Bulletin of the College of Science, Literature, and the Arts*.

In the last 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 Science, Literature, and the Arts. The following courses or their equivalents must be completed before admission to the junior year:

(Credits are shown in parentheses)

AnCh 57—Quantitative Analysis (4) Anat 4—Elementary Anatomy (5) Bact 53—General Bacteriology (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 InCh 4-5—General Inorganic Chemistry (10)	InCh 11—Semimicro Qualitative Analysis (4) Math Y++—Higher Algebra (5) MedT 10-11-12++—Orientation in Medical Technology (3) MedT 30-31-32++—Case Presentations (3) OrCh 61-62—Elementary Organic Chemistry (8) Phys 2-3—Introduction to Physical Sciences (6) Zool 54—Histology (5) Electives to make a total of 90 credits for 2 years' work
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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 Y or Biol 1	Biol 1 or Biol 2	Biol 2
InCh 4	InCh 5	InCh 11
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 54	Phys 2	Phys 3
MedT 30	Bact 53	Anat 4
Electives	MedT 31	MedT 32
	Electives	Electives

++ Students may be exempt from the Math Y requirement if (a) they have satisfactorily completed a course in higher algebra in high school, and if (b) the score on part B of the freshman Math Placement examination indicates a satisfactory knowledge of the principles and methods of higher algebra. It is recommended that students not possessing the exemption qualifications plan to enroll in Math Y for fall quarter of the freshman year. Students who qualify for exemption from the Math Y requirement may elect to start the biology sequence in the fall or winter quarter.

†† Students who transfer into the medical technology program after the freshman year are exempt from the MedT 10, 11, and 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, and 32 requirements.

Junior Year—The following courses must be completed before assignment to the senior year of hospital training can be made.

(Credits are shown in parentheses)

Anat 165—Hematology (4)	MedT 61—Introductory Clinical Hematology (2)
Bact 102—Medical Bacteriology (4)	MedT 62—Introduction to Clinical Chemistry (3)
Bact 116—Immunology (4)	Phsl 60—Human Physiology (6)
MedT 51-52—Introduction to Medicine and Pathology (4)	PhCh 100-101—Physiological Chemistry (14)
MedT 60—Blood Group Serology (2)	Zool 51—Introductory Animal Parasitology (5)

The following program arrangement is suggested:

THIRD YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Anat 165	Bact 116	MedT 52
PhCh 100	PhCh 101	MedT 60
Zool 51	Phsl 60	MedT 61
	MedT 51	MedT 62
		Bact 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)

Clinical laboratory training in the laboratories of the University of Minnesota Hospitals includes the following courses in medical technology:

(Credits are shown in parentheses)

70A—Clinical Chemistry (10)—10 weeks	80A—Clinical Microbiology (7)—8 weeks
70B—Advanced Clinical Chemistry (6)—6 weeks	80B—Special Clinical Microbiology (3)—3 weeks
73—Electrocardiography and Basal Metabolism Testing (2)—2 weeks	82—Clinical Immunology (5)—5 weeks
75A—Clinical Hematology (6)—6 weeks	85—Histologic Techniques (3)—3 weeks
75B—Advanced Clinical Hematology (4)—4 weeks	90—Applied Laboratory Methods (2)—5 weeks

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 includes 6 months in residence on the campus in day classes and 6 months in clinical experience in laboratories of participating hospitals in Minnesota.

Fees—For the first 6 months on campus, tuition and incidental fees are \$280. No tuition is charged for the last 6 months in training. (University fees are subject to modification without notice.)

Certification—Upon satisfactory completion of all class work, hospital training, and comprehensive examinations, a certificate of completion is awarded by the General Extension Division of the University of Minnesota. The student upon satisfactory completion of the course is also eligible for certification by the Minnesota Society of Clinical Pathologists and the Minnesota 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, C-205 Mayo Memorial, University of Minnesota, Minneapolis 14.

C. Master of Science Program with Major in Medical Technology

The purpose of this program is to provide the opportunity for advanced study at a graduate level to prepare medical technologists for positions in educational programs in medical technology and supervisory positions in clinical laboratories.

The course is organized with emphasis on advanced study in one or more of the basic sciences pertinent to the practice of medical technology together with development of skills in guidance of learning and administrative practices.

Admission requirements for this program include certification as MT (ASCP) or eligibility for such certification and a Bachelor's degree from an accredited institution with sufficient scholarly attainment in chemistry and biological sciences to justify graduate work in these areas. Previous experience in a clinical laboratory is desirable.

Major and Minor Work—In choosing a field for major or minor work, the candidate must present the minimum undergraduate preparation prescribed in the departmental statements. He must complete in the Graduate School a minimum of 18 quarter credits in the major department and 9 in the minor with a grade not lower than B in any course offered as fulfilling the requirements in the major, and a grade not lower than C in minor courses. No graduate credit is allowed for course work of D quality. All requirements for the Master's degree under Plan A must be completed within 6 years.

Language Requirement—Reading knowledge of a foreign language, the language to be determined by the major department, is required of candidates for the Master's degree. This requirement is not a determinant for admission, but certification of proficiency in the designated language must be submitted before the candidate may be admitted to the written or oral examinations required for this degree.

Master's Thesis—The thesis should be on a topic falling within the field of a basic science in medical technology. The candidate will ordinarily devote approximately half of his time to the preparation of the thesis, including courses on which the thesis is based. The thesis must be written in acceptable English, show ability to work independently, and give evidence of power of independent thought both in perceiving problems and making satisfactory progress toward their solution. Familiarity with the bibliography of the special field and correct citation of authorities are expected.

Examinations—All candidates for the Master's degree will meet the regular requirements as to examinations, reports, etc., of the classes in which they are registered.

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.

Complete detailed information with respect to the structure and rules of the Graduate School, the programs of study, and a list of courses offered 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 14. Applications should be sent to 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 any graduate work that may have been taken.

DESCRIPTION OF COURSES

Other courses which are equivalent or more comprehensive may be substituted for the required courses. The quarterly *Class Schedule* issued at the time of registration should be consulted for class hours and any special fees.

Medical Technology (MedT)

All courses numbered 50 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. (3 cr; prereq fr only)
- 30-31-32. Case Presentations.** Demonstrations and discussion of clinical laboratory techniques in relation to diagnosis and treatment of disease. (3 cr; prereq soph only)
- 51-52. Introduction to Medicine and Pathology.** Relation and use of clinical laboratory methods in clinical medicine. Introduction to clinical pathology. (4 cr)
- 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. (2 cr)
- 62. Introduction to Clinical Chemistry.** Introduction to fundamental principles of laboratory procedures in clinical chemistry. (3 cr)
- 70A. Clinical Chemistry.** Basic methods and techniques used in clinical chemistry and urinalysis. (10 cr)
- 70B. Advanced Clinical Chemistry.** Laboratory methods and additional experience in special procedures used in clinical chemistry. (6 cr)
- 73. Electrocardiography and Basal Metabolism Testing.** Principles and practice in the use of electrocardiographs and metabolors. (2 cr)
- 75A. Clinical Hematology.** Application and use of laboratory methods in hematology. Morphology of blood cells. (6 cr)
- 75B. Advanced Clinical Hematology.** Special projects and techniques in hematology. (4 cr)
- 80A. Clinical Microbiology.** Identification of bacteria by microbiologic techniques. Correlation with clinical cases. (7 cr)
- 80B. Special Clinical Microbiology.** Practice in serological methods, identification of parasites and fungi. (3 cr)
- 82. Clinical Immunology.** Application of technical methods in procurement of blood and in blood grouping and cross matching for transfusions. (5 cr)
- 85. Histologic Techniques.** Preparation of tissue specimens for microscopic study. (3 cr)
- 90. Applied Laboratory Methods.** Review of laboratory methods with independent work including night duty. Orientation in related hospital practices. Term paper required. (2 cr)
- 110-111. Advanced Clinical Laboratory Techniques.** Assignment on individual basis for observation, study, and practice in special problems; techniques and methodology in 1 or 2 of the units of the Clinical Laboratories (bacteriology, chemistry, hematology, histology, or immunology). (10 cr)
- 120. Seminar in 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. (6 cr)
- 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. (6 cr)
- 145. Development of Medical Technology.** Current problems. (1 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 Zool 3)
- Anat 165. Hematology.** Blood and blood forming organs; emphasis on blood and bone marrow from standpoint of diagnosis and prognosis. (4 cr; prereq Zool 54)

Bacteriology

- Bact 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 4 cr in biological sciences)
- Bact 102. Medical Bacteriology.** Pathogenic bacteria, especially in their relationship to disease; principles of infection and immunity; microbiological techniques for laboratory diagnosis and antibiotic determination. (4 cr; prereq 116)
- Bact 116. Immunology.** Interactions between host and parasite; serologic procedures; hemolysis; antigen and antibody; opsonins, serums, vaccines, toxin, antitoxin, complement fixation; neutralization, precipitative and agglutinative reactions, blood grouping, atopy, anaphylaxis. (4 cr; prereq 53)

Chemistry

- InCh 4-5. General Inorganic Chemistry.** Introduction to chemistry from the standpoint of atomic structure; periodic properties of the elements and compounds derivable from structural considerations; laws governing the behavior of matter, theories of solution, acids, bases, and equilibrium. (10 cr)
- InCh 11. Semimicro Qualitative Analysis.** Laboratory work in systematic qualitative analysis of the cations with lectures on solutions, ionization, chemical and physical equilibria, oxidation and reduction, etc. (4 cr; prereq InCh 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 InCh 11)
- 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. Students absent the first day will lose their place in class. (12 cr; prereq assignment to Category 1, 1A or 2; see note above)

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. Students absent the first day will lose their place in class. (12 cr; prereq assignment to Category 1, 1A, 2 or 3; see note above)

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; prereq assignment to Category 1, 1A, 2 or 3; see note above)

Mathematics

Math Y. Higher Algebra. Essentially the equivalent of the second year of high school algebra. Included are factoring, fractions, linear equations and systems in one or more unknowns, determinants of order 2 and 3, graphing, exponents, radicals, ratio, proportion, variation, quadratic equations. (3 or 5 cr; prereq 1 yr elementary algebra)

Physics

Phys 2-3. Introduction to Physical Science. Demonstration lectures on the principles of physics and the physical phenomena underlying these principles. (6 cr; prereq high school algebra and plane geometry)

Physiological Chemistry

PhCh 100-101. Physiological Chemistry. (14 cr; prereq organic chemistry and physics)

Physiology

Phsl 60. Human Physiology. Lectures, conferences, and laboratory. (6 cr; prereq courses in physiological chemistry and human or mammalian anatomy)

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 51. Introductory Animal Parasitology. Parasitic protozoa, worms, and arthropods, and their relation to diseases of man and animals. (5 cr; prereq Biol 2)

Zool 54. Histology. Microscopic structure of the tissues and organs. (5 cr; prereq Biol 2)

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College of Pharmacy

1961-1963



The principles and processes of pharmacy include the production of pharmaceuticals.

Bulletin

of the UNIVERSITY of MINNESOTA

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable Charles W. Mayo, M.D., Rochester, Second Vice President; The Honorable James F. Bell, Minneapolis; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Robert E. Hess, White Bear Lake; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable A. J. Olson, Renville; and The Honorable Herman F. Skyberg, Fisher.

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Malcolm M. Willey, Ph.D., L.H.D., LL.D., Vice President, Academic Administration
Laurence R. Lunden, B.A., LL.D., Vice President, Business Administration
Stanley J. Wenberg, M.A., Vice President and Administrative Assistant
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
_____, Professor and Head, Department of Pharmacognosy
Robert H. Miller, Ph.D., Associate Professor of Pharmaceutical Technology
Herbert Jonas, Ph.D., Assistant Professor of Pharmacognosy
Philip S. Portoghese, M.S., Assistant Professor of Pharmaceutical Chemistry
Edward G. Rippie, Ph.D., Assistant Professor of Pharmaceutical Technology

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 course 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, 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 scholar-

ship 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, 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 Science, Literature, and the 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 and enter here upon the professional pharmaceutical work in the College of Pharmacy should arrange their programs so as to include all subjects in the prepharmacy year.

The pharmacy curriculum consists of 237 to 239 credit hours of work in professional, scientific, and pharmacy administrative courses (most of it required) of which approximately 50 per cent is laboratory instruction. This must be preceded by the required credits of the prepharmacy year.

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*. For course fees, see *Class Schedule* issued at registration.

Admission of High School Graduates

Evidence of high school graduation or its equivalent is required for admission to the prepharmacy course in the College of Science, Literature, and the Arts. For details concerning the requirements for admission, consult the *Bulletin of General Information*.

Admission by Examination

Students who do not meet the requirements for admission by certificate may qualify for admission on the basis of entrance tests as described in the *Bulletin of General Information*.

Admission to the Professional Work of the College of Pharmacy

Students interested in entering the professional college at the beginning of any fall quarter should apply for admission as soon as possible after completion of the required work of the prepharmacy year, and preferably not later than August 1. Applications should be accompanied by an official transcript of the student's record. These applications will be reviewed and all applicants will be notified, 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 course deficiencies during a Summer Session should proceed as indicated above, being sure to supply information on (a) deficient subjects to be removed; (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 of the first year in pharmacy.

Prepharmacy and other University of Minnesota students desiring to transfer to the College of Pharmacy should make application at 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 4 years of work as set forth in the curriculum. The comprehensive examination will be given during the spring quarter final examination period.

A student who has met all other requirements for graduation but has failed in the comprehensive examination is eligible for re-examination during the week immediately preceding any subsequent 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 as an apprentice 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 apprenticeship began; (b) within 30 days after termination of apprenticeship, an affidavit by his pharmacist preceptor showing the date on which apprenticeship began and ended, this regardless of the length of time employed; and (c) a progress report covering period of apprenticeship 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 as an apprentice 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, 3965 Minnehaha Avenue South, Minneapolis 6.

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 fol-

lowing descriptions. The faculty of the College of Pharmacy will award scholarships only to students who apply unless otherwise specified. 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*.

Two **American Foundation for Pharmaceutical Education Scholarships** (\$200) are awarded to junior and senior students.

One **Bertha D. McWilliams Memorial Scholarship** (\$100) is awarded to a student in the College of Pharmacy with preference to a woman student.

Two **C. Earl Dougherty Memorial Scholarships** (\$250), sponsored by the Mando Photo Company, are awarded to students in the final 3 years of the curriculum of the College of Pharmacy.

One **Cecil A. Krelitz Memorial Scholarship** (\$250) is awarded 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 to a student from the Iron Range with preference to students in pharmacy.

One **Dolores and Lawrence M. B. Atkinson Scholarship** (\$300) is awarded to a student in the prepharmacy year at the University of Minnesota with preference to graduates of Bloomington High School.

One **Doris and Ted Maier Scholarship** (\$300) is awarded to a student in the prepharmacy year or the first 2 professional years of the pharmacy curriculum with preference to residents of Winona or vicinity.

One **Gray's Drug Stores Pharmacy Scholarship** (\$250) is awarded to a student in the prepharmacy year or the first 2 professional years of the pharmacy curriculum with preference to students who have demonstrated interest in the practice of retail pharmacy.

One or more **Kitty and Floyd Alcott Scholarships** (up to \$250) are awarded to students enrolled for the pharmacy curriculum, including prepharmacy work, with preference to graduates of Hopkins High School.

Twelve **Samuel W. Melendy Scholarships** (\$225) are awarded to students in the College of Pharmacy. Not more than 4 scholarships are awarded to students in any 1 of the 4 professional years.

One or more **Minnesota Rexall Pharmacists Scholarships** (\$300) are awarded 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 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 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 to women students enrolled in any or the last 3 years of the pharmacy curriculum.

Two **Nelson-Forchay Pharmacy Intern Scholarships** (\$300) are awarded to students in the College of Pharmacy who have been nominated by pharmacists in the Twin Cities area who have been serving as preceptors of the nominees' apprenticeship training.

One **Northwestern Drug Company Scholarship** (\$400) is awarded to a student in the first professional year or to a student in an upper class of the College who held the scholarship during the preceding year.

Two **Snyder's Drug Stores, Inc., Scholarships** (\$250) are awarded 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 to students enrolled for the prepharmacy year at the University of Minnesota.

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
- Rowell Laboratories Incorporated Fellowship (PhmC)
- Samuel W. Melendy Memorial Fellowships
- The Upjohn Company Fellowship in Pharmaceutical Sciences

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 5, D.C.

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.

Kappa Epsilon Prize—The Alumnae Chapter of Kappa Epsilon, national women's pharmacy fraternity, offers the interest on \$425 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.

Lehn and Fink Gold Medal—Lehn and Fink Products Corporation, of New York City, awards annually a gold medal to that student in the College of Pharmacy who graduates with the degree B.S. in Pharm. and who has earned the highest general average rating during the 4 years of professional study.

Merck Award—Merck and Company, Inc., manufacturing chemists of Rahway, New Jersey, offers annually the Merck Award to 2 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 14. Official transcripts for advanced standing will be evaluated by the Office of Admissions and Records only when accompanied by a completed Application for Admission form. All other inquiries should be addressed to Office of the Dean, College of Pharmacy, University of Minnesota, Minneapolis 14.

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 Science, Literature, and the 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)	OrCh 61, 62—Elementary Organic Chemistry
Phys 1, 2, 3—Introduction to Physical Science	Econ 1, 2—Principles of Economics
Phys 1A, 2A, 3A—Introduction to Physical Science Laboratory	BA 24, 25—Principles of Accounting
	Electives—not less than 6 credits

PREPHARMACY YEAR

(In the College of Science, Literature, and the Arts or at any accredited college)

(Credits shown in parentheses)

InCh 4, 5—General Inorganic Chemistry (5, 5)	PhmT 1A, 1B, 1C—Orientation (1, 1, 1)
InCh 11—Semimicro Qualitative Analysis (4)	Electives (6-8)
Math 10—College Algebra (5)	
Math T—Trigonometry (3)	Total Prepharmacy Year (16f, 13w, 14-16s = 43-45)
Comm 1, 2, 3*—Communication (4, 4, 4)	

FIRST YEAR

Biol 1, 2—General Biology (5, 5)	PhmT 3—Pharmaceutical Calculations (3)
Phys 1, 2, 3—Introduction to Physical Science (3, 3, 3)	PhmT 54—Fundamental Principles and Processes (4)
Phys 1A, 2A, 3A—Introduction to Physical Science Laboratory (1, 1, 1)	PhmT 64—Pharmaceutical Jurisprudence (3)
OrCh 61, 62—Elementary Organic Chemistry (4, 4)	Electives (9)
	Total First Pharmacy Year (16f, 16w, 17s =49)

* If these courses are not available, consult the dean's office for permissible substitutes.

SECOND YEAR

Bact 53—General Bacteriology (5)
 OrCh 63—Elementary Organic Chemistry (3)
 Econ 1, 2—Principles of Economics (3, 3)
 BA 24, 25—Principles of Accounting (3, 3)
 PhmC 1, 2—Inorganic Pharmaceutical Products
 (4, 4)
 PhmC 54, 55—Quantitative Pharmaceutical
 Chemistry (5, 5)

Phcg 1, 2, 3—Drug Collection and Medicinal
 Plant Study; Vegetable Drug Histology (3,
 3, 3)
 Electives (3)

Total Second Pharmacy Year (17f, 18w, 15s=50)

THIRD YEAR

PubH 50—Personal and Community Health (3)
 Phsl 60—Human Physiology (6)
 PhmT 55, 56—Pharmaceutical Preparations
 (4, 4)
 PhmC 53—Pharmaceutical Biochemistry (5)
 PhmC 161, 162, 163—Organic Medicinal
 Agents (3, 3, 3)

Phcl 55, 56, 57—Pharmacology of Official Me-
 dicinal Agents (3, 3, 3)
 Electives (6)

Total Third Pharmacy Year (15f, 16w, 15s=46)

FOURTH YEAR

PubH 75—Introduction to Environmental Sani-
 tation (3)
 BA 107A—Retail Management for Pharmacy
 Students (3)
 PhmT 58, 59, 60—Prescription Compounding
 (6, 5, 5)
 PhmT 70—First Aid (2)
 PhmT 71—Pharmaceutical Specialties (3)
 Phcg 59—Biological Products (3)

Phcl 101, 105, 106—Introduction to Pharma-
 cology (2, 6, 2)
 Specialization courses (3, 3, 3)

Total Fourth Pharmacy Year (16f, 17w, 16s =
 49)

Grand Total Including Prepharmacy Year = 237-
 239

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. PCh 107-108 (6 cr); and OrCh 64 (3 cr)
2. PhmC 164-165-166 (9 cr)
3. PCh 101, 102, 103 (12 cr)

Pharmacy (retail, hospital, manufacturing)

4. PhmT 165, 68, 69 (9 cr)
5. PhmT 165, 166-167 (9 cr)

Biology (with a view to graduate work, retail and manufacturing pharmacy)

6. PhmT 72 (3 cr); Phcl 162 (3 cr); and Phcg 164 (3 cr)
7. Phcg 60-61, 164 (9 cr)
8. Phcl 109 (3 cr), 162 (3 cr); and ITM 90

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. Require-

ments 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 (6)	BA 51—Business Statistics A (3)
BA 28—Business Law (3)	BA 56—Corporation Finance (3)
BA 24, 25, 26—Principles of Accounting (9)	BA 107C—Retail Management II (3)
BA 5—Elements of Statistics (4)	Econ 66—Intermediate Economic Analysis: In-
BA 57—Principles of Marketing (3)	come and Employment (3)
Econ 68—Elements of Public Finance (3)	Econ 65—Intermediate Economic Analysis: The
BA 50—Production Management (3)	Firm (3)
Jour 18—Principles of Advertising (3)	Econ 67—Money and Banking (3)
BA 107A—Retail Management for Pharmacy	BA 187—Price Policy (3)
Students (3)	BA 97—Market Analysis and Research I (3)
BA 53—Insurance Principles (3)	
BA 55C—Managerial Costs (3)	Total Business Administration Courses—(70)
BA 52—Modern Industrial Relations: Labor	
Marketing (3)	

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 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 ‡.

The courses PhmT 173, PhmC 173, Phcg 173, and Phcl 109 are offered only to high ability third- and fourth-year students. Credits earned in these courses may not be used to satisfy requirements in the required, elective, or specialization courses of the curriculum.

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

Robert H. Miller, Ph.D.

Assistant Professor

Edward G. Rippie, Ph.D.

Chief Pharmacist

Marie L. Perreault, B.S.

Special Lecturer

Richard H. Bachelder, LL.B.

Student Pharmacist Supervisor

Lyle Becker, Phm.C.
Ruth Livingston, B.S.
James L. Olsen, B.S.

- 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. (3 cr; 3 lect hrs per wk)
- 54. Fundamental Principles and Processes.** Physicochemical aspects of pharmaceutical technology. (4 cr; prereq Phys 2, PhmT 3, OrCh 62; 2 lect and 6 lab hrs per wk)
- 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.** (5 cr for 58, 6 cr for 59, 5 cr for 60; prereq sr, PhmC 55, 163, Phcl 57, PhmT 56; 3 lect and 6 lab hrs per wk [w,s], 4 lect and 6 lab hrs per wk [f])
- 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; 3 lect hrs per wk)
- 68-69. Introduction to Hospital Pharmacy.** Training for hospital pharmacy: stock control, records, manufacture of pharmaceutical preparations, prescriptions, and parenteral solutions. (Specialization course) (3 cr per qtr; regis limited; prereq sr, 56, PhmC 163; 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 sr; 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.** Chemical, pharmaceutical, and pharmacological study of agents and preparations used in the prevention and treatment of disease in domestic animals and poultry. (Specialization course) (3 cr; prereq sr; 3 lect hrs per wk)
165. **Cosmetics and Dermatological Preparations.** Pharmaceutical aspects of cosmetics and dermatological preparations. (3 cr; prereq 56; 2 lect and 3 lab hrs per wk)
- 166-167. **Pharmaceutical Manufacturing.** Problems in the production of pharmaceutical preparations on a pilot plant scale. Formula development and product stabilization. (Specialization course) (3 cr per qtr; regis limited; prereq sr, 56; 1 lect and 6 lab hrs per wk)
173. **Special Problems in Pharmaceutical Technology.** Problems in the formulation, production, and evaluation of pharmaceutical products. (Extra credit course for high-ability students) (Cr ar; prereq 3rd- or 4th-year pharmacy student and #)

PHARMACEUTICAL CHEMISTRY (PhmC)

Professor

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

Assistant Professor

Philip S. Portoghese, M.S.

Student Pharmacist Supervisor

Alan F. Mahler, B.S.

- 1-2. **Inorganic Pharmaceutical Products.** Histories, sources, commercial manufacture, laboratory preparation, properties, and uses of inorganic chemicals. (4 cr per qtr; prereq soph, InCh 11 or equiv; 2 lect and 6 lab 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, volumetric, and oxidation-reduction methods of analyses of inorganic and organic pharmaceutical products. (5 cr per qtr; prereq soph, InCh 11, 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.** 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. (Specialization course) (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. (Extra-credit course for high ability students) (Cr ar; prereq 3rd- or 4th-year pharmacy student and #)

PHARMACOGNOSY (Phcg)

Professor

_____, *head*

Gardener

Harvey H. Harrington

Assistant Professor

Herbert Jonas, Ph.D.

1. **Drug Collection and Medicinal Plant Study.** Cultivation of medicinal plants in the University of Minnesota medicinal plant garden, and the preparation of crude drugs from them. Gross morphological characteristics required for identification. Physiological aspects of biogenesis of medicinal principles. (3 cr; prereq soph, Biol 2; 2 lect and 3 lab hrs per wk)
- 2-3. **Vegetable Drug Histology.** Microscopic characteristics of vegetable drugs used to identify them and detect adulteration; function and nature of plant parts furnishing vegetable drugs. (3 cr per qtr; prereq soph, 1; 2 lect and 3 lab hrs per wk)
59. **Biological Products.** Preparation, standardization, medicinal, and pharmaceutical properties of important biological preparations such as modified virus and bacterial vaccines, antitoxins, immune serums, toxoids, tuberculins, normal serums, blood plasma, diagnostic biological reagents. (3 cr; prereq sr, Bact 53; 3 lect hrs per wk)
- 60-61. **Pharmacognosy and Pharmaco-Histology.** The microscopic appearance, structure, and function of drug tissues, cells, and cell contents, by means of which the identity and purity of vegetable drugs are determined. Use of the micropolariscope, microtome, and microphotographic camera. (Specialization course) (3 cr per qtr; regis limited; prereq sr, 3; 1 lect and 6 lab hrs per wk)
164. **Insecticides, Fungicides, and Herbicides.** Insecticides (and rhodenticides), fungicides, and herbicides of natural and synthetic origins. Their application in cultivation of plants, storage of food and drug products, general prevention of insect infestation, etc. (3 cr; prereq Phel 56, PhmC 53, or ‡)
173. **Special Problems in Pharmacognosy.** Problems dealing with the botany, biochemistry, and physiology of medicinal plants, including their processing and utilization. (Extra-credit course for high ability students) (Cr ar; prereq 3rd- or 4th-year pharmacy student and ‡)

PHARMACOLOGY (Phcl)

Professor

Wallace F. White, Ph.D.

- 55-56-57. **Pharmacology of Official Medicinal Agents.** An introduction to the pharmacology of official drug products with emphasis on posology, biological control, therapeutics, and other topics of particular importance to the dispensing pharmacist. (3 cr per qtr; prereq jr, Phcg 3, Bact 53; 3 lect hrs per wk)
162. **Biological Assay of Drugs.** Quantitative biological control procedures with an introduction to biostatistics. (Specialization course) (3 cr; prereq sr, grad, 57; 1 lect and 6 lab hrs per wk)

Required Courses Offered by Other Departments

PREPHARMACY YEAR

(Credits shown in parentheses)

InCh 4, 5—General Inorganic Chemistry (10)
 InCh 11—Semimicro Qualitative Analysis (4)
 Math 10—College Algebra (5)

Math T—Trigonometry (3)
 Comm 1, 2, 3—Communication (12)
 Electives (6-8)

PROFESSIONAL YEARS

Bact 53—General Bacteriology (5)
 Biol 1, 2—General Biology (10)
 OrCh 61, 62, 63—Elementary Organic Chemistry (11)
 Econ 1, 2—Principles of Economics (6)
 BA 24, 25—Principles of Accounting (6)
 BA 107A—Retail Management (3)
 Phel 101—Introduction to Pharmacology (2)
 Phcl 105—General and Experimental Pharmacology (6)

Phcl 106—General Pharmacology (2)
 Phys 1, 2, 3—Introduction to Physical Science (9)
 Phys 1A, 2A, 3A—Introduction to Physical Science Laboratory (3)
 Phsl 60—Human Physiology (6)
 PubH 50—Personal and Community Health (3)
 PubH 75—Environmental Sanitation (3)

*Department of Physical Medicine
and Rehabilitation*

1961-1963



- Occupational Therapy
- Physical Therapy

Bulletin
of the UNIVERSITY of MINNESOTA

UNIVERSITY OF MINNESOTA

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BULLETIN OF THE UNIVERSITY OF MINNESOTA

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Department of Physical Medicine and Rehabilitation

PHYSICAL THERAPY

Physical therapy is concerned with the treatment of disease or injury by the effective properties of heat, light, water, electricity, massage, and by therapeutic exercises and rehabilitation techniques. These techniques are carried out by the physical therapist under the direction of the physician.

Because of the complexity of the equipment to be used and the exacting nature of the duties to be performed, it is essential for the therapist to be well grounded in the fundamental sciences of anatomy, physiology, pathology, physics, and psychiatry.

Qualifications for a career in physical therapy are much the same as those for any other profession in the field of medicine. The essentials are good health, tact, emotional stability, personal integrity, and an interest in science and the medical field.

Employment opportunities in this field are extremely varied and almost unlimited. It is the purpose of the programs described in this bulletin to prepare well-trained physical therapists to take their place in the wide field of medicine and perform their duties intelligently and efficiently to the benefit of the patient.

The University of Minnesota offers a 4-year curriculum leading to a bachelor of science degree in physical therapy. Graduates are eligible for registration with the American Registry of Physical Therapists. They are also eligible to join the American Physical Therapy Association, the national professional organization.

Admission Requirements

Applicants for admission to the freshman or sophomore year of the Course in Physical Therapy must meet the requirements of the College of Science, Literature, and the Arts. It is recommended that prospective students take physics, algebra, or geometry in high school. (See *Bulletin of General Information* for specific requirements and procedures.) Graduates of accredited high schools may enter at the beginning of any quarter, but the curriculum as outlined is based on entrance in the fall. After completion of 2 years in the Arts College, students must apply for transfer to the Course in Physical Therapy. At this time applicants are considered for entrance to the junior class. The sequence of courses in the professional school (the last 2 years) cannot be altered and must begin in the fall. Applications are also considered from students who have completed equivalent courses at other accredited colleges and universities. Transfer students from other schools should apply for admission with advanced standing to the Office of Admissions and Records, University of Minnesota, Minneapolis 14, in accordance with the *Bulletin of General Information*.

Selection of students for the junior year will be based on scholastic standing (C+ average in the basic science courses) and upon character and personal fitness as disclosed by personal interview. Each student must pass a physical examination in the University Health Service of the University of Minnesota.

Nonresidents note section on Admission in the *Bulletin of General Information*.

Further information relating to requirements and training may be obtained from the Physical Therapy office, 860 Mayo Memorial, University of Minnesota, Minneapolis 14. Telephone Fe 9-7311, extension 2721.

General Information

College Expenses

Fees—For complete information about fees and expenses, consult the *Bulletin of General Information*.

Housing—Information about residence halls may be obtained from the Director of University Housing, 108 Wesbrook Hall. Information about private rooming houses is furnished by the Student Housing Bureau, 209 Eddy Hall.

Uniforms—During the junior year, students are expected to provide white uniforms and white duty shoes for clinical practice.

Loans and Scholarships

Information on scholarships and loans open to all University of Minnesota students is listed in the *Bulletin of General Information*. Further information may be obtained by writing the Bureau of Student Loans and Scholarships, 201 Eddy Hall. Information on local and national scholarships specific to physical and occupational therapy may be obtained through the respective offices. A limited number of 4-year scholarships is available to high school seniors. Application should be made to Department of Professional Education, The National Foundation, 800 Second Avenue, New York 17, New York.

Curriculum

To make certain that all prerequisite courses are completed on time, students should submit a tentative 2-year program for approval by the physical therapy director. Ninety quarter credits including the following courses or their equivalents must be completed before admission to the fall quarter of the junior year:

(Quarter credits are shown in parentheses)

Elementary Human Anatomy (5)	From the following social sciences (10)
Human Physiology (4-6)	Humanities
General Inorganic Chemistry (10)	History
Physics (5-6)	Sociology
General Biology (10)	Political science
General Psychology, plus 3	Philosophy
additional credits (9)	Anthropology
Freshman English (12-15)	Social Science

Registration for the freshman and sophomore years at the University of Minnesota takes place in the College of Science, Literature, and the Arts. During that period students are subject to the regulations of that college. Programs must be approved each quarter by a faculty adviser in the Department of Physical Medicine and Rehabilitation.

Although a minor is not required, electives are somewhat guided to prevent scattering. The following program is suggested in order to include courses which are offered only once a year:

(Credits are shown in parentheses)

FRESHMAN YEAR

Fall

Engl A, Engl 1A, Engl 1B
or Comm 1 (4-5)
Biol 1 (5)
Social science (3)
Elective (3)

Winter

Engl B, Engl 2A, Engl 2B
or Comm 2 (4-5)
Biol 2 (5)
Social science (3)
Elective (3)

Spring

Engl C, Engl 3A, Engl 3B
or Comm 3 (4-5)
GC 7A—Physics (5)
PMed 2A (1)
Social science (3)
Elective (3)

SOPHOMORE YEAR

Fall

InCh 4 (5)
Psy 1 (3)
PubH 50 (3)
Electives (3)

Winter

InCh 5 (5)
Psy 2 (3)
Phsl 51 (6)
Electives (3)

Spring

Anat 4 (5)
Psychology (3)
Electives (6)

JUNIOR YEAR

Fall

Anat 58 (5)
PMed 50 (2)
PMed 57 (1)
PMed 60A (6)

Winter

PMed 4 (1)
PMed 58 (2)
PMed 70 (3)
PMed 82 (3)
PMed 83 (5)

Spring

Path 60 (3)
PMed 61 (5)
PMed 63 (1)
PMed 60B (3)
PMed 80A (4)
PMed 87 (3)
PMed 97 (2)

SENIOR YEAR

Fall

NPsy 171A (2)
NPsy 171B (2)
PMed 80B (5)
PMed 85 (5)
PMed 98 (3)

Winter

PMed 64 (1)
PMed 68 (3)
PMed 80C (4)
PMed 88 (3)
PMed 91 (1)
Elective (3)

Spring

PMed 89 (18)
PMed 90 (1)

OCCUPATIONAL THERAPY

Occupational therapy is a profession which employs mental and physical activities as remedial treatment. Occupational therapists work under the direction of a physician and use arts, crafts, educational subjects, and recreation to aid the patient in his recovery. In rehabilitation, therapists are trained to assist with the activities of daily living and evaluate the patient's interests and skills in various work areas.

Occupational therapy offers unlimited opportunities for qualified therapists because the demand for them is greater than the supply. Graduates are employed in general, orthopedic, psychiatric, and children's hospitals. Schools for the blind, deaf, and exceptional children also hire therapists as do rehabilitation centers, homes for the aged, sanatoriums, and homebound services.

The University of Minnesota offers an occupational therapy curriculum of 4 years plus 3 months of clinical training during the summer after the junior year. Upon completion of the prescribed curriculum, the students receive the degree of bachelor of science in occupational therapy.

The Course in Occupational Therapy is approved by the Council on Medical Education and Hospitals of the American Medical Association, and the American Occupational Therapy Association. Graduates are eligible to become registered occupational therapists by taking the national registration examinations given by the American Occupational Therapy Association. Registered occupational therapists are urged to become members of this organization whose purpose it is to promote the use of occupational therapy, to advance standards of education and practice, to encourage research, and to engage in other activities advantageous to the profession and its members.

Admission Requirements

Applicants for admission to the freshman and sophomore years of the Course in Occupational Therapy must meet the entrance requirements of the College of Science, Literature, and the Arts. (For specific requirements and procedures see *Bulletin of General Information*.) Graduates of accredited high schools may enter at the beginning of any quarter, but the curriculum as outlined is based on entrance in the fall quarter.

At the end of the sophomore year, students having a total of 90 quarter credits, including the required courses for occupational therapy, or their equivalents, may make application for entrance into the Department of Physical Medicine and Rehabilitation, College of Medical Sciences. Students who have completed 2 years toward occupational therapy should apply for admission to the professional school by contacting the Office of Admissions and Records of the University. Students must make application and file complete transcripts with the Office of Admissions and Records before July 1 of the year in which they expect to enter the course as juniors. Selection of students will be based on scholastic standing (at least C+) and upon character and personal fitness as disclosed by personal interview. Selections will be made as early as possible and students notified promptly. Those accepted will transfer into the College of Medical Sciences, Department of Physical Medicine and Rehabilitation, Course in Occupational Therapy. Students attending institutions other than the University of Minnesota during their freshman and sophomore years must meet the same requirements for admission. Nonresidents note section on Admission in the *Bulletin of General Information*.

Each student must pass a physical examination in the University Health Service. Any student who is not physically able to do the work required of a therapist will not be accepted.

Further information relating to requirements and training may be obtained from the Occupational Therapy office, 860 Mayo Memorial, University of Minnesota, Minneapolis 14. Appointments may be made by calling Federal 9-7311, extension 2721.

General Information

College Expenses

Fees—For complete information about fees and expenses, consult the *Bulletin of General Information*.

Housing—Information about residence halls may be obtained from the Director of University Housing, 108 Wesbrook Hall. Information about private rooming houses is furnished by the Student Housing Bureau, 209 Eddy Hall.

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Curriculum

The work of the first 2 years of the Course in Occupational Therapy is taken in the College of Science, Literature, and the Arts. If the work is taken at the University of Minnesota, the courses listed for the freshman and sophomore years are required. Students who have taken the first 2 years of work at other institutions must have taken the equivalents of these courses. It is recommended that prospective students take biology, physics, chemistry, and art in high school.

The curriculum includes 9 months of clinical training in various types of hospitals or services such as psychiatric, tuberculosis, general, orthopedic, and children's hospitals, rehabilitation centers, etc. During this period students work a full day which includes treatment of patients, attendance at lectures, staff meetings, and clinics. They are under the supervision of a qualified registered occupational therapist. Maintenance is usually provided at clinical affiliation centers.

FRESHMAN YEAR

(Credits are shown in parentheses)

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engl 1A (4) (or) Engl 1B (4)	Engl 2A (4) (or) Engl 2B (4)	Engl 3A (4) (or) Engl 3B (4)
Biol 1 (5)	Biol 2 (5)	Anat 4 (5)
Art 1 (5)	Hum 22 (3)	PMed 1 (1)
PE 1 (1)	ArEd 19 (3)	Hum 23 (3)
Total (15)	Total (15)	Art 45 (3)
		Total (16)

SOPHOMORE YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
GC 7C (5)	PubH 3 (2)	Phsl 4 (4)
ArEd 53 (3)	Soc 1 (3)	PMed 5 (2)
Ind 2 (3)	Psy 2 (3)	ArEd 54 (3)
Psy 1 (3)	CD 80 (3) (or) FL 25 (3)	Ind 15 (3)
PMed 3 (2)	Ind 12 (3)	Electives (3)
Total (16)	Electives (3)	Total (15)
	Total (17)	

JUNIOR YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PMed 57 (1)	Psy 145 (3)	PMed 61 (5)
Psy 144 (3)	PMed 83 (5)	PMed 63 (1)
Anat 58 (5)	PMed 2B (1)	PMed 77 (5)
PMed 71 (2)	PMed 72 (3)	PMed 73 (3)
PMed 74 (3)	PMed 75 (3)	PMed 84 (3)
NPsy 171A-B (4)	PMed 92 (3)	Total (17)
Total (18)	Total (18)	

TENTH QUARTER

(I and II Summer Sessions)

PMed 94 (18)

SENIOR YEAR

<i>Fall or Spring</i>	<i>Winter and Fall or Spring</i>
PMed 55 (2)	PMed 95-96 (18 per qtr)
PMed 78 (3)	
PMed 76 (3)	
PMed 93 (2)	
PMed 97 (2)	
Electives (3)	
Total (15)	

DESCRIPTION OF COURSES

Physical Medicine and Rehabilitation (PMed)

1. **Introduction to Occupational Therapy.** Orientation. Films showing hospital occupational therapy programs. Tours of hospitals and rehabilitation centers. Discussion and reports following trips. (1 cr)
- 2A. **Orientation to Physical Therapy and Rehabilitation.** History and opportunities of the profession; survey of techniques; field trips to physical therapy departments. (1 cr; prereq #)
- 2B. **Orientation to Physical Therapy and Rehabilitation.** Physical therapy and rehabilitation procedures; survey of techniques and application; observation of treatment in the physical therapy clinic, University Hospitals. (1 cr for OT students)
3. **Orientation to Occupational Therapy.** Survey of the profession through lectures, films, and tours. Methods of treatment including demonstrations. Observation in clinics. (2 cr)
4. **Orientation to Occupational Therapy.** Introduction to treatment techniques and their application. Observation of treatment in occupational therapy clinics. (1 cr for PT students)
5. **Therapeutic Recreation.** Instruction in application of recreational activities for hospital and convalescent patients. (2 cr)
50. **Physics for Physical Therapy.** Mechanics, heat, light, and electricity as applied to physical medicine and rehabilitation. Lectures and laboratory demonstrations with participation by students. (2 cr)
55. **Process of Rehabilitation.** Public laws; community agencies; job opportunities and trends; rehabilitation programs relating to handicapped persons. (2 cr)
57. **Ethics and Administration.** Lectures covering appropriate conduct of therapists; orientation to the hospital; professional and related organizations. (1 cr)
58. **Bandaging, Aseptic, and Isolation Techniques.** Methods and principles of bandaging, splinting, and taping; care and wrapping of the amputee stump; medical asepsis includes preparation for and cleansing and dressing of wounds; isolation procedures for all contagious diseases. Laboratory practice of all techniques. (2 cr)
- 60A. **Theory and Technique of Thermo-, Photo-, and Hydrotherapy.** Lectures, demonstrations, student practice, and clinical applications to patients under supervision. (6 cr)
- 60B. **Theory and Technique of Electrotherapy.** Lectures, demonstrations, student practice, and clinical application to patients under supervision. (3 cr)
61. **Theory and Technique of Physical Medicine and Rehabilitation Applied to Medical Sciences.** Lectures include related fields of surgery, orthopedics, pediatrics, dermatology, medicine, neurology, and speech. (5 cr)
63. **Junior Clinic in Physical Medicine and Rehabilitation.** Correlation clinic. Presentation of hospital cases, with emphasis on therapeutic problems to be treated by occupational and physical therapists. (1 cr)
64. **Senior Clinic in Physical Medicine and Rehabilitation.** (1 cr)
68. **Applied Anatomy.** Review of joint structures, muscles, nerves, and function. Diseases and injuries causing impairment of function and deformities are reviewed and correlated to physical medicine and rehabilitation. (3 cr)

70. **Theory and Technique of Massage.** Methods of applying various types of massage, their therapeutic indications, and physiological effects. Laboratory demonstration and practice. Supervised clinical practice. (3 cr)
71. **Theory of Occupational Therapy.** The practical application of occupational therapy in the major medical fields. Professional ethics and etiquette. Organization and administration. Interdepartmental relationships. (3 cr)
72. **Theory of Occupational Therapy.** Principles of treatment for pediatrics, the tuberculous, and patients with medical and surgical conditions. (3 cr)
73. **Theory of Occupational Therapy.** Application of occupational therapy to treatment of psychiatric patients; current theories, problems, and practices. (3 cr)
- 74-75. **Techniques of Occupational Therapy.** Laboratory instruction in craft skills; adaptation of these to specific disabilities. (3 cr per qtr)
76. **Techniques of Occupational Therapy.** Laboratory instruction in the maintenance, operating procedures, and safety precautions of power woodworking equipment. (3 cr)
77. **Study of Physical Disabilities.** Techniques of treatment of patients with physical disabilities. Evaluation and training in activities of daily living. Lecture and laboratory. (5 cr)
78. **Principles and Practice of Occupational Therapy.** Experience in planning and conducting a research project with therapeutic application. (3 cr)
- 80A-B-C. **Theory and Technique of Therapeutic Exercise.** Scientific application of exercise programs for specific disabilities, including the practical application of all types of apparatus. Lectures, demonstrations, and student practice. Supervised clinical practice. (13 cr)
82. **Physiology of Muscles, Nerves, and Circulation.** Specific physiological basis for physical therapy. (3 cr)
83. **Theory and Technique of Muscle Function, Tests, and Measurements.** Review of muscles and joints in regard to anatomical and physiological function. Analysis of body mechanics and co-ordinated movement. Theory and technique of muscle testing and joint measurement. Lectures, laboratory demonstration and practice, clinical application under supervision. (5 cr)
84. **Theory and Technique of Rehabilitation Procedures.** Working knowledge of the principles used in rehabilitation of the physically handicapped, from the bed patient to ambulation. Lectures, demonstration, and practice. (3 cr)
85. **Theory and Technique of Rehabilitation Procedures.** Ambulation and all activities of daily living. Total program of treatment for specific disabilities. (5 cr)
- 87-88. **Clinical Practice.** Clinical application of techniques under supervision in the physical therapy departments of the affiliated hospitals. (3 cr per qtr)
89. **Clinical Practice.** One-quarter, full-time clinical application of techniques in the affiliated hospitals in the Twin Cities. (18 cr)
- 90-91. **Senior Conference.** Discussion of problems arising during clinical practice. (1 cr per qtr)
92. **Preliminary Hospital Practice in Occupational Therapy.** Supervised pre-clinical experience in the University Hospitals. (3 cr)
93. **Orientation to Prevocational Therapy.** Practical experience and observation in a rehabilitation center. Job analysis and development of work units as used in prevocational evaluation. Field trips. (2 cr)

-
- 94-95-96. **Clinical Training in Occupational Therapy.** A total of 9 months of supervised training in affiliated hospitals. (18 cr per qtr)
97. **Introduction to Scientific Research.** Use of source material, evaluation of literature, fundamentals of medical research, graphic presentation of data, technique of writing. (2 cr)
98. **Special Problems in Physical Therapy.** Opportunity to participate in selected research areas. (Cr ar; prereq 97)

XIV-19

DESK COPY

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OK KILL _____

Medical School

1960-1962



Mayo Memorial,
University Hospitals

Bulletin

of the UNIVERSITY of MINNESOTA

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable Charles W. Mayo, M.D., Rochester, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Robert E. Hess, White Bear Lake; The Honorable Mar'orie J. Howard (Mrs. C. Edward), Excelsior; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable A. J. Olson, Renville; The Honorable Otto A. Silha, Minneapolis; and The Honorable Herman F. Skyberg, Fisher.

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Ray M. Amberg, Ph.C., Director, University Hospitals

Volume LXIV, Number 19

October 1, 1961

BULLETIN OF THE UNIVERSITY OF MINNESOTA

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Medical School

GENERAL INFORMATION

The College of Medical Sciences is 1 of 16 colleges which comprise the University of Minnesota. Within the College of Medical Sciences are the Medical School, the School of Nursing, the School of Public Health, and the Department of Laboratory Medicine. All are housed on the Minneapolis Campus of the University in a complex of buildings which includes University Hospitals. The close physical relationship of the Medical School and its associated faculties promotes unusual opportunities for exchanges of professional and scientific information across departmental and college lines. Medical students benefit from close association with students in training in related fields; and the faculty, while primarily concerned with the teaching of medical students, participates in the instruction of students in other schools within the College of Medical Sciences.

History of the Medical School

The first classes in medicine at the University began in 1888 when 3 of the 4 private or proprietary medical schools in Minneapolis and St. Paul offered their charters and resources to the state. In accepting this offer the Regents assumed responsibility on behalf of the people of the state of Minnesota for medical education. In 1908 the remaining proprietary school was incorporated into the University Medical School; since then there have been no other schools of medicine in Minnesota.

In 1905, money for the construction of a hospital was offered to the University by the executor of a private estate. Various delays were encountered but eventually legislative approval and additional money were obtained. The Elliot Memorial Hospital, the first unit of University Hospitals, was dedicated in 1911. The act of acceptance passed by the Legislature stated that the hospital would belong to and be a part of the University, that indigent residents of Minnesota would receive free care and treatment, and that the hospital would be managed and controlled by the Regents of the University. During negotiations and construction of the Elliot Hospital, the Regents, in 1909, approved the use of a private residence near the campus for hospital use. Additional hospital and medical school buildings have been added along a similar pattern of private donation to the University with control and management by the Regents and with legislative appropriations to supplement the gifts of private donors. These include the Todd Hospital, the Cancer and Christian gifts, Eustis Hospital, Mayo Memorial, Variety Club Heart Hospital, Masonic Memorial Hospital, and Veterans of Foreign Wars Clinical Cancer Research Institute.

University Hospitals, as the clinical units are called collectively, are administered separately from the Medical School but there has always been close co-ordination of activities in patient care, medical education, and research investigation.

With the growth of the Medical School since its early years additional clinical facilities for teaching have been developed in the public and private hospitals of the Twin Cities area. There are approximately 800 beds in University Hospitals and it is here that teaching is concentrated. However, there are an additional 2,200 beds in nearby hospitals which are available to and are utilized by the Medical School. The main teaching hospitals include Minneapolis General Hospital and the

Veterans Administration Hospital in Minneapolis and Ancker Hospital and the Gillette State Hospital for Crippled Children in St. Paul. Many of the full-time staff members of these hospitals are regular faculty members of the Medical School. A number of other hospitals in the Twin Cities have affiliations with the Medical School and these include Mt. Sinai, Northwestern, Miller, and St. Joseph's. There are in excess of 5,000 hospital beds utilized for postgraduate and medical school teaching in this area.

Library facilities have not been neglected by the University in the development of the Medical School and these services are readily available to students and staff at the Walter Library, the main library building on the University campus. The bio-medical section of the University Library is housed in Diehl Hall, immediately adjacent to the Medical School and the Hospitals. The library contains extensive collections of periodical reference material as well as primary source books. A medical historical collection contains several unique items. Departmental libraries supplement the main library collections.

The Course of Study

In common with essentially all American medical schools, the University of Minnesota offers a comprehensive course of study in basic medical sciences during the first and second years of the curriculum. In the first year the student has an opportunity to study, in depth, the structure and function of the human organism by way of gross and microscopic anatomy, physiology, and physiological chemistry. Special courses acquaint the student with the structure and function of the central nervous system and with embryological development. The laboratory method of instruction is emphasized. Also, the first-year students begin their studies of the emotional, social, and psychological development of the individual.

During the second of the basic science years medical students encounter the changes which occur in the body as a result of disease processes. In bacteriology and pharmacology the student is introduced to the study of chemical and biological changes which alter or modify physiological and anatomical functions. The concept of therapeutic alterations in the body is introduced into the student's knowledge and thought about disease states. Instruction in psychological adaptation continues through the second year along with study in the broad fields of public health and preventive medicine with the result that the student enlarges his knowledge of man as a social being.

Instruction in the techniques of physical and laboratory diagnosis begins in the second year of the medical student's career when he attends clinics and meets sick people seeking relief of the symptoms of disease and discomfort. Thus, in the clinics, the student comes face to face with illness and the problems of people who have become ill. Though as yet a doctor-in-training, the second-year medical student observes and assists graduate physicians in the daily exercise of their professional skills.

Throughout these first 2 basic science years the emphasis is on broad and detailed understanding of the human being as a biological individual. Regardless of the student's ultimate choice of a general or specialized medical career, a choice he is rarely able to make before completion of medical school, sound and thorough knowledge of the basic medical sciences is required. The University of Minnesota endeavors to provide such a background for all medical students so that, regardless of choice from the extraordinarily wide fields open to him, the graduate physician will have an adequate background in the fundamentals of medical science.

Immediately following 2 academic years, or 6 academic quarters of study, the student embarks on 2 more years of clinical study, during which the focus shifts from the laboratory to the patient. Bedside instruction on hospital wards and in the clinics is now the locus of the student's experiences. It is here, under the guidance of his instructors, that the medical student begins to apply the knowl-

edge and skills he has acquired in the past years. Individual instruction, usually in small groups, replaces the lecture hall. Although there are regular lecture-demonstrations available to the student, he is encouraged to learn from the patients assigned to him and his scheduled time is so arranged that he has opportunity to do so.

Junior-Senior Biennium

In June, immediately following completion of the second academic year of the Medical School curriculum, the third-year student enters clinical studies on the hospital wards. Students may be assigned to the University Hospitals or to any of the major associated hospitals such as Ancker, Minneapolis General, or Veterans. On these assignments the student participates in the evaluation of patients both as an exercise in learning and as a member of the clinical team engaged in the treatment of patients.

The 2-year period is divided into 8 academic quarters of approximately 3 months each, co-ordinated with the all-University quarter schedule. Six of the 8 quarters are required assignments to clinical services with a standard clinical curriculum but the student is asked to register his choice of sequence of clerkships; 1 quarter is a free period, and 1 quarter is set aside as an elective period. Both free and elective quarters may be arranged at any time during the biennium. The student is assigned to internal medicine during 1 quarter, to a surgical service in another quarter. During one 6-month period the student rotates through a sequence which includes pediatrics, obstetrics and gynecology, and psychiatry and neurology. Nine weeks are spent on each service of these three services. Finally, the student reports for a 2-quarter or 6-month assignment to the Comprehensive Clinic Program. Except in unusual circumstances, the student will have completed all other clinical services before the Comprehensive Clinic assignment. Free time and the elective period may be chosen at the student's discretion, either before or after the Comprehensive Clinic assignment.

Didactic or lecture room instruction has been reduced to a minimum in the junior-senior biennium. A single afternoon lecture hour for third- and fourth-year classes together provides an opportunity for systematic discussion of clinical topics and the application of basic science subjects as they pertain to clinical matter.

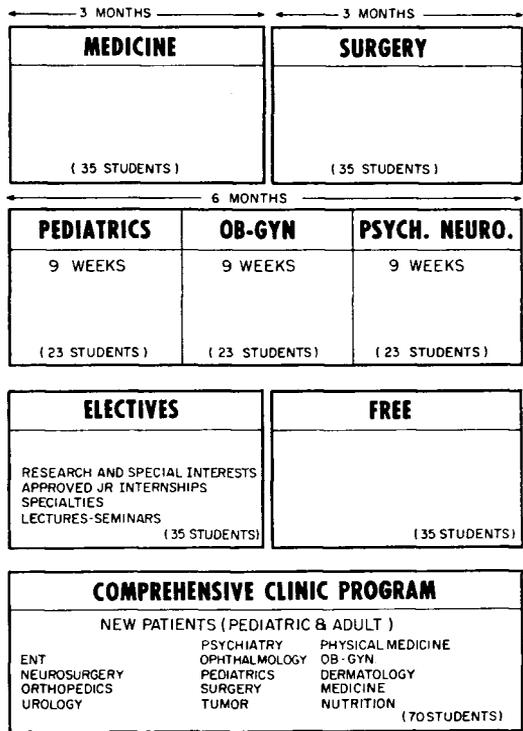
1960-1961

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Summer	Phys Med	Ob-Gyn			
Fall	Dermatol	Ob-Gyn			
Winter	Dermatol	Ob-Gyn			
Spring	Med Econ	Psychiatry				Pub Health

1961-1962

Summer	Anesthes				Neurology
Fall	Radiology					Neurology
Winter	Radiology					Neurology
Spring					Neurology

Diagram of Junior-Senior Biennium in one of several possible variations



Comprehensive Clinic Program

Under the direction of Dr. Richard Magraw, assistant dean and director of the Comprehensive Clinic Program, the medical student reaches the culmination of his experience in the care and treatment of patients. For 6 months, 2 consecutive academic quarters, the student's major assignment and responsibility is to organize and actively participate in the complete medical care of patients referred to University Hospitals. The student's role approaches that of an intern in many respects.

Ambulatory patients are assigned to students as they enter the hospital outpatient clinic department. In consultation with the supervisory staff the student plans the diagnostic procedures and treatment of each of his patients for as long as the patient is in attendance at the clinic or is admitted to the hospital. In some instances patients admitted for special diagnostic or treatment procedures are followed by the student throughout the period of hospitalization.

The student-doctor is the patient's clinic-doctor and arranges for return of the patient to the referring physician or agency. Staff and faculty operate as consultants to the student-doctor and his assigned patients. The essential difference between this system and the usual hospital clinic system is that the student-doctor is an active participant with clearly defined responsibility in a doctor-patient relationship rather than an on-looker watching over the shoulder of a staff physician.

In addition, during the comprehensive clinic assignment students work for 3-week periods in specialty clinics where they have an opportunity to acquire further knowledge of medical specialties. These supplementary assignments are arranged so that there is minimum interference with the primary assignment of clinic-doctor.

The junior-senior biennium has been designed to give maximum flexibility to the student in his daily work and at the same time give an opportunity for inclusive didactic instruction in all of the branches of clinical medicine.

In the spring of each year, examinations are given over the lecture material of the afternoon lecture hour. Currently the fourth-year students are required to write Part II of the National Board Examinations as a requirement for graduation.

Admission

Academic Requirements

Admission to the Medical School is based on individual qualifications, the most important of which are apparent aptitude for medical training and potential or proven intellectual ability. Race, sex, color, national origin, and foreign citizenship are not, in themselves, factors in determining eligibility for admission. Residents of Minnesota have certain financial advantages in that they pay lower tuition fees and are eligible for some scholarships limited to students of a certain geographical area. However, nonresident students may apply for admission providing they meet the other requirements of the School.

The Medical College Admission Test is required of all applicants.

The School recommends and encourages students to complete a 4-year program and obtain a Bachelor's degree before entering the Medical School. The equivalent of 3 academic years of college course work must be completed before matriculation. In credit hours this is 135 quarter credits or 90 semester hours of college credit. In addition to preparation in physical and biological sciences, the student should prepare himself in liberal arts courses including English, history, social sciences, and literature, and the outline presented should be recognized as suggesting minimum requirements only. The medical graduate has an increasing responsibility to understand and deal with the social and cultural forces of his environment. Scientific training and background alone are not sufficient to meet this need and studies in the general field of humanities are required.

MINIMUM REQUIREMENTS

	Approximate Semester Hours	Approximate Quarter Hours
Biology	8	13
General biology (or zoology) and genetics are required		
Chemistry	20	30
Inorganic, quantitative, organic, and physical chemistry (qualitative analysis if recommended by the college)		
English and Literature	8	12
Mathematics	7	10
College algebra and trigonometry are essential; introductory calculus is strongly recommended		
Physics	8	12
Should cover mechanics, heat, electricity, sound, and light, with laboratory; college algebra and trigonometry must be prerequisite		
Social Sciences	18	27
Introductory psychology is required; other liberal arts courses such as history, sociology, economics, philosophy or a modern language may be used to meet this requirement		
	69	104

The student will add to the required credit hours, indicated in various ways depending on his own special interests, the requirements of his college and the counsel of his college adviser. Students applying for a combined medical-graduate degree program or considering a career in academic medicine should proceed beyond the required preparatory courses in the sciences.

Medical School representatives are available and will be pleased to discuss pre-medical programs with college students, teachers, and advisers, either in person or through correspondence.

Other Admission Requirements and Procedure for Application

Application forms with detailed instructions for completing the forms may be obtained from the Office of Admissions and Records, University of Minnesota, Minneapolis 14. These forms are available in the spring of the year before the student plans to enter the Medical School; they should not be completed and forwarded to the University before May 15, but must be received before October 1. Since all first-year students begin the 4-year course of medical study in September, the application is made a little more than a year before matriculation. In most instances the student will not have completed his undergraduate studies at the time of application. Two official copies of all college transcripts are required as part of the application. Additional official records of completed courses are to be forwarded as soon as the student's grades are available. Provisional acceptance may be granted depending on satisfactory completion of required courses or other college work in process at the time of application. The applicant may be asked to indicate his plans for completion of additional courses. Nonresidents of Minnesota are asked to pay a fee of \$5 for evaluation of college credentials. This should be forwarded with the application.

Applicants are asked to submit a report of their health status and personal medical history. This is to be completed and forwarded directly by an officer of the Health Service of the student's college. Where this is not possible, the student's physician should complete and forward the form. Students are also asked to supply the names of three persons, not relatives, who will be willing to supply letters of reference. It is to an applicant's advantage to select persons who can provide a knowledgeable and detailed report and to obtain the permission of the referent before submitting his name. The Medical School writes directly to the person indicated and considers the reports to be of a confidential nature.

Several testing procedures are required of all applicants to the University of Minnesota Medical School. These are standard tests of personality characteristics or of aptitude for scientific and medical study. In addition a personal interview may be necessary. With exception of the Medical College Admission Test (MCAT), the admissions office arranges for testing to be done at the student's own college *after* the application form has been returned to the Medical School. In common with the MCAT, these tests do not measure the individual's factual knowledge but instead they are designed to help the admissions committee learn more about the candidate's aptitudes and suitability for training in medicine. Since the tests do not measure the amount of factual information possessed by the student, attempts to study for them are wasted effort.

The MCAT. Premedical students must make individual arrangements for the Medical College Admissions Test which is required of all applicants. This test is given throughout the country at many colleges in May and October of each year. Those students planning to enter medical school in September 1962 should plan to take the MCAT in May or October of 1961. This test is administered by The Psychological Corporation and the results of testing are not sent to the student. There is a \$15 fee for the examination which entitles the student to have his scores sent to 3 medical schools. The student is responsible for making arrangements with the testing agency. An announcement booklet giving application deadlines,

dates of the tests, sample questions, and instructions as to where the test will be given can be obtained by writing to Medical College Admission Test, The Psychological Corporation, 304 East 45th Street, New York 17, New York.

In accordance with the acceptance procedures approved by the Association of American Medical Colleges, applicants may be notified of the decision of the admissions committee as early as December of the year before matriculation. Accepted candidates will be notified in writing in mid-January of the year they plan to enter the first-year class and candidates have a period of 2 weeks in which to indicate their intention to matriculate. A deposit of \$10, which is applied on tuition fees, is required within 2 weeks of notification to hold the student's place in his class.

Foreign Students

While there is no firm rule against the admission of students trained in other countries, it is strongly recommended that graduates of foreign colleges plan to study at an American university for at least 1 year and preferably 2 years before applying for admission to this Medical School. One or two years of study in the United States will give the foreign student some exposure to the teaching methods of this country, the language, and the general social and cultural environment. Without such acquaintance the foreign student is at a distinct disadvantage in pursuit of a medical education. The foreign student must, of course, provide satisfactory evidence that he has completed the prerequisite course of study required of all other applicants.

Transfers

Medical students wishing to transfer to the University of Minnesota from other medical schools may be accepted only from medical schools in the United States and Canada and only after completion of the first 2 years of schooling. Students must be in good standing and have the approval of the dean of the medical school which they are attending before transfer will be considered. Transfers from foreign medical schools will not be accepted. (See section on foreign students). If a student has completed the first and second years of medical school in the United States, is in good standing, and has the consent of his dean, he should arrange for discussion of the transfer with the office of the dean. In most cases the student will be asked to make formal application including transcripts of premedical credits. The psychological aptitude tests required before admission of first-year students are required of transfer students.

Research Opportunities and Graduate Study Programs

In addition to the prescribed course of study leading to the degree of doctor of medicine there are additional opportunities for qualified students to obtain the Masters and Ph.D. degrees in the medical sciences, and for medical students to conduct research work in either clinical or basic science departments. Medical School facilities are available for original investigations and for students to work with established faculty investigators as assistants and co-workers. The formally established programs are outlined here; other programs of study are arranged individually within the department in which the student's work is to be done.

Nonmedical graduate students register and enroll in the Graduate School of the University. Medical students working for a graduate degree in addition to the degree of doctor of medicine are registered in both the Medical and the Graduate Schools. The *Bulletin of the Graduate School* should be consulted for information on requirements for admission. The combined M.D.-Ph.D. program is especially planned for academically superior medical students with tentative interests in graduate study in a fundamental medical science, leading to a graduate degree (M.S. or Ph.D.) and

the M.D. degree. The combined program allows distribution of the student's time between a graduate degree program and the standard medical curriculum, thus extending the period for completion of both doctoral degrees over 6 or more years. The program emphasizes flexibility and adaptability to each student's individual requirements and research interests. Financial support is available to qualified students who spend at least half of their time in any calendar year under Graduate School registration. Stipends for the combined program (a Public Health Service Experimental Training Grant) begin at a level of \$2,800, plus dependency allowances and Graduate School tuition. Application is made through the Medical School office to the Combined Medical-Graduate Program Committee, following admission to the Medical School and acceptance for Graduate School admission in the basic medical science department of major interest.

The United States Public Health Service sponsors post-freshman research fellowships for qualified medical students who wish to interpose a full year of research and special study between any 2 years of the medical curriculum. The basic stipend is approximately \$3,000 per year plus dependency allowances.

All of the basic medical science departments conduct active and extensive study programs under the aegis of the Graduate School of the University of Minnesota, leading to the M.S. or Ph.D. degree. Research fellowships, teaching assistantships, or scholarships through United States Public Health Service training grants are available to academically qualified students in all of these fields. Further inquiry should be directed to a faculty member in the basic medical science department of the student's interest or to the appropriate departmental office.

Numerous opportunities for experience in medical research, both basic and clinical, are offered to medical students as 3-month (1-quarter) research fellowships provided from various funds granted to the Medical School and individual departments through federal agencies and voluntary health foundations. Research fellowships may be held during the full summer vacation following the freshman medical year or during the free quarter of the junior-senior biennium. Fellowships are announced in March from the Medical School office and applications are received during April in the offices of participating departments. These research fellowships are usually granted at \$300 per month for a 3-month (or 1-quarter) period.

Many medical students obtain a stimulating introductory experience in medical research through employment on an hourly or part-time basis during the academic year, or a full-time basis during vacation or free quarters. Such opportunities for employment are arranged individually with faculty members or directors of the numerous research laboratories in the University of Minnesota Medical Center, Veterans Administration Hospital, Minneapolis General Hospital, and Ancker Hospital. Students in satisfactory academic standing are encouraged to seek these opportunities to supplement their formal medical education and to augment their financial resources as needed.

The Mayo Foundation for Medical Education and Research in Rochester, Minnesota, is affiliated with the Graduate School of the University. Graduate physicians engaged in postdoctoral training and research in Rochester may receive graduate credit for their work and be awarded advanced degrees.

Approximately 450 physicians are enrolled each year in the postdoctoral or residency training programs in the clinical departments of the Medical School and its affiliated hospitals. These doctors are being trained as specialists in their various fields. The majority have qualified for registration in the Graduate School and graduate credit may be obtained for residency training.

For the practicing physician, the Department of Continuation Medical Education organizes and presents brief courses on special topics of current interest. These courses are usually presented in concentrated form over a period of less than 1 week. Medical School faculty participate with visiting lecturers in bringing recent medical advances to registrants in these courses.

Tuition and Fees

Medical School enrollment at the University of Minnesota Medical School is for 13 academic quarters and tuition is paid quarterly at the rate of \$135 per quarter for residents of Minnesota. Nonresident tuition is \$285 per quarter. An additional incidental fee of about \$20 per quarter is required of both residents and nonresidents. Students do not pay tuition during the free period of the junior-senior biennium nor are they required to pay tuition if they arrange to spend their elective period at another medical school in this country or abroad.

Books and supplies such as microscopes, stethoscope, and other necessary equipment are provided by the student and the cost is variable. Living expenses are not included; dormitory housing with or without meals is available to medical students in University-operated residence halls conveniently located near the Medical School.

Loan Funds, Scholarships, and Prizes

Financial aid to students is available to certain students in the form of regional scholarships, National Defense Loans, special loan funds, and designated prizes. With few exceptions students must be accepted for admission and be regularly enrolled to qualify for these grants. Most financial assistance is administered by the University's Bureau of Student Loans and Scholarships.

Student research fellowships are awarded for vacation or free time work within the Medical School. These fellowships are generous and enable a student to supplement income while pursuing serious medical or basic science research interests. Research fellowships have the added advantage that Medical School facilities and laboratory equipment may be utilized as well as faculty advice and counsel in designing and executing the student's investigative work. Part-time employment may be necessary for some students though the student should be aware that his studies are a full-time obligation. Limited part-time work is available in some departmental research laboratories.

The Minnesota Medical Foundation is a nonprofit organization of medical alumni, faculty, and private citizens serving the Medical School at the University of Minnesota. This foundation annually offers a substantial number of cash scholarships to medical students, based on scholastic achievement and financial need. It is also administrator of the Herman M. Johnson Memorial Emergency Loan Fund, provided by the Minnesota State Medical Association, from which medical students can obtain short-term, interest-free loans for critical needs. Other foundation services to the Medical School include awards to faculty for distinguished accomplishment in academic medicine and research; and editorial management of the *University of Minnesota Medical Bulletin*, official monthly medical journal of the Medical School, which it co-sponsors with the University of Minnesota Hospitals, the Minnesota Medical Foundation, and the Minnesota Medical Alumni Association.

DESCRIPTION OF COURSES - 12

Symbols and Explanations - 10

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

† 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.

Anatomy - 12

Arnold Lazarow, Professor and Head

Professor

J. Francis Hartmann, Ph.D.
Arnold Lazarow, M.D., Ph.D.
Charles F. Morgan, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.
Lemen J. Wells, Ph.D.

Associate Professor

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

Assistant Professor

A. Douglas Hally, M.D., Ch.B.
Carl B. Heggstad, M.D., Ph.D.
Morris Smithberg, Ph.D.

Instructor

Mary Jane Buckman, Ph.D.
Lucille J. Hoiland, M.D.

REQUIRED COURSES - 7

- 100-101.† **Gross Human Anatomy.** Dissection, including osteology. (8 cr for 100, 7 cr for 101; prereq regis Med or Grad for 100, 100 for 101)
- 103-104.† **Human Histology.** The microscopic structure, and the cytochemical and functional aspects of cells, tissues, and organs. (4 cr for 103, 4 cr for 104; prereq regis Med or Grad for 103, 103 for 104)
107. **Human Embryology.** Development of the human body. (4 cr; prereq regis Med or Grad)
111. **Neuroanatomy.** Structure and function of the nervous system including the organs of special senses. (5 cr; prereq regis Med and 103, or grad and 104, or Zool 54)

ELECTIVE COURSES

Elective courses are generally for small groups of 6 to 16 students

131. **Biological Electron Microscopy.** (Cr and hrs ar; prereq #; offered fall qtr 1961 and alt yrs)
132. **Experimental Study of the Fetus.** (Cr and hrs ar; prereq #)
149. **Experimental Neurology.** Morphology of the central nervous system as determined by experimental methods. (Cr and hrs ar; prereq #)
- 153-154-155-156.† **Advanced Anatomy.** Gross anatomy, histology, embryology, cytochemistry, hematology, neurology, or experimental morphology. (Cr and hrs ar; prereq #)
161. **Experimental Cytochemistry.** (Cr and hrs ar; prereq 103, 104, PhCh 100-101, #)

- 165-166. Hematology.** Blood and blood-forming organs; emphasis on blood and bone marrow from the standpoint of diagnosis and prognosis. (4 cr for 165, 4 cr for 166; class limited to 90; prereq 103, or Zool 54 or # for 165...165, # for 166)
- 167. Seminar in Hematology.** Discussion of literature and research. (1 cr; prereq 166)
- 190. Advanced Anatomy.** Instruction in teaching methods or supervision of student's original research or combination of both. (Cr and hrs ar; prereq regis Med and 104)
- 201-202-203-204.† Research in Anatomy**
- 205-206-207.† Anatomy Seminar**

Anesthesiology

Frederick H. Van Bergen, Professor and Head

Professor

Frederick H. Van Bergen, M.D., M.S.
Joseph J. Buckley, M.D., M.S.

Clinical Associate Professor

Ellis N. Cohen, M.D., M.S.

Assistant Professor

James H. Matthews, M.D., M.S.
Earl A. Schultz, M.D., M.S.

Instructor

Charles F. Galway, M.D.
John R. Gordon, M.D.
Arthur J. Oswald, M.D.

Clinical Instructor

Russell W. Bagley, M.D.
Charles W. Field, M.D.
Edward G. Hustad, M.D.
J. Albert Jackson, M.D.
Van S. Lawrence, M.D.
Byron D. Petersen, M.D.

REQUIRED COURSES

- 101. Principles of Anesthesia.** (1 cr; prereq regis Med)

ELECTIVE COURSES

- 169. Research.** (Cr and hrs ar; prereq regis Med)
- 181. Externship in Anesthesiology.** (Cr and hrs ar; prereq regis Med)
- 182. Externship in Anesthesiology and Respiratory Problems.** (Cr and hrs ar)
- 265. General Anesthesia**
- 266. Regional Anesthesia**
- 267. Pre- and Postanesthetic Evaluation**
- 268. Seminar in Anesthesiology**
- 269. Research in Anesthesia**

Laboratory Medicine

Gerald T. Evans, Professor and Head

Professor

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

Associate Professor

Ellis Benson, M.D.
Ruth Hovde, M.D.
Newell Ziegler, M.D., Ph.D.

Assistant Professor

Robert Bridges, M.D.
Esther Freier, M.S.
Lorraine Gonyea, M.S.

Elaine McMaster, M.S.

Verna Rausch, M.S.

Instructor

Rex Conn, M.D.
Mary Delaney, M.S.
Patricia Hanauer, B.S.
Douglas Nelson, M.D.
Ann Peterson, B.S.
Betty Ann Ruspino, B.S.
Arthur I. Sanders, B.A.
Edmond Yunis, M.D.

REQUIRED COURSES

102. **Clinical Laboratory Medicine.** Methods of laboratory examination for diagnostic purposes. (5 cr; prereq regis Med, PhCh 100, Path 101)

ELECTIVE COURSES

- 180f. **Problems in Fluid and Electrolyte Metabolism A.** (2 cr; limited to 12 jrs and srs)
 181w. **Problems in Fluid and Electrolyte Metabolism B.** (2 cr; limited to 12 jrs and srs)
 182s. **Topics in Endocrinology and Metabolic Disease.** (Cr and hrs ar; prereq regis Med)
 183f. **Topics in Immunology.** (Cr and hrs ar; prereq regis Med)
 184. **Problems in Clinical Laboratory Medicine.** (Cr and hrs ar; prereq regis Med)
 185s. **Topics in Hematology.** (Cr and hrs ar; prereq regis Med)
 235. **Advanced Clinical Laboratory Medicine**
 236. **Research on Clinical Laboratory Problems**

Medicine - 12

Cecil J. Watson, Professor and Head

Division of Internal Medicine - 10

Professor

Ivan D. Frantz, M.D.
 Frederick W. Hoffbauer, M.D., M.S.
 Wendell H. Hall, M.D., Ph.D.
 Robert B. Howard, M.D., Ph.D.
 Samuel Schwartz, M.D., Ph.D.
 Wesley W. Spink, M.D., D.Sc.
 Cecil J. Watson, M.D., Ph.D.

Clinical Professor

Thomas Lowry, M.D.

Associate Professor

James B. Carey, Jr., M.D., Ph.D.
 N L Gault, Jr., M.D.
 Paul S. Hagen, M.D., M.A.
 Byrl J. Kennedy, M.D., M.S.
 Frank M. MacDonald, M.D.
 Richard Magraw, M.D.
 Alvin L. Schultz, M.D.
 William W. Stead, M.D.
 Louis Tobian, M.D.
 Leslie Zieve, M.D., M.A.
 Horace H. Zinneman, M.D.

Clinical Associate Professor

Donald S. Amatzio, M.D.
 Karl W. Anderson, M.D., M.S.
 Reuben Berman, M.D., M.S.
 Paul Bilka, M.D.
 John J. Boehrer, M.D.
 Joseph F. Borg, M.D.
 John F. Briggs, M.D.
 E. P. K. Fenger, M.D.
 Richard J. Frey, M.D.
 Robert A. Green, M.D.
 Howard L. Horns, M.D.
 Wyman Jacobson, M.D.
 Arthur C. Kerkhof, M.D., Ph.D.
 John W. LaBree, M.D.
 Donald McCarthy, M.D.
 Harold E. Miller, M.D.

O. L. Norman Nelson, M.D.
 Herbert F. R. Plass, M.D., M.S.
 L. Raymond Scherer, M.D.
 Horatio B. Sweetser, Jr., M.D.
 A. Boyd Thomes, M.D.
 Macnider Wetherby, M.D., Ph.D.
 J. Allen Wilson, M.D., Ph.D.
 Ragnvald S. Ylvisaker, M.D., M.S.

Assistant Professor

Stanley Crosbie, M.D.
 Edmund P. Eichhorn, M.D.
 Frederick C. Goetz, M.D.
 Murray J. Murray, M.D.
 Naip Tuna, M.D.
 Yang Wang, M.D.
 C. Paul Winchell, M.D.

Clinical Assistant Professor

Rolf L. Andreasson, M.D.
 Robert D. Blomberg, M.D.
 Donald G. Bohn, M.D.
 Sumner S. Cohen, M.D.
 David M. Craig, M.D.
 James Dahl, M.D.
 Robert E. Doan, M.D.
 Abraham Falk, M.D.
 John G. Fee, M.D.
 William R. Fifer, M.D.
 Benjamin Fuller, M.D.
 Delmar R. Gillespie, M.D.
 Albert J. Greenberg, M.D.
 Mark Hanson, M.D.
 Douglas P. Head, M.D.
 Earl Hill, M.D.
 John E. Holt, M.D.
 Wayne Hoseth, M.D.
 Milton M. Hurwitz, M.D., M.S.
 Martin E. Janssen, M.D.
 Herbert W. Johnson, M.D., M.S.
 John W. Johnson, M.D.
 David Jones, M.D.
 Walter F. Larrabee, M.D.

George X. Levitt, M.D.
 Robert Erwin Lindell, M.D.
 Charles E. Lindemann, M.D.
 Russell C. Lindgren, M.D.
 Paul T. Lowry, M.D.
 James C. Mankey, M.D.
 Frank Martin, M.D.
 William Mazzitello, M.D.
 Charles N. McCloud, M.D., M.S.
 Burtis J. Mears, M.D.
 J. C. Miller, M.D.
 Johannes K. Moen, M.D.
 James C. Myhre, M.D.
 Valentine O'Malley, M.D.
 William E. Peterson, M.D.
 Fred A. Rice, M.D.
 Dean K. Rizer, M.D.
 George G. Roth, M.D.
 Alan P. Rusterhold, M.D.
 Joseph M. Ryan, M.D.
 Andrew W. Shea, M.D.
 Ben Sommers, M.D.
 Philip H. Soucheray, M.D.
 Richard Tregilgas, M.D.
 Lowell Weber, M.D.
 A. Cabot Wohlrahe, M.D.

Instructor

Arnold Adicoff, M.D.
 Carl S. Alexander, M.D.
 Graham Beaumont, M.D.
 James L. Brown, M.D.
 Thaddeus Chao, M.D.
 Richard B. Davis, M.D.
 Richard P. Doe, M.D.
 Alfred Doscherholmen, M.D.
 Alfred Eichenholz, M.D.
 Joyce L. Funke, M.D.
 A. Sigrid Gilbertsen, M.D.
 Harry Glenchur, M.D.
 Mary Goepfert, M.D.
 George B. Gordon, M.D.
 Frank Hieber, M.D.

John W. Jenne, M.D.
 Henry A. Johnsen, M.D.
 Dennis Kane, M.D.
 James P. Lillehei, M.D.
 Robert J. McCollister, M.D.
 H. Dawes Miller, M.D.
 Robert G. Rossing, M.D.
 Russell T. Schultz, M.D.

Clinical Instructor

Alfred F. Anderegg, M.D.
 Henry W. Blackburn, Jr., M.D.
 Henry S. Bloch, M.D.
 Harry B. Blumberg, M.D.
 Rene Braun, M.D.
 Robert Breitenbucher, M.D.
 Ephraim Cohan, M.D.
 Henry W. Cohen, M.D.
 Donald E. Derauf, M.D.
 Frederick Englund, M.D.
 David L. Fingerman, M.D.
 David Gold, M.D.
 William L. Hedrick, M.D.
 Kjeld O. Huseby, M.D.
 Harold A. Kaplan, M.D.
 Markle Karlen, M.D.
 Charles P. Kolars, M.D.
 Donald W. Koza, M.D.
 Dwight L. Martin, M.D.
 Winston R. Miller, M.D.
 Jack Tullius Murphy, M.D.
 William F. Nuessle, M.D.
 William A. O'Brien, M.D.
 Earl T. Opstad, M.D.
 Milton Orkin, M.D.
 David A. Randall, M.D.
 William D. Remole, M.D., M.S.
 Raymond W. Scallen, M.D.
 William M. Schulze, M.D.
 Marguerite Schwyzer, M.D.
 Donald B. Swenson, M.D.
 Francis B. Tiffany, M.D.
 Frank A. Ubel, M.D.

REQUIRED COURSES

101. **Physical Diagnosis.** Examination of the normal body; physical diagnosis in disease. Students assigned to cases. (4 cr; prereq regis Med, Anat 100, Phsl 107)
104. **Introduction to Internal Medicine.** Systematic lectures and clinics in the field of internal medicine. (2 cr; prereq 101, LMed 102)
112. **Clerkship in Internal Medicine.** Supervised study of new cases in the outpatient medical clinic. Rotation through special clinics including cardiology, gastrointestinal diseases, chest diseases, diabetes, metabolism and endocrinology, hematology, allergy, rheumatoid diseases, peripheral vascular disease, and gastroscopy. (Cr ar; prereq regis Med)

ELECTIVE COURSES

180. **Externship in Internal Medicine.** (Cr and hrs ar; prereq regis Med)
181. **Problems in Internal Medicine.** (Cr and hrs ar; prereq regis Med)
201. **Clinical Medicine**
202. **Diseases of the Cardiovascular Apparatus**
203. **Research in Medicine**
205. **Diseases of the Chest**
206. **Clinical Conference**
207. **Clinical Pathological Conference**

- 208. Clinical Radiological Conference
- 210. Infectious Disease Seminar
- 211. Electrocardiographic Conference
- 212. Pigment Metabolism
- 213. Psychosomatic Medicine

Division of Dermatology

Professor

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

Clinical Professor

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

Clinical Associate Professor

Stephen Epstein, M.D.
Robert W. Goltz, M.D.
John G. Rukavina, M.D.

Clinical Assistant Professor

Frederic T. Becker, M.D.
Isadore Fisher, M.D., M.S.
Elmer M. Rusten, M.D.

Instructor

Ramon M. Fusaro, M.D.

Clinical Instructor

Charles Balogh, M.D.
Elmer T. Ceder, M.D.
Elmer H. Hill, M.D.
Irvine M. Karon, M.D.
Sheldon Mandel, M.D.
Orville E. Ockuly, M.D., M.S.
Harold C. Ravits, M.D.
Nadine C. Smith, M.D.
James L. Tuura, M.D.
C. Gordon Vaughan, M.D.

REQUIRED COURSES

123. **Dermatology and Syphilology.** Clinical lectures on common skin diseases and syphilis; diagnosis and treatment. (2 cr; prereq 101)

ELECTIVE COURSES

182. **Externship in Dermatology.** (Cr and hrs ar; prereq regis Med)
183. **Problems in Dermatology.** (Cr and hrs ar; prereq regis Med)
225. **Clinical Dermatology**
226. **Dermatology**
227. **Histopathology of Skin**
228. **Research: Dermatology and Syphilology**

Microbiology

John Spizizen, Professor and Head

Professor

Herman C. Lichstein, D.Sc.
William F. Scherer, M.D.
John Spizizen, Ph.D.
Dennis W. Watson, Ph.D.

Associate Professor

S. Gaylen Bradley, Ph.D.
K. F. Gerhard Brand, M.D.
Leroy C. McLaren, Ph.D.
Edwin L. Schmidt, Ph.D.
Newell R. Ziegler, M.D., Ph.D.

Assistant Professor

S. Joseph Deal, Ph.D.
Sidney E. Grossberg, M.D.
Wendell H. Hall, M.D., Ph.D.
John C. Herweg, M.D.
John D. Krafchuk, M.D.

G. Albin Matson, Ph.D.
John D. Ross, Ph.D.
Robert C. Skarnes, Ph.D.
John E. Verna, Ph.D.

Instructor

Gordon T. M. Cummins, M.D.
Ronald W. Hinz, Ph.D.
James T. Prince, M.S.
Joseph W. St. Geme, M.D.
Richard E. Shope, D.V.M.
Perry E. Treadwell, Ph.D.

Research Associate

J. Johanna Clausen, Ph. D.
Philippe Daniel, M.D.
Tomas Rubio, M.D.
Henry V. Thorne, Ph.D.

REQUIRED COURSES

105-106f.w. Principles of Infectious Disease. Medical bacteriology, immunology, mycology, and virology; the infectious process. Principles and techniques enabling diagnosis, treatment, and prevention of infectious disease. (6 cr for 105, 5 cr for 106; prereq regis Med or Grad, Anat 103, PhCh 100 or 101 or AgBi 120 for 105...105 for 106) Scherer and staff

ELECTIVE COURSES

- 110w. 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 1960-61 and alt yrs) Bradley
- 111f. Advanced Laboratory.** Techniques employed in study of microbial genetics and mycology. Laboratory exercises illustrate recombination in bacteria and fungi, antibiosis, morphogenesis in bacteria and fungi, and other techniques. (3 cr; prereq 110 or 112 or #; offered 1960-61 and alt yrs) Bradley
- 112w. General Mycology.** Physiology; genetics; development; ecology; evolution; taxonomy; economic importance of the yeasts, molds, actinomycetes, and other fungi. (3 cr; prereq 53 or #; offered 1961-62 and alt yrs) Bradley
- 114f. Medical Mycology.** Pathogenic fungi and mycotic infections in man and animals; emphasis is placed on diagnostic procedures. (3 cr; prereq 102; offered 1961-62 and alt yrs) Bradley, Krafchuk, and staff
- 116w. Immunology.** Interactions between host and parasite; serologic procedures; hemolysis; antigen and antibody; opsonins, serums, vaccines, toxin, antitoxin, complement fixation, neutralization, precipitative and agglutinative reactions, blood grouping, atopy, anaphylaxis. (4 cr; prereq 53) Watson, Skarnes
- 121f. Physiology of Bacteria.** Chemical and physical structure; staining; growth; influence of environment on growth; nutrition; enzymes; metabolism. (3 cr; prereq 53, 8 cr in organic chemistry or biochemistry) Lichstein
- 122w. Physiology of Bacteria Laboratory.** Bacterial physiology and metabolic analysis techniques. (3 cr; prereq 121, or #) Lichstein
- 123s. Bacterial Metabolism.** Advanced treatment of metabolism; enzymes; biological energy; fermentation; respiration; nitrogen metabolism. (3 cr; prereq 122, biochemistry or #; offered 1961-62 and alt yrs) Lichstein
- 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 and 116 or 105 and 106) McLaren, Ross
- 152f,w,s. Special Problems.** (Cr ar; prereq #) Staff
- 153f,w,s. General Bacteriology.** Lectures, demonstrations, and laboratory exercises in morphology, physiology, taxonomy, and ecology of bacteria. Emphasis on practical application of these fundamental principles in other phases of science and industry. (3 cr; prereq 10 cr in chemistry, 4 cr in biological sciences, #) Schmidt, Deal, Verna
- 201f,w,s. Research in Microbiology**
- 202f,w,s. Diagnostic Microbiology**
- 203f,w,s. Seminar**
- 206f. Laboratory Methods, Applied Animal Cell Culture and Virology**
- 207f. Research Techniques in Virology and Animal Cell Culture**

Obstetrics and Gynecology

John L. McKelvey, Professor and Head

Professor

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

Associate Professor

Konald A. Prem, M.D., M.S.

Assistant Professor

Edgar L. Makowski, M.D.

Clinical Assistant Professor

Alex Barno, M.D.

Irving Bernstein, M.D.
 Claude J. Ehrenberg, M.D.
 Donald W. Freeman, M.D.
 John S. Gillam, M.D.
 George W. Janda, M.D.
 Leonard A. Lang, M.D.
 Mancel T. Mitchell, M.D.
 William P. Sadler, M.D.
 David I. Seibel, M.D.
 Rodney F. Sturley, M.D.

Instructor

Robert C. Goodlin, M.D.
 Robert R. Horton, M.D.

Clinical Instructor

Milton Abramson, M.D., Ph.D.
 James R. Bergquist, M.D.
 Joseph F. Bicek, M.D.
 Ray F. Cochrane, M.D.
 Joseph W. Goldsmith, M.D.
 John A. Haugen, M.D.
 Albert F. Hayes, M.D.
 Eugene M. Kasper, M.D., Ph.D.
 Harold R. Leland, M.D.
 Edward C. Maeder, M.D., Ph.D.
 Owen F. Robbins, M.D.
 Melvin B. Sinykin, M.D.
 James J. Swendson, M.D.

REQUIRED COURSES

- 120. Obstetrics.** Physiology of pregnancy, labor, and the puerperium. (5 cr per yr; prereq regis Med)
124. Introduction to Obstetrics and Gynecology. (1 cr; prereq regis Med)
135. Clinical Clerkship in Obstetrics and Gynecology. Includes clinics in obstetrics and gynecology. (Cr ar; prereq regis Med)

ELECTIVE COURSES

- 184. Externship in Obstetrics.** (Cr and hrs ar; prereq regis Med)
190. Problems in Obstetrics and Gynecology. (Cr and hrs ar; prereq regis Med)
201-202-203-204. Advanced Obstetrics and Gynecology, Part I
205-206-207-208. Advanced Obstetrics and Gynecology, Part II
209-210-211-212. Advanced Obstetrics and Gynecology, Part III
213-214-215. Staff Conference Seminar
216-217-218-219. Research
221-222-223-224. Clinical Obstetrics and Gynecology

Ophthalmology

John E. Harris, Professor and Head

Professor

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

Clinical Professor

Walter Fink, M.D.

Clinical Professor Emeritus

Erling W. Hansen, M.D.

Clinical Associate Professor

Walter L. Hoffman, M.D., M.S.
 John P. Wendland, M.D., M.S.

Assistant Professor

William L. Fowls, Ph.D.
 (Ophthalmologic Research)

Research Associate

Donald F. Clausen, Ph.D.

Clinical Assistant Professor

Frank Adair, M.D.
 Edward P. Burch, M.D.
 Llewellyn E. Christensen, M.D.

Robert R. Cooper, M.D.

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

Bourne Jerome, M.D.

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

Vernon L. Lindberg, M.D.

Malcolm A. McCannel, M.D., M.S.

Robert H. Monahan, M.D.

Karl E. Sandt, M.D.

Virgil J. Schwartz, M.D.

Howard A. Shaw, M.D.

Leander T. Simons, M.D.

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

Frederic F. Wippermann, M.D.

Instructor

Rolando L. Udasco, M.D.

Clinical Instructor

Wilfred J. Bushard, M.D.

Robert J. Fink, M.D.

Harry S. Friedman, M.D.

Joseph L. Garten, M.D.

Douglas L. Johnson, M.D.

Robert P. Koenig, M.D.

Richard O. Leavenworth, Jr., M.D.

Winston Lindberg, M.D.
John A. McNeill, M.D.
Thomas W. O'Kane, M.D.
Harry L. Plotke, M.D.

Robert E. Ricknem, M.D.
Thomas K. Rucker, M.D.
Irving Shapiro, M.D.
Donald C. Sterner, M.D.

REQUIRED COURSES

100. **Ophthalmology.** Lectures and demonstrations. (2 cr per yr; prereq regis Med)

ELECTIVE COURSES

180. **Externship in Ophthalmology.** (Cr and hrs ar; prereq regis Med)
190. **Ophthalmology Research Problems.** (Cr and hrs ar; prereq regis Med)
201. **Clinical Ophthalmology**
202. **Ocular Muscles**
204. **Surgery of the Eye**
205. **Pathology of the Eye**
207. **Neuro-Ophthalmology**
208. **Ophthalmology Research**
209. **Physiologic Optics**
211. **External Diseases and Diseases of the Anterior Segment**
214. **Radiology of the Eye, Orbit, and of the Head**
215. **Ophthalmic Surgical Principles**
217. **Pathology Conference**
220. **Basic and Applied Ophthalmology**

Otolaryngology

Lawrence R. Boies, Professor and Head

Professor

Lawrence R. Boies, M.A., M.D.
Henry B. Clark, Jr., D.D.S., M.S.

Clinical Professor

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

Associate Professor

Frank M. Lassman, Ph.D., (Audiology
and Speech)

Clinical Associate Professor

Conrad Holmberg, M.D.

Clinical Assistant Professor

Benjamin Bofenkamp, M.D.
John Glaeser, M.D.
Bradley Kusske, M.D.
Douglas R. Kusske, M.D.
Kurt Pollak, M.D.
Graham C. Smith, M.D., M.S.
George M. Tangen, M.D., M.S.
Harold S. Ulvestad, M.D.

Instructor

George E. Langsjoen, M.D.

Clinical Instructor

Ellis Ellison, M.D.
Malcolm R. Johnson, M.D.
Robert Koller, M.D.
Robert Richardson, M.D.

REQUIRED COURSES

101. **Otolaryngology.** Lectures and demonstrations. (2 cr per yr; prereq regis Med)

ELECTIVE COURSES

191. **Otolaryngology Externship.** (Cr and hrs ar; prereq regis Med)
230. **Clinical Otology**
231. **Clinical Rhinology, Laryngology**
232. **Surgery of the Ear, Nose, and Throat**

- 233. Operative Surgery of the Temporal Bone
- 234. Operative Surgery of the Nose and Throat
- 235. Roentgenology of the Head
- 236. Functional Ear Tests
- 237. Endoscopy
- 238. Pathology of the Ear, Nose, and Throat
- 239. Neurologic Lesions in the Field of Otolaryngology
- 240. Physiotherapy and Surgery of Malignant Diseases of the Ear, Nose, and Throat
- 241. Seminar in Otolaryngology
- 242. Applied Physiology in Otolaryngology
- 243. Applied Pharmacology in Otolaryngology
- 244. Speech Pathology
- 245. Allergy
- 246. Practical Audiology
- 247. Plastic Surgery of the Nose

Pathology

James R. Dawson, Jr., Professor and Head

Professor

James R. Dawson, Jr., M.D.
Robert Hebbel, M.D., Ph.D.

Clinical Professor

Jesse E. Edwards

Associate Professor

Paul H. Lober, M.D., Ph.D.
John F. Noble, M.D.
Lee W. Wattenberg, M.D.

Clinical Associate Professor

Nathaniel Lufkin, M.D., M.S.

Assistant Professor

John I. Coe, M.D.

Instructor

Donald F. Gleason, M.D.
Seymour Handler, M.D.
Erhard Haus, M.D.
Donald M. Larson, M.D.

Clinical Instructor

S. Steven Barron, M.D.
Craig Freeman, M.D.
Elery James, M.D., M.S.
Alan R. Jay, M.D.
Allen Judd, M.D.
Stanley Lofsness, M.D.
Frederick Lott, M.D.
Robert J. McClellan, M.D.
Martin Segal, M.D.
Thomas T. Semba, M.D.
Walter Subby, M.D.

REQUIRED COURSES

- 101. General Pathology. (8 cr; prereq regis Med or Grad)
- 102. Special Pathology. (8 cr; prereq 101)

ELECTIVE COURSES

- 104. Autopsies. (Cr and hrs ar; prereq 102)
- 105. Diseases of the Kidney. (3 cr; prereq 102)
- 106. Diseases of the Heart. (3 cr; prereq 102)
- 107. Pathology Slide Conference at Veterans Hospital. (1 cr; prereq 102)
- 109. Clinical Pathological Conference. (1 cr; prereq regis Med)
- 110. Seminar in Pathology. (1 cr per qtr; prereq 102)
- 111. Conference on Autopsies. (1 cr per qtr; prereq 102)
- 112. Diagnosis of Tumors. (Cr ar per qtr; prereq 102)
- 113. Surgical Pathology. (Cr ar per qtr; prereq 102)
- 114. Diseases of the Liver. (1 cr; prereq 102)
- 115. Advanced Neuropathology. (Cr ar, §NPsy 150, §NPsy 210; hrs ar)

- 116. Problems in Neuropathology. (Cr ar, §NPsy 143; hrs ar; prereq 102)
- 117. Neuropathology. (Cr ar, §NPsy 143; hrs ar)
- 118. Intracranial Neoplasms. (2 cr, §NPsy 211)
- 119. Survey of Neuropathology. Examination of specimens from current autopsies. (Cr ar, §NPsy 151; hrs ar)
- 120. Diseases of the Lungs. (1 cr; prereq 102)
- 121. Diseases of the Alimentary Tract. (1 cr; prereq 102)
- 123. Basic Science of Cancer. (Cr and hrs ar)
- 201. Research

Division of Cancer Biology

Professor

John J. Bittner, Ph.D.
Franz Halberg, M.D.

Associate Professor

Herbert M. Hirsch, Ph.D.

ELECTIVE COURSES

- 140. Seminar in Cancer Biology. (1 cr; hrs ar)
- 141. Problems in Cancer Biology. (Cr and hrs ar)
- 207. Research in Cancer Biology

Pediatrics

John A. Anderson, Professor and Head

Professor

John A. Anderson, M.D., Ph.D.
Robert A. Good, M.D., Ph.D.
Robert A. Ulstrom, M.D.
Lewis W. Wannamaker, M.D.

Clinical Professor

Bryng Bryngelson, Ph.D.
Hyman S. Lippman, M.D., Ph.D.
Albert V. Stoesser, M.D., Ph.D.

Associate Professor

Paul Adams, Jr., M.D.
Ray C. Anderson, M.D., Ph.D.
William Krivit, M.D.

Clinical Associate Professor

Joseph T. Cohen, D.D.S.
Paul F. Dwan, M.D.
Harold B. Hanson, M.D.
L. F. Richdorf, M.D., Ph.D.
David Siperstein, M.D., M.A.
Robert L. Wilder, M.D.

Assistant Professor

Robert Bridges, M.D.
Barbara Burke, M.D.
Eleanor Colle, M.D.
Harriet Morgart, B.S.
Paul Quite, M.D.
Richard Raile, M.D.
Robert Vernier, M.D.
Richard Von Korff, Ph.D.
Warren Warwick, M.D.
Howard Worthen, M.D.

Clinical Assistant Professor

Arnold S. Anderson, M.D.
Stuart L. Arey, M.D.
Northrop Beach, M.D.
Eldon B. Berglund, M.D.
Marguerite Booth, M.D.
Woodard Colby, M.D.
Paul Ellwood, M.D.
Harold Flanagan, M.D.
John J. Galligan, M.D.
Frank Hedenstrom, M.D.
Elizabeth Lowry, M.D.
George W. Lund, M.D.
Edward Nelson, M.D.
Alfred Ouellette, M.D.
Theodore Papermaster, M.D.
Edwin Robb, M.D.
Robert Rosenthal, M.D.
W. Ray Shannon, M.D., M.S.
Theodore Smith, M.D.
Willis Thompson, M.D.

Instructor

Elia Ayoub, M.D.
John H. Bornhofen, M.D.
Ida Gans, M.D.
Marvin Rallison, M.D.

Clinical Instructor

William Bevis, M.D.
Alice Brill, M.D.
Richard T. Cushing, M.D.
Donnell Etzwiler, M.D.
Clayton R. Green, M.D.
Evelyn Hartman, M.D.
William Heilig, M.D.

George Kimmel, M.D.
Wallace Lueck, M.D.
William Mulholland, M.D.
Lloyd Nelson, M.D.
Everett Perlman, M.D.
Frances E. Schaar, M.D.
Albert Schroeder, M.D.

Eva Shaperman, M.D.
Henry Staub, M.D.
Ellsworth Stenswick, M.D.
Norman Sterrie, M.D.
Edward K. Strem, M.D.
John D. Tobin, M.D.
Richard Tudor, M.D.

REQUIRED COURSES

120. **Clinical Lectures in Pediatrics.** Physical growth and development. Psychological development. Physiology and metabolism. (2 cr per yr; prereq regis Med)
135. **Clinical Clerkship in Pediatrics.** Patients in dispensaries assigned to individual students for examination and follow-up observation under supervision. Special clinics in well-baby care, allergy, heart, metabolism, and child psychiatry each week. (Cr ar; prereq regis Med)

ELECTIVE COURSES

181. **Pediatric Externship.** (Cr and hrs ar)
182. **Externship on Pediatric Service at Minneapolis General Hospital.** (Cr and hrs ar)
183. **Special Clinical Program in Pediatric Cardiology.** (Cr and hrs ar)
184. **Special Clinical Training in Pediatric Neurology.** (Cr and hrs ar)
185. **Special Clinical Training in Pediatric Endocrinology and Metabolism.** (Cr and hrs ar)
- 186A. **Pediatric Hematology.** (Cr and hrs ar)
- 186B. **Infectious Disease.** (Cr and hrs ar)
- 186C. **Immunology and Inflammatory Diseases.** (Cr and hrs ar)
- 186D. **Renal Diseases.** (Cr and hrs ar)
- 186E. **Metabolic and Endocrinologic Research.** (Cr and hrs ar)
200. **Graduate Seminar in Pediatrics**
202. **Pediatric Clinic**
204. **Residency in Pediatrics**
208. **Pediatric Research**

Pharmacology

Raymond N. Bieter, Professor and Head

Professor

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

Assistant Professor

Elizabeth M. Cranston, Ph.D.

REQUIRED COURSES

101. **Introduction to Pharmacology.** (3 cr; prereq Phsl 106, 107 or equiv)
102. **General and Experimental Pharmacology.** Detailed lecture and laboratory study of important drugs. (7 cr; prereq 101, regis Med)
103. **Clinical Lectures in Pharmacology.** (1 cr)

ELECTIVE COURSES

109. **Pharmacological Problems.** Experimental study of special topics; review of the literature. (Cr and hrs ar; prereq #)
110. **Toxicology.** Systemic qualitative toxicological analysis. (Cr and hrs ar; prereq #)

111. **Advanced Toxicology.** Quantitative toxicological analysis. (Cr and hrs ar; prereq 110 or §110)
112. **Spectrochemical Toxicology.** (5 cr; prereq 110)
113. **Industrial Toxicology.** (Cr and hrs ar; prereq 110)
124. **Pharmacology of Special Systems.** More detailed pharmacology of cardiovascular system, autonomic nervous system, etc.; clinical applications. (3 cr; prereq §)
203. **Research in Pharmacology**
204. **Advanced Pharmacology**
205. **General Discussions in Pharmacology**

Physical Medicine and Rehabilitation

Frederic J. Kottke, Professor and Head

Professor

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

Clinical Professor

Miland E. Knapp, M.D.
Frank Krusen, M.D.

Associate Professor

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

Assistant Professor

Peter F. Briggs, Ph.D.
William Fleeson, M.D.
Borghild Hansen, B.S.
Marvin G. Lepley, B.S.
Romine E. Matthews, Ph.D.
Wilbur L. Moen, B.S., B.A.
Ruby G. Overmann, M.A.
Bror S. Troedsson, M.D.

Instructor

John D. Allison, B.S.
Marian L. Eliason, B.S.
Dortha L. Esch, B.S.
Martin O. Mundale, B.S.
James F. Pohtilla, B.S.
Samuel M. Reichel, M.D.
Gary R. Sampson, D.V.S.
Bernard Sandler, M.D.
Helen V. Skowlund, M.S.

Clinical Instructor

Joseph P. Engel, M.D., M.S.
Michael Kosiak, M.D.
Richard R. Owen, M.D.
Arthur B. Quiggle, M.D.

REQUIRED COURSES

122. **Physical Medicine and Rehabilitation.** Clinical lectures. (1 cr per yr)

ELECTIVE COURSES

181. **Externship in Physical Medicine and Rehabilitation.** (Cr and hrs ar; prereq regis Med)
190. **Problems in Physical Medicine and Rehabilitation.** (Cr and hrs ar; prereq regis Med)
191. **Seminar in Rehabilitation Literature.** (Cr and hrs ar; prereq regis Med)
200. **Physical Medicine and Rehabilitation Service**
203. **Poliomyelitis Clinic**
204. **Peripheral Vascular Disease Clinic**
205. **Physical Medicine and Rehabilitation Literature Conference**
206. **Conference on Physical Medicine and Rehabilitation**
210. **Research in Physical Medicine**
211. **Electronics in Physical Medicine**
212. **Electromyography**

Physiological Chemistry

Wallace D. Armstrong, Professor and Head

Professor

Wallace D. Armstrong, Ph.D., M.D.
Cyrus P. Barnum, Jr., Ph.D.
Paul D. Boyer, Ph.D.
Ivan D. Frantz, Ph.D.
David Glick, Ph.D.
Ralph T. Holman, Ph.D.

Associate Professor

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

Assistant Professor

Curtis H. Carlson, M.D., Ph.D.
William O. Caster, Ph.D.
Leonard Greenberg, Ph.D.
John F. Van Pilsun, Ph.D.
Richard W. Von Korff, Ph.D.

Instructor

Quenton T. Smith, Ph.D.

REQUIRED COURSES

100. Physiological Chemistry. (7 cr; prereq physics, physical and organic chemistry)
101. Physiological Chemistry. (7 cr; prereq 100)

ELECTIVE COURSES

153. Problems in Physiological Chemistry. (Cr and hrs ar; may be taken 1 or more qtrs; prereq 101)
200. Seminar in Physiological Chemistry
205. Research in Physiological Chemistry
206. Advanced Endocrinology and Steroid Chemistry
207. Radiotracers and Mineral Metabolism
208. Advanced Laboratory Technique
209. Quantitative Histochemistry
210. Metabolic Enzymology
211. Nucleic Acid and Protein Metabolism
212. Quantitative Histochemistry Laboratory
214. Kinetics and Mechanism of Enzymic Reactions
236. Radioactive Isotope Seminar

Physiology

Maurice B. Visscher, Professor and Head

Professor

E. B. Brown, Jr., Ph.D.
John A. Johnson, M.D., Ph.D.
Joseph T. King, M.D., Ph.D.
Nathan Lifson, M.D., Ph.D.
Victor Lorber, M.D., Ph.D.
Carlos Martinez, M.D., Ph.D.
Carlo Terzuolo, M.D.
Maurice B. Visscher, M.D., Ph.D.

Associate Professor

H. Mead Cavert, M.D., Ph.D.
Charles Edwards, Ph.D.
Eugene D. Grim, Ph.D.

Assistant Professor

Robert L. Evans, Ph.D.
Irwin J. Fox, M.D., Ph.D.
Lerner B. Hinshaw, Ph.D.
Jui S. Lee, Ph.D.
Laurence O. Pilgeram, Ph.D.
Robert E. Swanson, Ph.D.

Instructor

Una L. Hart, Ph.D.

REQUIRED COURSES

- 106-107. Human Physiology. (7 cr for 106, 8 cr for 107, §4, §60, §101; prereq regis Med or Grad, neuro-anatomy, organic chemistry, zoology)

ELECTIVE COURSES

112. **Hemodynamic Measurements.** Demonstration and laboratory. Use of modern tools for various hemodynamic measurements. (Cr and hrs ar; prereq regis Med)
113. **Problems in Physiology.** Topics assigned for laboratory study, conferences, and reading. (Cr and hrs ar; prereq 107)
202. **Readings in Physiology**
203. **Research in Physiology**
210. **Selected Topics in Permeability**
211. **Selected Topics in Heart and Circulation**
212. **Selected Topics in Respiration**
215. **Selected Topics in Intermediary Metabolism**

Psychiatry and Neurology

Donald W. Hastings, Professor and Head

Division of Psychiatry

Professor

Richard W. Anderson, M.D.
 Donald W. Hastings, M.D.
 Burtrum C. Schiele, M.D.
 Werner Simon, M.D.

Clinical Professor

S. Alan Challman, M.D.

Associate Professor

William Fleeson, M.D.
 Robert Hinckley, M.D.
 Richard M. Magraw, M.D.

Clinical Associate Professor

Clifford O. Erickson, M.D.
 Walter Gardner, M.D.
 Gove Hambidge, Jr., M.D.
 Gordon R. Kamman, M.D.
 Frank Kiesler, M.D.
 Clarence J. Rowe, M.D.
 Marvin Sukov, M.D.

Assistant Professor

Ian Gregory, M.D.
 G. Wendell Hopkins, M.D.
 William Jepson, M.D.
 Orville Johnson, M.D.
 Carl D. Koutsky, M.D.
 H. Douglas Lamb, M.D.
 Myron Messenheimer, M.D.
 Otto N. Raths, Jr., M.D.
 George E. Williams, M.D.

Clinical Assistant Professor

Vera M. Behrendt, M.D.
 Irving Bernstein, M.D.
 Robert Bush, M.D.
 Leslie Caplan, M.D.
 Philip Feinberg, M.D.
 Joyce S. Lewis, Jr., M.D.
 J. Benjamin Lund, M.D.
 David Vail, M.D.

Instructor

Ann Margaret Bailey, M.D.
 Henry Johnsen, Jr., M.D.
 Frances P. Olson, M.D.
 Ivan Sletten, M.D.
 Edward S. Sulzer, M.D.
 Margaret R. Wendell, M.D.

Clinical Instructor

Robert Clark, M.D.
 Donald Dagget, M.D.
 Luther Dehnel, M.D.
 George Dorsey, M.D.
 James Garvey, M.D.
 Charles Haberle, M.D.
 Richard Kogl, M.D.
 James Lyons, M.D.
 Donald Mayberg, M.D.
 Jennings Peteler, M.D.
 Anthony J. Pollock, Jr., M.D.

REQUIRED COURSES

103. **Clinical Clerkship in Psychiatry and Neurology.** (Cr and hrs ar; prereq regis Med)
120. **Basic Behavioral Science.** (3 cr)
121. **Behavior Pathology and Psychiatric Methods.** (4 cr)
122. **Clinical Lectures in Psychiatry.** (2 cr)

ELECTIVE COURSES

145. Readings in Psychiatry. (Cr and hrs ar; prereq regis Med)
 146. Problems in Therapy Design. (Cr and hrs ar; prereq regis Med)
 171A. Descriptive Psychiatry. (Cr and hrs ar; prereq regis Med)
 191. Externship in Adult Psychiatry. (Cr and hrs ar; prereq regis Med)
 193. Problems in Psychiatry. (Cr and hrs ar; prereq regis Med)
 251. Clinical Inpatient Psychiatry
 252. Clinical Outpatient Psychiatry
 254. Advanced Clinical Inpatient Psychiatry
 255. Advanced Clinical Outpatient Psychiatry
 257. Special Assignments
 258. Research
 260. Orientation to Clinical Psychiatry
 262. Techniques of Clinical Observation and Evaluation
 264. Descriptive Psychopathology
 265. Personality Development and Psychodynamics
 266. Therapeutic Dynamics in Hospital Psychiatry
 269. Introduction to Psychotherapy
 271. Basic Readings in Psychoanalysis I
 272. Reconstructive Psychotherapy
 273. Survey of Psychosomatic Medicine
 275. Introduction to Collaborative Therapy
 276. Current Research
 277. Psychophysiology for Psychiatrists
 278. The Family and the Community
 279. Development of Psychiatric Thought
 281. Readings in Psychoanalysis II
 283. Special Topics Seminar
 291. Seminar in Current Literature
 292. Special Supervision in Psychotherapy
 293. Problems in Teaching Psychiatry
 294. Seminar in Advanced Critical Examination of Systems and Theories
 295. Introduction to Group Therapy

*Division of Neurology***Professor**

A. B. Baker, M.D., Ph.D.
 Maynard M. Cohen, M.D., Ph.D.
 Royal C. Gray, M.D., Ph.D.

Clinical Professor

Harold H. Noran, M.D., Ph.D.

Associate Professor

Frank Morrell, M.D.
 Hildred Schuell, Ph.D.
 Fernando Torres, M.D.
 David Webster, M.D.

Clinical Associate Professor

Robert L. Meller, M.D., M.S.
 Zondal Miller, M.D.
 Joseph Resch, M.D.

Assistant Professor

Michael Blaw, M.D.
 Harold Cohen, Ph.D.
 John Logothetis, M.D.
 Arne Lundervold, M.D.

Clinical Assistant Professor

Harold Berris, M.D.
 William Chalgren, M.D., Ph.D.
 Paul Ellwood, M.D.
 Ernest Hammes, Jr., M.D.
 Andrew Leemhuis, M.D.
 Sidney Shapiro, M.D.
 V. Richard Zarling, M.D.

Instructor

John Bornhofen, M.D.
 Milton Ettinger, M.D.
 George Flora, M.D.

Anthony Iannone, M.D.
Edward Jimenez-Pabon, M.D.
James Moriarty, M.D.
Erland R. Nelson, M.D.
Francis Ramsay, M.D.

Clinical Instructor
Harris Bernhisel, M.D.
Maland Hurr, M.D.
Robert Stoltz, M.D.
Frederic Wilson, M.D.

REQUIRED COURSES

- 101. **Clinical Neurology.** Systematic clinics, demonstrations, and lectures. (4 cr; prereq regis Med or grad clinical psychology; offered 1961-62 and alt yrs)
- 103. **Clinical Clerkship in Psychiatry and Neurology.** (Cr and hrs ar; prereq regis Med)

ELECTIVE COURSES

- 143. **Problems in Neuropathology.** (Cr and hrs ar; prereq regis Med)
- 145X. **Readings in Neurology.** (Cr and hrs ar; prereq regis Med)
- 150. **Advanced Neuropathology.** (Cr and hrs ar; prereq regis Med)
- 151. **Survey of Neuropathology.** (Cr and hrs ar; prereq regis Med)
- 155. **Therapeutics in Neurology.** (Cr and hrs ar; prereq regis Med)
- 171B. **Descriptive Neurology.** (Cr and hrs ar; prereq regis Med)
- 181. **Externship in Neurology.** (Cr and hrs ar; prereq regis Med)
- 182. **Problems in Basic and Clinical Neurology.** (Cr and hrs ar; prereq regis Med)
- 208. **Clinical Neurology**
- 209. **Research in Neurology**
- 210. **Advanced Neuropathology**
- 211. **Intracranial Neoplasms**
- 212. **Survey of Neuropathology**
- 213. **Neuropharmacology**
- 214. **Child Neurology**
- 215. **Neurological Complications of Internal Disease**
- 216. **Clinical Neurochemistry**
- 217. **Neuro-embryology**
- 218. **Neurological Language Disorders**
- 219. **Electronics of Neurological Instrumentation**
- 220. **Advanced Clinical Neurology**
- 221. **Neurochemistry**
- 222. **Seizure Mechanisms**
- 223. **Brain Tumors**
- 224. **Infectious Diseases of the Nervous System**
- 225. **Neuro-ophthalmology**
- 226. **Neurological-Neurosurgical Conference**
- 227. **Neurological Development**
- 228. **Research in Neuropathology**
- 230. **Electroencephalography**
- 231. **Applied EEG and Myography**
- 232. **Applied Neuroentgenology**
- 233. **Applied Neuropathology**
- 238. **Neurological Clinical Pathological Conference**
- 239. **Neuroanatomy**
- 240. **Neuropathology Conference**
- 241. **Neuroradiology**
- 247. **Speech Disorders**
- 248. **Applied Neurophysiology**

Division of Clinical Psychology

Professor

Starke R. Hathaway, Ph.D.
Gardner Lindzey, Ph.D.
Paul E. Meehl, Ph.D.
William Schofield, Ph.D.

Associate Professor

Gordon Heistad, Ph.D.
David T. Lykken, Ph.D.
Robert D. Wirt, Ph.D.

Assistant Professor

John P. Brantner, B.A.
Peter F. Briggs, Ph.D.
Harold Gilberstadt, Ph.D.
A. Jack Hafner, M.A.

Manfred Meier, Ph.D.
Reuben Silver, Ph.D.
Daniel Wiener, Ph.D.

Clinical Assistant Professor

Howard Davis, Ph.D.
Guy Miles, M.D.

Instructor

Thomas Kiresuk, Ph.D.
Donald Stieper, Ph.D.

Clinical Instructor

Raymond Johnson, M.A.
Zigfrids Stelmachers, B.A.

ELECTIVE COURSES

- 201. Clinical Seminar for Psychologists
- 202. Case Conference
- 203. Psychometric Clerkship
- 204. Intermediate Seminar
- 205. Advanced Seminar

Division of Child Psychiatry

Professor

Reynold A. Jensen, M.D.

Clinical Professor

Hyman S. Lippman, M.D., Ph.D.

Clinical Associate Professor

Harold B. Hanson, M.D.

Assistant Professor

James Lawton, Jr., M.D.
Wentworth Quast, B.A.
William Wolking, Ph.D.

Clinical Assistant Professor

Leo Hanvik, Ph.D.

ELECTIVE COURSES

- 192. Externship in Child Psychiatry. (Cr and hrs ar; prereq regis Med)
- 253. Clinical Child Psychiatry
- 256. Advanced Clinical Child Psychiatry
- 284. Readings in Child Psychiatry
- 285. Seminar in Current Literature in Child Psychiatry
- 286. Diagnostic and Therapeutic Methods in Child Psychiatry

Public Health

Gaylord W. Anderson, Professor and Director

(Staff giving instruction to medical students. For complete announcement of staff and courses in Public Health, see *Bulletin of the School of Public Health*)

Professor

Gaylord W. Anderson, M.D., Dr.P.H.
Joseph T. Anderson, Ph.D.
Jacob E. Bearman, Ph.D.

Richard G. Bond, M.S., M.P.H.
Herbert M. Bosch, M.P.H.
Ruth E. Boynton, M.D., M.S.
Francisco Grande, M.D.

Ancel Keys, Ph.D.
 Marion I. Murphy, M.P.H.
 Leonard M. Schuman, M.D., M.S.
 Ernst Simonson, M.D.
 Henry L. Taylor, Ph.D.
 Stewart C. Thomson, M.D., M.P.H.

Associate Professor

George S. Michaelsen, M.S.

Instructor

Ralph O. Wollan, B.A.

Lecturer

Robert N. Barr, M.D., M.P.H.
 Henry Bauer, Ph.D.
 Dean S. Fleming, M.D., M.P.H.
 John F. Shronts, M.D., M.P.H.
 Frank L. Woodward, B.E., M.P.H.

REQUIRED COURSES (for medical students)

- 90. **Medical Statistics I.** Frequency proportions and probability; rates, measured variables; chance variation and judgment of significance; association. (3 cr)
- 100. **Elements of Preventive Medicine and Public Health.** Occurrence and prevention of communicable, degenerative, and industrial diseases; protection of food, water, and milk; maternal and child health. (6 cr)
- 142. **Medical Economics.** Economic problems of medical and hospital care for community; programs for medical care and health and hospital insurance. (2 cr)

ELECTIVE COURSES

- 104. **Epidemiology.** (Cr ar; prereq 90 or 140)
- 106. **Public Health Administration.** (Cr and hrs ar; prereq regis Med)
- 123. **Topics in Public Health.** (Cr and hrs ar; prereq regis Med)
- 140. **Vital Statistics I.** (3 cr)
- 154. **Control of Radiation Hazards.** (Cr and hrs ar; prereq regis Med)
- 155. **Introduction to Air Pollution Problems.** (Cr and hrs ar; prereq regis Med)
- 191. **Science of Human Nutrition.** (3 cr; prereq #)
- 192. **Physiology of Exercise.** (4 cr; prereq 92 or Phsl 103, #)
- 195. **Public Health Aspects of Cardiovascular Disease.** (3 cr; prereq #)
- 200. **Research**
- 241. **Epidemiology of Noncommunicable Diseases**

Radiology

Harold O. Peterson, Professor and Head

Professor

Donn G. Mosser, M.D., M.S.
 Harold O. Peterson, M.D.

Clinical Professor

J. Richards Aurelius, M.D.
 Oscar Lipschultz, M.D.
 Paul C. Swenson, M.D.

Associate Professor

Joseph Jorgens, M.D., Ph.D.
 Richard G. Lester, M.D.

Clinical Associate Professor

Samuel B. Feinberg, M.D.
 Daniel L. Fink, M.D.
 John P. Medelman, M.D.

Assistant Professor

Kurt Amplatz, M.D.
 Phil R. Berger, M.D.
 Lewis S. Carey, M.D.

John F. Dillon, M.D.
 Merle Loken, Ph.D.

Clinical Assistant Professor

Osmond J. Baggenstoss, M.D.
 Solveig M. Bergh, M.D.
 Chauncey N. Borman, M.D.
 Sewell Gordon, M.D.
 Cyrus Owen Hansen, M.D.
 Malcolm B. Hanson, M.D.
 Gjert Kelby, M.D.
 Elmer Paulson, M.D.
 Donald H. Peterson, M.D.

Instructor

Norman Blank, M.D.
 J. Paul Leonard, M.D.
 Arthur Lieber, M.D.
 Andrew R. Lillie, M.D.
 Arnolds Veinbergs, M.D.
 Stanley F. Wyner, M.D.

Clinical Instructor

Eugene Ahern, M.D.
 Heino Alari, M.D.
 Manouchehr Azad, M.D.
 Stanford H. Calin, M.D.
 John B. Coleman, M.D.
 Marvin Goldberg, M.D.
 Frank R. E. Gratzek, M.D.
 Bernard Hall, M.D.
 Jule J. Hopperstad, M.D.
 Richard S. Johnson, M.D.
 Robert Kasper, M.D.

Warren L. Kump, M.D.
 Thomas B. Merner, M.D.
 Harry Mixer, M.D., M.S.
 Leo Nash, M.D., M.S.
 Ames Naslund, M.D.
 Paul C. Olfelt, M.D., M.S.
 Arnold O. Rholl, M.D.
 Norman F. Stone, M.D.
 Richard C. Tucker, M.D.
 Stanley C. VonDrashek, M.D.
 Hugh Williams, M.D.

REQUIRED COURSES

107. **Biophysics.** (1 cr; prereq regis Med)
 126. **Clinical Lectures in Roentgen Diagnosis and Radiation Therapy.** (3 cr; prereq regis Med)

ELECTIVE COURSES

102. **X-Ray Conference.** (1 cr; prereq #)
 180. **Externship in Radiology.** (Cr and hrs ar; prereq regis Med)
 181. **Externship in Diagnostic Radiology.** (Cr and hrs ar; prereq regis Med)
 182. **Externship in Radiation Therapy.** (Cr and hrs ar; prereq regis Med)
 183. **Problems in Radiation Biology and Radioactive Isotope Methods.** (Cr and hrs ar; prereq regis Med)
 184. **Problems in Diagnostic Radiology.** (Cr and hrs ar; prereq regis Med)
 186. **Roentgen Technique.** (2 cr; prereq regis Med)
 187. **Roentgen Anatomy of Bones, Joints, and Viscera.** (1 cr; 15 hrs; prereq Anat 100, 101)
 188A. **Roentgen Diagnosis of Diseases of Bones and Joints.** (1 cr; prereq regis Med)
 188B. **Roentgen Diagnosis of Diseases of Thorax.** (1 cr; prereq regis Med)
 188C. **Roentgen Diagnosis of Diseases of Abdominal Viscera.** (1 cr; prereq regis Med)
 188D. **Roentgen Diagnosis of Diseases of the Gastrointestinal Tract.** (1 cr; prereq regis Med)
 189A. **Clinic in X-Ray Diagnosis.** (1 cr; prereq 121; University Hospitals)
 189B. **Clinic in X-Ray Diagnosis.** (1 cr; prereq 121; Minneapolis General Hospital)
 189C. **Clinic in X-Ray Diagnosis.** (1 cr; prereq 121; St. Joseph's Hospital)
 190. **Roentgen Diagnosis of Pediatric Cases.** (1 cr; prereq 121)
 195. **Clinic in X-Ray Therapy.** (Cr ar; prereq regis Med)

Surgery

Owen H. Wangensteen, Professor and Head

Division of General Surgery**Professor**

Donald J. Ferguson, M.D., Ph.D.
 C. Walton Lillehei, M.D., Ph.D.
 Richard L. Varco, M.D., Ph.D.
 Owen H. Wangensteen, M.D., Ph.D.

Clinical Professor

Orwood J. Campbell, M.D., Ph.D.
 Lyle J. Hay, M.D., Ph.D.
 Thomas J. Kinsella, 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

Joe Bradley Aust, M.D., Ph.D.
 Claude R. Hitchcock, M.D., Ph.D.
 William D. Kelly, M.D., Ph.D.
 Lloyd D. MacLean, M.D., Ph.D.
 Fletcher A. Miller, M.D., Ph.D.
 Yoshio Sako, M.D., Ph.D.
 Alan P. Thal, M.D., Ph.D.

Clinical Associate Professor

George S. Bergh, M.D., M.S.
 Tague C. Chisholm, M.D.
 Davitt A. Felder, M.D., Ph.D.
 L. Haynes Fowler, M.D., M.S.
 William A. Hanson, M.D.
 Victor Hauser, M.D.
 Earl C. Henrikson, M.D., M.S.
 N. Kenneth Jensen, M.D.
 Conrad I. Karleen, M.D., D.D.S.
 Bernard G. Lannin, M.D., M.S.
 Maynard C. Nelson, M.D., M.S.
 Frederick H. Owens, M.D.
 Edward A. Regnier, M.D.
 Carl O. Rice, M.D., M.S.
 Willard D. White, M.D.

Assistant Professor

Ernest M. Berkas, M.D., Ph.D.
 Victor A. Gilbertsen, M.D.
 Edward W. Humphrey, M.D., Ph.D.
 Richard C. Lillehei, M.D., Ph.D.
 John F. Perry, Jr., M.D., Ph.D.
 Raymond C. Read, M.D., Ph.D.
 Benjamin R. Reiter, M.D.
 Harlan D. Root, M.D.
 George Schimert, M.D.
 W. Albert Sullivan, M.D., M.S.

Clinical Assistant Professor

Stuart W. Arhelger, M.D., Ph.D.
 Samuel G. Balkin, M.D., D.D.S.
 Coleman J. Connolly, M.D.
 Leo C. Culligan, M.D.
 George D. Eitel, M.D.
 Joseph J. Garamella, M.D., Ph.D.
 David Gaviser, M.D., M.S.
 William F. Hartfel, M.D.
 Laurence D. Hilger, M.D.
 Samuel Hunter, M.D.
 Frank E. Johnson, M.D.
 Donald C. MacKinnon, M.D.

Stanley R. Maxeiner, Jr., M.D.
 Robert F. McGandy, M.D.
 Daniel J. Moos, M.D.
 Nathan C. Plimpton, M.D., M.S.
 Frank Quattlebaum, M.D., M.S.
 Walter R. Schmidt, M.D.
 Abbott Skinner, M.D., M.S.
 Vernon D. Smith, M.D.
 Bernard J. Spencer, M.D.
 Lyle Tongen, M.D., M.S.
 Robert W. Utendorfer, M.D., M.S.
 Earl G. Yonehiro, M.D.

Instructor

Richard A. DeWall, M.D.

Clinical Instructor

John F. Alden, M.D., Ph.D.
 U. Schuyler Anderson, M.D.
 Frank S. Ankner, M.D.
 Manuel R. Binder, M.D.
 Raymond E. Buirge, M.D., M.S.
 Merrill D. Chesler, M.D.
 Charles T. Eginton, M.D., M.S.
 Edward C. Emerson, M.D.
 Leroy J. Fox, M.D.
 John K. Grotting, M.D., M.S.
 Donald W. Hannon, M.D.
 Carter W. Howell, M.D.
 Clarence V. Kusz, M.D.
 Lawrence M. Larson, M.D., Ph.D.
 Louis C. Lick, M.D.
 Berton D. Mitchell, M.D.
 Aaron A. Papermaster, M.D.
 John H. Rosenow, M.D.
 Horace G. Scott, M.D., M.S.
 Joseph L. Sprafka, M.D.
 William E. Stephens, M.D.
 Rolla I. Stewart, M.D.
 Jacob H. Strickler, M.D.
 John E. Twomey, M.D.
 Richard J. Webber, M.D.
 Darrell E. Westover, M.D.

REQUIRED COURSES

121. **Principles of Surgery.** Principles of surgery; anesthesia, antiseptics, asepsis, hemostasis, inflammations; process of repair of tissues. (3 cr; prereq regis Med)
 129. **Clinical Lectures in General Surgery.** (2 cr; prereq regis Med)
 134. **Clinical Lectures in Frontiers.** (1 cr; prereq regis Med)
 135. **Clinical Clerkship.** (Cr and hrs ar; prereq regis Med)

ELECTIVE COURSES

139. **Operative Surgery.** Participation in surgical procedures. (Cr and hrs ar; prereq regis Med)
 152. **Problems in Clinical Investigations.** Study of special case records correlated with literature study. (Cr and hrs ar; prereq regis Med)
 167. **Problems in Experimental Surgery.** Supervised investigation of problems; operations incident to individual problems. (Cr and hrs ar; prereq regis Med)
 169. **Diagnostic Bedside Surgical Clinic.** (Cr and hrs ar; prereq regis Med)
 181. **Externship in General Surgery.** (Cr and hrs ar; prereq regis Med)
 182. **Problems in Clinical Investigation and/or Problems in Experimental Surgery.** (Cr and hrs ar; prereq regis Med)
 183. **Extramural Surgical Program.** (Cr and hrs ar; prereq regis Med)

- 184. Externship in Emergency Room Practice. (Cr and hrs ar; prereq regis Med)
- 200. Outpatient Clinic in Surgery
- 202. Applied Surgical Anatomy on the Cadaver
- 203. Proctoscopy and Sigmoidoscopy
- 204. Tumor Clinic
- 205. Surgical Diagnosis
- 208. Surgical Service
- 211. Operative Surgery
- 214. Surgical Ward Conference
- 215. Roentgenological-Surgical Conference
- 216. Surgical Research
- 217. Surgical Seminar
- 218. Medical and Surgical Pathological Conference
- 219. Surgical Literature Conference
- 220. Peripheral-Vascular Surgical Clinic-Conference
- 221. Surgery-Physiology Conference
- 225. Surgical Diagnosis
- 228. Surgical Service
- 231. Operative Surgery
- 236. Surgical Research
- 237. Surgical Seminar

Division of Orthopedic Surgery

Clinical Professor

Edward T. Evans, M.D.
Harry B. Hall, M.D.
John H. Moe, M.D.

Clinical Associate Professor

Richard H. Jones, M.D.
Malvin Nydahl, M.D.

Clinical Assistant Professor

Frank S. Babb, M.D., M.S.
Lester W. Carlander, M.D.
Walter Indeck, M.D.
Edward H. Kelly, M.D.
Donald R. Lannin, M.D., M.S.
D. Keith Millett, M.D.
Harvey O'Phelan, M.D.
Richard Reiley, M.D.
Frederick G. Rosendahl, M.D.

Instructor

Paul M. Arnesen, M.D.
Robert F. Premer, M.D.

Clinical Instructor

Robert M. Barnett, M.D.
John J. Beer, M.D.
Wesley H. Burnham, M.D.
Evan S. Ellison, M.D.
Meyer Z. Goldner, M.D.
Paul O. Gustafson, M.D.
John A. Hartwig, M.D.
Richard J. Johnson, M.D.
Sheldon M. Lagaard, M.D.
Donovan L. McCain, M.D.
Roland F. Neumann, M.D.
Irwin F. Schaffhausen, M.D.
Ivan Schloff, M.D.

REQUIRED COURSES

- 122. Principles of Diagnosis, Treatment, Prognosis of Fractures, Dislocations. (1 cr; prereq regis Med)
- 140. Clinical Lectures in Orthopedic Surgery. (1½ cr; prereq regis Med)

ELECTIVE COURSES

- 185. Externship in Orthopedic Surgery and Fractures. (Cr and hrs ar; prereq regis Med)
- 186. Research Problems. (Cr and hrs ar; prereq regis Med)
- 405. Orthopedic Diagnosis
- 408. Orthopedic Service
- 411. Orthopedic Operative Surgery
- 416. Orthopedic Research
- 418. Pediatric Orthopedics

Division of Neurosurgery

Professor

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

Clinical Professor

Wallace P. Ritchie, M.D., M.S.

Clinical Associate Professor

Harold F. Buchstein, M.D., M.S.

Clinical Assistant Professor

Paul S. Blake, M.D.
Robert L. Merrick, M.D.
Leonard A. Titrud, M.D., Ph.D.

Instructor

S. N. Chou, M.D., M.S.

REQUIRED COURSES

127. Clinical Lectures in Neurosurgery. (1 cr; prereq regis Med)

ELECTIVE COURSES

- 188. Neurosurgery Externship, University Hospitals. (Cr and hrs ar; prereq regis Med)
- 189. Neurosurgery Externship, Veterans Administration Hospital. (Cr and hrs ar; prereq regis Med)
- 190. Neurosurgery Investigation. (Cr and hrs ar; prereq regis Med)
- 262. Outpatient Clinic in Neurosurgery
- 305. Neurosurgical Diagnosis
- 308. Neurosurgical Service
- 311. Operative Neurosurgical Surgery
- 316. Neurosurgical Research
- 318. Neurosurgical Conference

Division of Urology

Professor

C. D. Creevy, M.D., Ph.D.

Clinical Professor

Theodore H. Sweetser, M.D.

Clinical Associate Professor

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

Assistant Professor

George Mellinger, M.D.
Milton P. Reiser, M.D., M.S.

Clinical Assistant Professor

Samuel S. Beirstein, M.D.
Richard S. Rodgers, M.D.
Edgar A. Webb, M.D.

Instructor

David M. Anderson, M.D.
Bruce Edgar Linderholm, M.D.
Hugo E. Miller, M.D., M.S.
William E. Price, M.D.

Clinical Instructor

George L. Garske, M.D.
Harold A. Reif, M.D., M.S.
Edward J. Richardson, M.D.

REQUIRED COURSES

173. Urology Lecture. (1½ cr; prereq regis Med)

ELECTIVE COURSES

- 160. Clinic in Urology at Minneapolis General Hospital. (Cr and hrs ar; prereq regis Med)
- 161. Clinic in Urology at Ancker Hospital. (Cr and hrs ar; prereq regis Med)
- 180. Externship in Urology. (Cr and hrs ar; prereq regis Med)
- 250. Urological Surgery
- 251. Cystoscopy and Urology Diagnosis
- 252. Urological Conference

253. Research in Urology
 254. Urological Seminar
 255. Urological Radiological Conference
 256. Urological Pathological Conference

Division of Proctology

Clinical Professor

William C. Bernstein, M.D.

Clinical Associate Professor

Howard M. Frykman, M.D.
 Charles A. Neumeister, M.D.

Clinical Assistant Professor

Loren E. Nelson, M.D.
 Lloyd F. Sherman, M.D.
 William T. Smith, M.D.
 Robert J. Tenner, M.D., M.S.

Clinical Instructor

Emerson E. Hoppes, M.D.

COURSES

For course descriptions, see preceding section on General Surgery.

Interdepartmental Instruction

Comprehensive Clinic Program

Richard Magraw, Assistant Dean and Director
 Warren Warwick, Assistant Director and Assistant Professor of Pediatrics

REQUIRED COURSE

150. **Comprehensive Clinic.** Students in the junior-senior biennium attend Comprehensive Clinic during 2 consecutive quarters near the end of the Medical School career. In the clinic the student is the clinic-doctor and is responsible for patient care as long as his patients are in attendance at the clinic. In addition to this primary assignment, the student serves for 3 weeks in each of the specialty clinics: neurosurgery, orthopedics, urology, ophthalmology, dermatology, physical medicine, radiology, otology. Instruction throughout is interdepartmental. (Cr and hrs ar; prereq regis Med)
- Staff: Medicine—James B. Carey, Jr., M.D., Director
 Russell Schultz, M.D., Assistant Director
 Pediatrics—Warren J. Warwick, M.D., Director
 Marvin Rallison, M.D., Assistant Director
 Surgery—John Perry, M.D., Director
 Eye—George Tani, M.D., Director
 Roland Udasco, M.D., Assistant Director
 ENT—Kurt Pollak, M.D., Director
 Urology—Donald Creevy, M.D., Director
 Milton Reiser, M.D., Assistant Director
 Psychiatry—Richard Anderson, M.D., Director
 Orthopedics—Paul Arneson, M.D., Director
 Neurology—James Moriarty, M.D., Director
 Gynecology—Edgar Makowsky, M.D., Director
 Neurosurgery—Lyle French, M.D., Director
 Shelley Chou, M.D., Assistant Director
 Dermatology—Ramon Fusaro, M.D., Director
 Physical Medicine and Rehabilitation—Glenn Gullickson, M.D., Director

Contributing University Departments

School of Chemistry

Any advanced work given in the School of Chemistry may be elected for credit in the Medical School. Such courses as AnCh 127, 131, 132, 133, 134 on pH and on electrical and spectrophotometric methods of analysis by members of the analytical chemistry staff, PCh 128, 129, 130 on colloid chemistry. PCh 214 on enzyme chemistry, PCh 275 on protein chemistry, and OrCh 142 on the chemistry of natural products are recommended.

For description of these courses see *Bulletin of the Institute of Technology*.

Zoology

(For faculty see *Bulletin of the College of Science, Literature, and the Arts*)

- 144. **Medical Entomology.** Arthropods which serve as vectors of pathogenic organisms of man and animals. (3 cr; prereq 15 cr in zoology or entomology, #; lect, lab)
- 145. **Parasitic Protozoa.** Protozoal parasites of man and animals including laboratory diagnosis. (3 cr; prereq 15 cr in zoology, #; lect, lab)
- 146. **Helminthology.** Worm parasites of man and animals. (3 cr; prereq 15 cr in zoology, #; lect, lab)
- 170. **Advanced Genetics.** General laws involved in heredity and variation, exclusive of man. (3 cr; prereq 15 cr in zoology incl 83, or #)
- 171. **Genetics of Speciation.** (3 cr; prereq 15 cr in zoology incl 83, or #)
- 175. **Human Genetics.** Inherited characters in man from standpoint of medicine. (3 cr; prereq 83, #)
- 182. **Experimental Embryology.** Growth, differentiation, and metabolism of developing organisms. (5 cr; prereq 15 cr in zoology incl 50 or 59 or equiv)

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Department of Mortuary Science

1961-1963



The east side of the mall, a center of student activity.

Bulletin

of the UNIVERSITY of MINNESOTA

How to Use This Bulletin ¹²

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 personnel services and campus activities.

Copies of all bulletins of the University can be obtained at the Information Window in the Administration Building.

**The Department of Mortuary Science office is
located in room 155 Nicholson Hall**

UNIVERSITY OF MINNESOTA

Board of Regents

The Board of Regents is composed of The Honorable Ray J. Quinlivan, St. Cloud, First Vice President and Chairman; The Honorable Charles W. Mayo, M.D., Rochester, Second Vice President; The Honorable Daniel C. Gainey, Owatonna; The Honorable Richard L. Griggs, Duluth; The Honorable Bjarne E. Grottum, Jackson; The Honorable Robert E. Hess, White Bear Lake; The Honorable Marjorie J. Howard (Mrs. C. Edward), Excelsior; The Honorable A. I. Johnson, Benson; The Honorable Lester A. Malkerson, Minneapolis; The Honorable A. J. Olson, Renville; The Honorable Otto A. Silha, Minneapolis; and The Honorable Herman F. Skyberg, Fisher.

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Malcolm M. Willey, Ph.D., L.H.D., LL.D., Vice President, Academic Administration
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DEPARTMENT OF MORTUARY SCIENCE

Administration

Julius M. Nolte, LL.B., Dean of University Extension
Robert C. Slater, B.S., Director of Mortuary Science

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 Mortuary Management
Eugene M. Larson, B.S., Instructor and Co-ordinator in Public Health Laws and Regulations
Reuel I. Lund, Ph.D., Associate Professor of Accounting
T. F. Saholt, Licensed Mortician, Clinical Instructor in Embalming
Robert C. Slater, B.S., Associate Professor of Embalming and Mortuary Management
Walter K. Thorsell, B.A., Instructor in Embalming and Mortuary Management

All other appointments are made from full-time staff members of the co-operating colleges and departments.

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Department of Mortuary Science

INTRODUCTION -12

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 Department of 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.

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.

The department, 50 years old in 1958, was the first such department 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 mortuary science. The curriculum is fully accredited by 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 -appointed instructors. With but a single exception these are all full-time University personnel from the faculties of seven colleges within the University. This highly trained teaching staff together with the modern classroom and laboratories of this leading University enable 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 15 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 meet the requirements of those 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.

Department Regulations

In this section the answers to the most common questions of students will be found. 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 associates 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 14. 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 equivalency. 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 associates.

Counseling—Because of the specialized nature of the work in funeral service, all applicants are urged to consult with the director or his associates before registration. Advisers for mortuary science are available for consultation, in person or by letter, with prospective students. Their offices are located in 155 Nicholson Hall. A pamphlet *Funeral Service as a Profession* 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 your grade point average, only the grades that you earn in this University are considered.

Registration Dates—Registration for students on campus begins several weeks before the opening of the quarter and is announced in the Official Daily Bulletin of the *Minnesota Daily*. The expiration date is listed in the University Calendar which is included in the *Class Schedule* and the *Bulletin of General Information*. Only in exceptional circumstances may you register after that date, and then you must pay a special privilege fee.

New students entering in the fall come, by appointment, to the University in small groups for 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 the director, 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 only at the June Commencement.

Fees—For complete information concerning fees, see the *Bulletin of General Information*.

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 averages.

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 3 examinations in 1 day, he should report that fact to the department office in 155 Nicholson 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.

All department examinations are conducted under the Honor System. At the time of the first registration, all students are requested to sign a statement certifying willingness to abide by the regulations governing the Honor System. The administration of the Honor System is a combined effort of a student-appointed committee and the department. Infractions and discipline are jointly considered by these two groups.

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 probational 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.

As an adult special student, you will proceed under the following regulations:

1. You may take any course for which you have the necessary prerequisites.
2. You cannot become a candidate for a mortuary science degree without the approval of this department. After completing 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 in the Administration Building (window 20) to check on your financial status, cancel courses for the current or succeeding quarter, and generally clarify your relationship with the University.

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.

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.

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 depart-

ment office. Since this process takes time, allow a few days for the committee's decision. You should drop back later to pick up your copy of the petition, or request that it be mailed to you.

Who makes up the committee? The director of the department is the chairman. The assistant director for the department serves as secretary. Two other members are appointed yearly from the faculty by the dean of the Extension Division.

Orientation Programs—The Department of Mortuary Science joins with other divisions of the University in helping new students, whether freshmen or those with advanced standing, to get acquainted with one another and with the department program. Usually this involves 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 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 Eddy Hall.

See the special scholarship described under "Awards" in this bulletin.

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
Admission Policy and Requirements
Orientation and Registration
Degree and Course Requirements
University Calendar
Special Services for Students
Veteran, War Orphan, and Selective Service Information

Library Facilities and Services
Cultural and Recreational Opportunities
Financial Aids
Housing Facilities
Fees and Expenses
Athletic Purposes

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.

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.

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.

Silver Anniversary Fund—This fund is established by the classes of the department that celebrate their Twenty-Fifth 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.

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 as 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 mortuary science 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. On this occasion each graduate is recognized and awards and prizes are announced.

PLANS OF INSTRUCTION

Below are outlined the suggested plans of instruction, both under 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 (8)
Sports Education (3)
Personal Health (2)

Fundamentals of Speech (6)
Orientation in Funeral Service (3)
Electives (8)

Total Credits = 44

SECOND YEAR

Community Hygiene (3)
General Biology (10)
Social Sciences (12)
Introduction to Restorative Art (1)
Introduction to Mortuary Management (2)
Introduction to Embalming (3)

Mortuary Law (6)
Psychology of Funeral Service (2)
Electives (6)

Total Credits = 45

THIRD YEAR

Principles of Accounting (3)
Anatomy (6)
Restorative Art (3)
Pathology (6)
Medical Science Survey (3)
Embalming Theory and Practice (9)
Public Health, Laws and Regulations (2)

Mortuary Management (6)
Business Methods (2)
Embalming Chemistry (6)
Microbiology (4)

Total Credits = 50

Plan B

(Quarter credit evaluation is shown in parentheses)

FIRST YEAR

English Composition (9)
General Psychology (5)
General Inorganic Chemistry (8)
Personal Health (2)
Sports Education (3)
General Biology (10)

Orientation in Funeral Service (3)
Mortuary Law (6)
Electives (3)

Total Credits = 49

SECOND YEAR

Principles of Accounting (3)
Restorative Art (3)
Anatomy (6)
Pathology (6)
Medical Science Survey (3)
Embalming Theory and Practice (9)
Elective (3)
Public Health, Laws and Regulations (2)

Mortuary Management (6)
Business Methods (2)
Psychology of Funeral Service (2)
Embalming Chemistry (6)
Microbiology (4)

Total Credits = 55

DESCRIPTION OF COURSES

Explanations - 10

Course Numbering—A course is designated by a number, a letter, and occasionally an abbreviated prefix denoting a different department offering the course. It has the same number in whatever quarter it is offered. The quarter is indicated by letter (f, fall; w, winter; s, spring; su, summer).

1f-2w, a two-quarter course given in the fall and winter.

1w-2s, the same course given in the winter and spring.

3f,w,s, a one-quarter course given each quarter.

A course sequence separated by hyphens (1f-2w-3s) must be taken *in the order listed* unless there is a mark † indicating that a student may enter any quarter.

Course Symbols—The following symbols used in course descriptions have been adopted for all University bulletins and will not carry a bottom-of-the-page footnote.

† 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 - 12

3f,s **Introduction to Restorative Art.** Aspects of general art as apply to funeral service. (1 cr) Gates

4f-5w-6s†. **Restorative Art.** Anatomical modeling; expression, familiarization with tools, materials, and techniques of rebuilding human face and body. Color in cosmetics and interior decoration; physical effect of colors upon forms, psychological effects of colors upon people. Design; good taste, proportion, colors, and relationship with environment. Special laboratory skills. (1 cr per qtr; prereq soph) Gates, Koschig

8f,w-9w,s-10f,s.† **Orientation in Funeral Service.** Designed for a fuller understanding of funeral service. Aptitudes, skills, and personal qualifications; field trips. (1 cr per qtr) Koschig

11f,s,su. **Introduction to Mortuary Management.** Funeral service as a profession. Current statistics and studies. (2 cr; prereq 10) Slater

12f,s,su. **Introduction to Embalming.** Techniques; orientation. (3 cr; prereq 10) Thorsell

13f,s-14f,w.† **Mortuary Law.** Mortuary jurisprudence, probation of estates, administrators, social security, life insurance forms, public and personal liability, business law. (3 cr per qtr) Carney, Grayson

51w-52s.† **Anatomy.** Descriptive anatomy of the human body taught by systems; special attention is given to anatomical knowledge of value in the techniques of embalming. (3 cr per qtr; prereq Zool 3 or 15 and Phsl 4 or Biol 2) Buckman

53f-54w.† **Pathology.** General disease processes; specific diseases. Attendance at autopsies. (3 cr per qtr; prereq Zool 3 or Biol 2) Dawson and staff

55s. **Medical Science Survey.** Specific diseases; causative factors and clinical features correlated with pathologic changes. (3 cr; prereq 52, 54)

56f-57w-58s.† **Embalming Theory and Practice.** Preparations, theory, and participation in such clinical calls as is necessary for completion of requirements for the degree.

Participation in actual embalming. Clinical calls made available through the courtesy of Twin Cities funeral directors, under direction of licensed embalmers on the full-time staff. (3 cr per qtr; prereq 12, Zool 3 or Biol 2) Slater

- 59f,w,s. **Public Health, Minnesota Laws and Regulations.** Basic principles and practices of public health administration; organization and functions of agencies at federal, state, and local levels of government which are engaged in preservation and protection of public health. Role of mortician; regulatory procedures. Orientation in responsibilities; relationships with local boards of health and State Department of Health. (2 cr; prereq Δ) Larson
- 60f-61w-62s.† **Funeral Management.** Current practice and procedure; funeral direction; funeral home operation; records and forms; and professional regulations. Opportunity to meet local directors of long experience and high standing; important aspects of operating a funeral establishment. Field trips. Clinical experience. (2 cr per qtr; prereq 11) 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. (2 cr; prereq BA 24 or GC 16A) Lund
- 64w,s. **Psychology of Funeral Service.** Principles helpful to a prospective funeral director in dealing with his clients, especially those under severe emotional stress. (2 cr; prereq GC 2A or Psy 1-2) Thorsell
- 70w-71s. **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 InCh 4-5)
- 72s. **Bacteriology.** Distribution, nutrition of bacteria, bacterial physiology; disinfection and sterilization, transmission of infection, post-mortem bacteriology, immunity, pathogenic bacteria; viruses, pathogenic fungi, and protozoa. (4 cr; prereq Zool 3 or Biol 2) 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. (8 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 Health. Normal body function; causes and prevention of disease. (2 cr)

Community Hygiene. Community programs for disease control. (3 cr)

Reserve Officers Training Corps (ROTC)

The programs in Air Science (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

Introduction to the Social Sciences. Factors—historical, political, economic, social, psychological, and cultural—that influence and are influenced by man's conduct. (12 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 —10

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 at least 6 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 Science, Literature, and the 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)

Classics

- 24—Technical Terms of Science, Medicine, and Humanities (3)

Family Studies

- 1—Preparation for Marriage (3)
- 15—The Home and Its Furnishings (3)

Geography

- 1—Geography of Natural Resources (5)
- 4—Human Geography (5)

History

- 1-2-3—Civilization of the Modern World (9)
- 20-21-22—American History (9)

Journalism

- 11—Reporting for Nonmajors (3)

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

- 8A—Applied Mathematics (5)
- 10A—Human Biology: Fundamental Similarities in the Living World (3)
- 10B—Human Biology: How the Living Machinery in Man Works (3)

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 and the Upper Midwest (5)
- 45D—Community Problems (1-3)

General Arts

- 21—General Arts (3)
- 24A—Music Today: Basic Listening Skills (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, 155 Nicholson Hall, University of Minnesota, Minneapolis 14.

The Mortuary Science Curriculums are accredited by:

The Conference of Funeral Service Examining
Boards of the United States, Inc.

48 East Jefferson
Naperville, Illinois

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School of Nursing

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Bulletin

of the UNIVERSITY of MINNESOTA

UNIVERSITY OF MINNESOTA

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Co-operating Nursing Service Staff of University Hospitals

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Betty M. Pederson, M.N.A., Assistant Director of Nursing Services
Marjorie S. Auld, B.S., Hospital Nursing Supervisor and Instructor
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Genevieve A. Scholtes, B.S., Hospital Nursing Supervisor and Instructor
Frances M. Sullivan, B.S., Hospital Nursing Supervisor and Instructor
Margaret L. Vander Kraan, B.S., Hospital Nursing Supervisor and Instructor

* Participate in direct instruction of students in Plan A of the pre-service program.

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 professional nursing program is designed to prepare students for the beginning practice of 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.

Beginning in the fall of 1962 registered nurses who have completed an educational program in nursing leading to a diploma may enroll for baccalaureate studies in nursing in a program with purposes and content similar to that of the basic program. Current offerings that enable the registered nurse to prepare for teaching or supervision at the baccalaureate level are being discontinued. 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 programs in professional nursing 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 Medical School, the School of Public Health, the College of Education, the College of Science, Literature, and the Arts,

and the General College, participate with the faculty in nursing as appropriate in program development.

School of Nursing Programs

PRACTICAL NURSING PROGRAM

The purpose of this 4-quarter program is to provide opportunity for the student to develop as an individual as well as to prepare for practical nursing. With indirect supervision by registered nurses, the graduate of an approved practical nursing program is prepared to give nursing care to patients in situations that are relatively free of complexity. She 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 the curriculum provides opportunity for the student in practical nursing 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 a licensed practical nurse.

Having attained these objectives, the graduate of this program is ready to assume responsibilities of a beginning practitioner in practical nursing. She is eligible to write the appropriate licensing examination offered by the Minnesota Board of Nursing. Satisfactory performance on this examination entitles the applicant to practice as a licensed practical nurse (L.P.N.) in Minnesota.

BACCALAUREATE PROGRAMS IN NURSING

The University of Minnesota School of Nursing in keeping with the educational philosophy of the University assists undergraduate students to attain a broad base of knowledge and understanding which makes life more meaningful and helps the individual become an effective member of society and of the nursing profession.

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. 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 and to gain additional understandings and proficiency through formal and informal postbaccalaureate study and informed participation in nursing care.

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 through the promotion of health, the prevention of illness, and the care and rehabilitation of the sick.

Basic Professional Program—Students will be admitted to the nursing major in a revised basic program for the first time in the fall quarter of 1962. In this same quarter the last students to be enrolled in a 16-quarter basic program will be admitted to the nursing major in that program. The purpose and objectives of both these programs is described above. Admission requirements and descriptions of both programs appear later in this bulletin.

Baccalaureate Programs for Registered Nurses—In the fall of 1961 the last students to be enrolled in the baccalaureate offerings in teacher preparation or nursing administration, described on pages 22 and 23 of this bulletin, are to be admitted.

A general nursing program will be inaugurated in the fall quarter of 1962 for graduates of diploma programs in nursing. This program, leading to the degree of bachelor of science in nursing, is designed to prepare the registered nurse for professional nursing practice in first-level positions in hospitals, homes, public health nursing agencies, and other settings such as schools and industry where the services of professional nurses are required. The objectives for this program are the same as those described for the basic program and appear on pages 5 and 6 of this bulletin.

MASTER'S PROGRAMS

The School of Nursing conducts a program leading to the degree of master of nursing administration that is designed to prepare qualified professional nurses for administrative positions in organized nursing services.

Students interested in preparing to teach nursing enroll in the College of Education for a program leading to the degree of master 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.

Graduate programs in nursing provide opportunity for the student to broaden and deepen her general nursing competence and to develop further skills in teaching, administration, or clinical nursing through a variety of learning experiences including supervised practice.

The broad range of opportunities in an institution of higher education can enrich the students' understanding of many other professional disciplines and provide opportunity to explore resources for the continuing development of the art and science of nursing.

Graduate study assists the student to further define personal and professional goals, is flexible enough to allow for the unique interests of individuals, and fosters the ideal of independent and continuing study as a way of life for professional functioning.

In accord with these beliefs, the graduate programs have been developed to provide opportunity for students to grow toward achievement of the following objectives:

1. Increased understanding of the health needs of society and skill in assessing and meeting the nursing needs of individuals and groups.
2. Knowledge and competence in a specialized field of nursing: clinical nursing, teaching, or administration.
3. An appreciation of resources for continuing growth.
4. Increased appreciation of research and research methodology.
5. Increased understanding of and a feeling of responsibility for assuming a leadership role in nursing.
6. Enthusiasm for the potential of the nursing profession, and its interdependent relationship to other professional disciplines.

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. The courses for registered nurses, other than those that are a part of program majors, are offered primarily in the first term. 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 14.

IN-SERVICE COURSES

Noncredit, in-service courses are offered from time to time at the Center for Continuation Study. These courses vary in length, but are generally less than a week. They are made available to interested groups within the field of nursing. Instructors for these courses are recruited from the regular University staff, supplemented by special lecturers.

The School of Nursing offers through the General Extension Division certain evening classes to meet the needs of registered nurses in employment settings. These are of necessity 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. (See *Bulletin of Evening and Special Classes.*)

Appropriate credits earned through extension courses can be applied toward meeting degree requirements. However, students are urged to consult a faculty adviser in the School of Nursing in working out their educational plans for study through the Extension Division.

No professional courses are offered by correspondence.

Admission—All Programs in Nursing

(Also see *Bulletin of 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 14.

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 for entrance into various of its programs, including a report of a physical examination. Applications to any program are accepted from both men and women, married or single.

All applications are individually reviewed by the Admissions Committee of the School of Nursing after an initial evaluation by the Office of Admissions and Records. The processing of records may require as long as 12 weeks, so that prospective students are urged to apply well in advance of the date on which they hope to enroll.

3. Official transcripts of any prior college work taken for credit in another educational institution should accompany applications. This University accepts for transfer a maximum of 3 semester credits of religion courses. Religion courses do not transfer as history courses.

Graduates of programs leading to a diploma in nursing 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 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.

5. Whenever possible applicants are encouraged to arrange to have an interview with a member of the School's faculty.

6. 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.

7. At the time of entrance to any nursing program, students must complete a physical (health) examination and immunization program at the University Health Service for final acceptance. The Health Service recommendations concerning the ability of students to meet the demands of the nursing curriculums are carefully considered by the School of Nursing faculty.

8. Applicants will receive notification of action on their applications and information about initial enrollment procedures from the Office of Admissions and Records.

Admission—Specific Nursing Programs

PRACTICAL NURSING PROGRAM

1. Students are admitted only in the fall quarter of each year. Application is open to high school graduates or those meeting the requirements for admission to the University by examination as provided for in individual cases. Minimum age requirement is 17 years.

2. Applicants may start the application procedure as soon as their high school program is completed. If the procedure is started during the senior year, action of the Admissions Committee will be provisional until evidence of high school graduation is submitted. Non-high school graduates may be given individual consideration in selected instances.

3. All applicants are required to take a practical nursing aptitude test and to have an interview with a faculty member of the School of Nursing. Instructions for making these arrangements will be sent to each applicant after the application form is received by the Office of Admissions and Records.

The National League for Nursing Pre-Admission and Classification Examination (P.A.C.E.) is administered through the University of Minnesota Student Counseling Bureau (101 Eddy Hall, Minneapolis Campus) at a cost of \$6 to the applicant.

BASIC PROFESSIONAL NURSING PROGRAM

1. High school students interested in preparing for the practice of professional nursing at the University of Minnesota will find it helpful, when possible, to include in their high school programs 2 units of mathematics, 3 units in social studies, and 3 units in natural science inclusive of biology and either physics or chemistry.

2. Applicants are admitted to the nursing major in the fall quarter only.

3. Students planning to transfer to the School of Nursing from the College of Science, Literature, and the Arts of the University of Minnesota or from another accredited college or university should make application at the Office of Admissions and Records during the last quarter or semester of prenursing study. However, any action by the Admissions Committee of the School of Nursing will be provisional, pending receipt of evidence that all prenursing requirements have been met.

4. Any substitutions or exceptions in prenursing courses are determined by the Admissions Committee.

5. A grade point average of 2.00 (C average) is the minimum requirement for admission. Preference is given to those applicants with higher averages, especially when the number of qualified applicants exceeds the number to be admitted.

BACCALAUREATE PROGRAMS FOR REGISTERED NURSES

(Majors in Nursing Administration, Nursing Education, and General Nursing)

1. Students may be admitted at the beginning of any school term; however, the fall quarter is usually the most desirable time to start a program because of the schedule of many of the required courses.

2. Advanced standing credits for a diploma program in nursing are granted as "blanket credits" and do not recognize specific courses within the diploma nursing program. The granting of credit depends on evaluation of transcripts by the Office of Admissions and Records and the Admissions Committee of the School of Nursing.

3. The applicant must have achieved a minimum of 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.

4. Applicants admitted to these programs will be required to take the Graduate Nurse Examination of the National League for Nursing after enrolling for the first quarter. Instructions for these tests will be available from the Office of Admissions and Records. The fee for this testing is \$8.

5. Applicants admitted to the majors in general nursing or nursing administration will be admitted directly to the School of Nursing. Applicants admitted to the nursing education major will be admitted to the College of Education. School of Nursing faculty serve as major advisers for these students. (See *Bulletin of the College of Education.*)

MASTERS' PROGRAMS

(Master of Nursing Administration and Master of Education
with Major in Nursing Education)

1. The desirable time to begin either of these programs is the fall quarter of each year. Applicants who wish to begin study at any other time should consult with a faculty adviser.

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 grade point average of 3.00 (B average) in prior undergraduate college work.

3. Postbaccalaureate credits earned in other universities will generally not be granted transfer credit toward meeting the requirements of these degrees.

4. Applicants admitted to these programs will be required to take the National League for Nursing Graduate Nurse Examination on designated dates after enrolling for the first quarter. The fee for the examination is \$8.

5. Applicants admitted to the nursing administration major will be admitted directly to the School of Nursing.

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*.)

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 14.

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 years is generally necessary to meet requirements for a Master's degree.

3. Special arrangements can sometimes be made to provide appropriate course enrollment for individual nurses who do not qualify for admission to any organized program leading to a degree, or who wish to enroll for a limited time.

4. 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) certification of good health; and (d) possession of a student 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*.

A mark of F is given when a student does not complete successfully the work of a course, and no credit is accorded for it. 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 in undergraduate professional programs and below 1.5 (D average) for students in the practical 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 Scholastic Standing Committee. A second quarter of study on probationary status is permitted only when such recommendation is made following a review of a 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 below for each.

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.

Basic and General Nursing Programs

For continuance in and graduation from these programs, students must have received a passing grade in each required subject, and an average of C for the total credits (and major courses) completed. In the last year of either program of study, each student must apply for the appropriate 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 being sought are being met.

Bachelor of Science Programs in Nursing Education and Nursing Administration

A total of 186 credits and 372 grade points (the number of grade points must be at least twice the number of credits) in required courses including physical education is needed for graduation from the nursing education program. Graduation from

the nursing administration program requires a total of 180 credits and 360 grade points.

During the junior and senior years a grade point average of 2.00 (C average) for all courses taken must be maintained, whereas a grade point average of 2.50 (C+ average) is required in the major courses in either nursing education or nursing administration (45 credits).

For admission to student teaching in nursing education, or field instruction in nursing administration, the student is required to have a grade point average of 2.50 in completed courses in either the nursing education or nursing administration major, including clinical nursing courses. A student who is required to cancel registration in the nursing administration practicum is not eligible for graduation with a major in nursing administration.

Residence Requirements—A minimum of 45 credits must be earned while in residence in the School of Nursing. Of these, at least 30 credits must be earned in the senior year. Correspondence courses and extension classes do not count as residence credits, excepting only extension classes offered in Minneapolis, St. Paul or Duluth.

Programs Leading to the Degrees of Master of Education and Master of Nursing Administration

For continuance and graduation from these programs 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. In nursing administration a grade point average of 2.50 (C+ average) is required in all course work, and a grade point average of 3.00 in the required courses in nursing administration. In education 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 in programs leading to a Master's degree each student must apply for the appropriate 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 sought are being met.

Honors, Certificates, and Degrees

Graduation with distinction or with high distinction—These honors are not automatic, but are conferred to 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 high distinction must have attained an over-all grade point average of at least 3.00 (B average) or 3.5 (B+ average) respectively.

Certificate—Upon satisfactorily completing the requirements of the practical nursing curriculum students are issued a certificate.

Degrees—When students satisfactorily complete requirements in any of the programs described in this bulletin, the conferring of the appropriate degree is recommended to the Board of Regents of the University of Minnesota by the faculty of the School of Nursing. Completion of the basic and general nursing program leads to the degree of bachelor of science in nursing. The degrees of bachelor of science in nursing administration and master of nursing administration are conferred upon

those registered nurses who complete satisfactorily the outlined requirements for the respective degrees.

Students enrolled in the College of Education are recommended for degrees by the faculty of that college.

Expenses (1961-62)

For details regarding tuition, fees, maintenance, and other costs, see the current *Bulletin of General Information*. Students enrolled in Plan A of the basic nursing program should also refer to the information relative to maintenance costs that is given under the Plan of Instruction for the program on page 19 of this bulletin. Students in this program pay an incidental fee for only 2 of the 10 quarters in the nursing major.

All students provide their own uniforms as necessary and, with the exception of students enrolled in Plan A of the basic program, are responsible for having them laundered. Students in the basic program pay approximately \$90 for their uniforms, and those in the practical nursing program pay approximately \$50. These are ordered and paid for during the first quarter of study. Each student is responsible for the labeling of uniforms and caps for laundry purposes.

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—Several specialized personnel services are provided by the University for all students. For those wishing information, the nature of these services can be clarified by the School of Nursing counselor whose office is located in Room 124, Millard Hall. She can also assist students in availing themselves of such services as the following:

Student activities—Student Activities Bureau, 106 TSMa; (or) Coffman Union Program office, 229 Coffman Memorial Union

Financial help—Bureau of Student Loans and Scholarships, 201 Eddy Hall

Part-time employment—Student Employment Bureau, 153 TSF

Improvement of study skills—Educational Skills Clinic, 101 Eddy Hall

Problems of speech or hearing—Speech and Hearing Clinic, 205 Shevlin Hall

Off-campus housing—Student Housing Bureau, 209 Eddy Hall

Health needs—University Health Service building

Legal concerns—Legal Aid Clinic, 139 Fraser Hall

Counseling—Academic advisement is made available to students by members of the School of Nursing faculty. The School's counselor can be of additional assistance in this regard and can also give professional help to students with problems of a personal nature as well as to problems concerning vocational choice. Referral of students to special services can also be facilitated by the counselor.

Employment—Students in practical or basic nursing programs should consult with faculty advisers or the counselor about part-time employment. However, the schedules carried by students during the greater portion of the practical nursing program and Plan A of the basic programs make it advisable to limit employment in the interests of having adequate study time and the opportunity to participate in over-all University activities.

Students seeking employment opportunities are advised to consult with the Student Employment Bureau, 153 TSF.

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, Minnesota Nurses Association, 2395 University Avenue, St. Paul 14, by association members. The University Hospitals (on campus) can usually arrange for a limited number of students to do special or general duty nursing during evening or week end hours. Part-time or temporary full-time assignments are especially available at University Hospitals during the summer months. Inquiries about such employment opportunities should be made in writing to the Director of Nursing Services, University Hospitals, Minneapolis 14.

Registered nurse students who are engaged in full-time study (12 credits or more per quarter) are advised not to carry outside employment. To minimize problems of scheduling, other students should consult their faculty advisers regarding possible arrangements for part-time employment.

Residence Accommodations—Students living within commuting distance of the Minneapolis Campus of the University may elect to live at home, while others will want to reside in University-maintained residence halls. Most out-of-town students live either in University residence halls or in nearby private 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 office of the Director of Housing, 108A Westbrook Hall, Minneapolis 14. Information about private housing may be obtained from the Student Housing Bureau, 209 Eddy Hall, Minneapolis 14.

Students enrolled in Plan A of the basic program in nursing provide their own maintenance during the first 2 quarters in the School and throughout the period of learning experiences in public health nursing. During the remainder of the time that students are engaged in study of the major in nursing, maintenance is provided to students in this program in the various nursing dormitories or in approved private housing. The University of Minnesota Hospitals houses students in the adjacent Louise M. Powell Hall.

Students in Plan B of the basic program in nursing will meet their maintenance costs throughout the program. Inquiries about housing for the freshman year should be sent to the Director of Housing, 108A Westbrook Hall, Minneapolis 14. Information about housing during the remainder of the program will be made available to students by the School of Nursing.

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. 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.

Students in Plan A of the basic nursing program do not pay the incidental fee during 8 quarters of the 10-quarter major in nursing. These students must meet the cost of hospital care at University Hospitals which is in excess of 1 month per year of residence in the School. Further, they are responsible for meeting costs incident to medical or hospital care incurred during learning experiences conducted away from the University campus.

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 individuals' needs and adherence to maternity policies existing in institutions or agencies where students participate in planned learning experiences.

Student Loans and Scholarships—High school seniors and University students who apply for a loan from funds established by the National Defense Education Act should submit their applications to the Bureau of Student Loans and Scholarships before June 30. High school seniors may apply for a National Defense loan before their application for admission to the University has been acted upon.

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 interest on a loan while in school and repay the principal, together with interest payments, after graduation. They are eligible to submit their application for a loan after the completion of 2 quarters of satisfactory work 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 baccalaureate and Master's degree programs. Information and application forms may be obtained from the Minnesota Nurses' Association, 2395 University Avenue, St. Paul.

National Foundation Health Scholarships have been established for students intending to enter and complete a baccalaureate program in basic professional nursing. High school seniors should submit applications to the National Foundation through their high school principal or counselor before April 1 of their senior year.

High school seniors who wish to apply for the University's entering freshman scholarships should submit applications through their high school principal or counselor during January of their senior year.

University students enrolled in general education courses prerequisite to the nursing major in the basic professional program are eligible to apply for scholarship assistance (to be utilized prior to entrance to the School of Nursing) after the completion of 2 quarters at the University. Application forms and information about scholarships may be obtained from the Bureau of Student Loans and Scholarships.

University scholarship funds for School of Nursing students in the degree programs are administered by the Bureau of Student Loans and Scholarships, and applications should be submitted to that bureau. Students are eligible to apply for these scholarships after the completion of 1 quarter in the School of Nursing. The School of Nursing appreciates the interest of the following sponsors of these funds:

University of Minnesota School of Nursing Foundation

Alpha Tau Delta

Alumni, staff, and friends of the School of Nursing (Katharine J. Densford Scholarship)

Children and friends of Margaret Caldwell (Margaret Caldwell Memorial Scholarship)
 Hennepin County Tuberculosis Association (Dr. E. S. Mariette Memorial Scholarship)
 Maternity Hospital Auxiliary, Minneapolis (Dr. Martha Ripley Memorial Scholarship)
 Nursing College Board and Powell Hall Governing Association (Marion L. Vannier Scholarship)
 Railway Business Women's Association of the Twin Cities
 Sigma Theta Tau
 Woman's Auxiliary to the Minnesota State Medical Association (Margaret Scheman Wahlquist Memorial Scholarship)

The Minnesota State Legislature has enacted a law which provides scholarship funds for residents of Minnesota enrolled in basic professional nursing programs. Students accepting scholarships must agree to practice in the field of nursing in Minnesota for 1 year immediately after graduation. Applications should be submitted to the State of Minnesota Board of Nursing, 700 Minnesota Building, St. Paul, after application for admission to the School has been approved.

The U. S. Public Health Service Professional Nurse Traineeship Program provides awards to qualified registered nurses enrolled in baccalaureate and Master's degree programs. A maximum of 12 months' study can be awarded to any one individual, and this must be the final 12 months of study. Information and application forms may be obtained from the School of Nursing.

Nurses' Educational Funds provide a limited number of scholarships, fellowships, and loans to registered nurses enrolled in baccalaureate and Master's degree programs. They must be a member 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 19, N.Y.

The U. S. Army has two financial assistance programs for nursing students: (a) The Army Student Nurse Program is for selected students enrolled in baccalaureate programs in basic professional nursing. 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; (b) the Registered Nurse Student Program is for selected registered nurses enrolled in baccalaureate or Master's degree programs. They must be able to complete requirements for the degree within 1 year. Participants must agree to serve on active duty as an Army Nurse Corps officer for a period of 3 years which will include time spent in training. Information about these programs may be obtained from the Army Nurse Corps counselor at Army recruiting offices.

The U. S. Navy has two financial assistance programs for nursing students: (a) 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 minimum of 2 years; (b) the Nursing Education Program provides an opportunity, on a competitive basis, for enlisted WAVES to participate in a baccalaureate program in basic professional nursing. Participants must agree to serve, upon graduation, on active duty as a Navy Nurse Corps officer 1 year for each year of education received. Information about these programs may be obtained from the Navy Nurse Corps counselor in Navy recruiting offices.

The National League for Nursing Fellowship Program provides an annual award for postbaccalaureate study. Information may be obtained from the National League for Nursing, 10 Columbus Circle, New York 19, N.Y.

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 loan funds for registered nurses wishing to further their education. Students interested should 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. Program Leading to Certificate in Practical Nursing

Qualified applicants are admitted to this program at the beginning of the fall quarter only. The program requires 4 consecutive quarters of full-time study. The student is enrolled for 12-16 credit hours per quarter; approximately one-third of total credit is in general education courses.

As part of the practical nursing courses, the student has a laboratory schedule which includes supervised clinical experience in the care of medical and surgical patients, mothers, babies, and children, and requires approximately 20 hours per week during winter, spring, and summer terms.

Required Courses

(Credits shown in parentheses)

General College

- GC 10B, 10C—Human Biology (6)
- GC 1A—Individual Adjustment (4)
- GC 2C—Psychology of Human Development (3)
- GC 3B—Food Selection and Purchase (3)
- GC 41A—Man and Society (5) or other social studies elective with permission of adviser

- GC 32A—Oral Communication (3)
- (or) GC 30B—Fundamentals of Usage (3)

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)

The American Red Cross First Aid Course is required for graduation. If a student does not have a current Red Cross first aid certificate upon admission, the course must be taken during the first 2 quarters of the program.

II. Programs Leading to Bachelor of Science Degree in Nursing

PLAN A—BASIC PROFESSIONAL NURSING PROGRAM

(Admission to be discontinued after fall quarter, 1962)

Qualified students are admitted to the nursing major in this program at the start of the fall quarter only. The last students to be enrolled in the nursing major of Plan A will be admitted in fall quarter, 1962, and will have completed the general education requirements prior to that date.

Course Requirements in General Education

Upon admission to the nursing major, the applicant must have earned 95 quarter credits (90 academic and 5 physical education credits) or 64 semester credits (60 academic and 4 physical education credits) in general education courses taken in the College of Science, Literature, and the Arts at the University of Minnesota or another accredited college or university. (See page 9 of this bulletin for information about admission requirements.)

(Quarter credits shown in parentheses)

Engl A-B-C (Freshman Literature and Composition, composition portion 6 credits)	Biol 1-2 (10)
(or) Engl 1A-2A-3A (Freshman English, composition portion 6 credits)	InCh 4-5 (10)
(or) Engl 1B-2B-3B (Freshman English, composition portion 9 credits)	Sociology or social science (9)
(or) Comm 1-2-3 (Communication, 12 credits)	History or political science or economics (5-6)
(or) Exemption from the requirement	Child psychology, or child development (3)
(All students are required to have an English Classification Card before registration for one of these courses.)	First aid (2)
Personal health or hygiene (2)	(or) Current Red Cross First Aid Certificate for the standard course
	Physical education (5)
	Psy 1-2 (6)
	Electives (40-45)
	Total (95)

A suggested 6-quarter program in the College of Science, Literature, and the Arts follows:

FIRST YEAR

Fall	Winter	Spring
English	English	English
Biol 1	Biol 2	Sociology or social science
Sociology or social science	Sociology or social science	Physical education
Physical education	Physical education	Electives††
Electives††	Electives††	

SECOND YEAR

Fall	Winter	Spring
Psy 1	Psy 2	FamS 25 or CD 80
InCh 4	InCh 5	First aid
History or political science or economics	History or political science or economics	PubH 2 or 3 or 50
Physical education	Physical education	Electives††
Electives††	Electives††	

Plan of Instruction—Nursing Major

To meet the requirements of the nursing major, the student enrolls in the School of Nursing for 10 quarters, earning from 12-17 credits each quarter. During the first 2 quarters of the program, the student provides her own maintenance at home, in dormitory, or other University-approved housing. At the beginning of the third quarter in the program, maintenance (board, room, and uniform laundry) is provided either in Powell Hall or in nurses' residences in other agencies where the student may be assigned, with the exception of the period during which the student is assigned to public health nursing field experience. During this quarter, the student provides her own maintenance. Beginning the third quarter when maintenance is provided, the student is scheduled for 30 hours of clinical laboratory experience each week of the year with the exception of 7 weeks of vacation occurring, 2 at the end of the fourth quarter, 4 at the end of the eighth quarter, and 1 between the ninth and the tenth quarters.

Course Requirements in Nursing Major

Biological Sciences

Course No.	Title	Clinical Assignment (weeks)	Credits	Quarter
Anat 4	Elementary Anatomy		5	1st
MicB 53	General Bacteriology		5	2nd
Phcl 9-10	Pharmacology		4	3rd-4th
PhCh 50	Physiological Chemistry		4	1st
Phsl 51	Human Physiology		6	2nd

†† Electives should be chosen to make, on the average, a program of 16 credits per quarter.

Public Health

PubH 53 Introduction to Public Health 5 6th, 8th

Home Economics

HE 72 Nutrition 2 1st

Nursing

Nurs 17-18	Introduction to Clinical Nursing	Selected		
		Experience	12	1st-2nd
Nurs 50-51	Medical and Surgical Nursing	24	20	3rd-4th
Nurs 52-53	Fundamentals of Relationships in in Nursing		3	3rd, 4th
Nurs 54-55	Physiopathology of Illness		4	3rd, 4th
Nurs 56	Nursing in the Operating Room	6	6	5th, 6th, 7th, 8th, 10th
Nurs 58	Orthopedic Nursing	2	2	5th, 6th, 7th, 8th, 10th
Nurs 59	Gynecologic Nursing	4	4	5th, 6th, 7th, 8th, 10th
Nurs 60	Maternity Nursing	12	12	5th, 6th, 7th, 8th
Nurs 61	Pediatric Nursing	12	12	5th, 6th, 7th, 8th
Nurs 66	Psychiatric Nursing		4	4th, 6th, 7th, 8th, 9th
Nurs 67	Neuropsychiatric Nursing	12	8	5th, 6th, 7th, 8th, 9th
Nurs 87	Public Health Nursing	12	12	8th, 9th, 10th
Nurs 88	Rural Nursing		5	9th, 10th
Nurs 95	Orientation to Nursing Management	4	5	9th, 10th
Nurs 96	Nursing in the Outpatient Department		4	5
		4	5	9th, 10th
Nurs 98	The Nursing Profession		3	7th
	Total credits		148	

The following list comprises a possible sequence for the 10-quarter enrollment in the School of Nursing:

THIRD YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	<i>Summer</i>
Anat 4 (5)	MicB 53 (5)	Phcl 9 (2)	Phcl 10 (2)
PhCh 50 (4)	Phsl 51 (6)	Nurs 50 (10)	Nurs 51 (10)
HE 72 (2)	Nurs 18 (6)	Nurs 52 (1½)	Nurs 53 (1½)
Nurs 17 (6)		Nurs 54 (2)	Nurs 55 (2)

FOURTH YEAR

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	<i>Summer</i>
Nurs 56 (6)	Nurs 60 (12)	Nurs 61 (12)	Nurs 66 (4)
Nurs 58 (2)	PubH 53 (5)	Nurs 98 (3)	Nurs 67 (8)
Nurs 59 (4)			

FIFTH YEAR

<i>Fall</i>	<i>Winter</i>
Nurs 87 (12)	Nurs 88 (5)
	Nurs 95 (5)
	Nurs 96 (5)

PLAN B—BASIC PROFESSIONAL NURSING PROGRAM

(Admission to begin fall quarter, 1962)

Qualified students will be admitted to the second year of this program for the first time in the fall of 1962 after having completed the first year of general education requirements in the College of Science, Literature, and the Arts of the University of Minnesota or at another accredited college or university. (See page 9 of this bulletin for information about admission requirements.)

First Year Course Requirements

(Credits shown in parentheses)

The minimum quarter credit requirement for the first year is 45 (or 30 semester hours of credit) *plus* a current Red Cross first aid certificate for the standard course. Thirty-six (36) of these 45 quarter credits (or 24 [22 if the Freshman English requirement as established by this University is met with 6 semester credits] of the 30 semester credits) must be distributed as follows:

- Group A—Freshman English (12 quarter credits)
- Group B or E—Foreign Language or Humanities (9 quarter credits)
- Group C—Social Science (9 quarter credits)
- Group D—NSci 4 and 5 required (6 quarter credits††)

The remaining credit requirement may be fulfilled by selections from any of groups B, C, D, and E described below:

A. Freshman English

- Engl A-B-C (Freshman Literature and Composition, composition portion 6 credits);
- (or) Engl 1A-2A-3A (Freshman English, composition portion 6 credits);
- (or) Engl 1B-2B-3B (Freshman English, composition portion 9 credits);
- (or) Comm 1-2-3 (Communication, 12 credits);
- (or) Exemption from the 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. Political science |
| 2. Economics and business administration (except accounting, type-writing, shorthand, and office procedures) | 5. Psychology |
| 3. Geography | 6. Sociology |
| | 7. Social science (interdepartmental courses) |

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 6)
- 3. Mathematics (except higher algebra and mathematics of investment)

E. Humanities

- | | |
|-----------------------|---|
| 1. Art | 5. Humanities |
| 2. English literature | 6. Music |
| 3. Foreign literature | 7. Philosophy |
| 4. History | 8. Speech and theater arts (except Spch 6, 6A, 9, and 39) |

Second, Third, and Fourth Year Course Requirements

The plan of course requirements for these years is in the process of being developed. Specific questions related to this may be directed to the School of Nursing. The total credit requirement will maintain 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 will be enrolled for courses in both general and professional education. There will be one summer of study included in the program which will follow either the second or the third ac-

†† Students who transfer from another college may substitute 6 quarter credits (4 semester credits) of general chemistry for NSci 4 and 5.

demical year. Students in this program will pay tuition, fees, maintenance, and other costs incidental to their learning experiences throughout the program.

PLAN C—BACCALAUREATE PROGRAM FOR REGISTERED NURSES

(Admission to begin fall quarter, 1962)

The General Nursing Program is the only program offered at the undergraduate level to registered nurse students who matriculate as beginning students after September 15, 1961. Existing specialized baccalaureate programs will continue to be offered to students who matriculated prior to September 15, 1961, or to transfer students with substantial advanced standing who can complete the requirements for either of these programs by spring, 1964.

Students admitted to the General Nursing Program will pursue concurrent general and professional education. General education requirements will be comparable to those listed for Plan B of the Basic Professional Nursing Program on page 21 of this bulletin.

The nursing courses are offered in sequence. They 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. In general, transfer credit for nursing courses taken in other colleges or universities will not be granted toward specific requirements of this degree.

For further information about this program, write to the School of Nursing.

III. Programs Leading to Specialized Baccalaureate Degrees

Students may be admitted at the beginning of any school term, but sequence of courses is such that it is desirable to enter fall quarter. Applicants must have achieved a C average for any college work taken prior to admission, and must have ranked in the upper third of their class upon completion of their diploma program in nursing. Advanced standing credits for a diploma program in nursing are granted as blanket credits—i.e., specific courses within the diploma nursing program are not recognized. Granting of blanket credit and evaluation of college courses taken elsewhere is done by the Office of Admissions and Records and the Admissions Committee of the School of Nursing. Students who have been granted blanket credit that includes college or university courses comparable to those required in either program may be exempted from the specific courses. This exemption does not reduce the total number of credits required for graduation.

Students are required to take the National League for Nursing Graduate Nurse Examination as soon as possible after enrolling. Applications for this test may be obtained from the Office of Admissions and Records. The testing fee is \$8.

Applicants admitted to the nursing education major will be admitted to the College of Education. School of Nursing faculty serve as major advisers for these students. Nursing administration students are admitted to the School of Nursing.

NURSING ADMINISTRATION PROGRAM

(Admission to be discontinued after fall quarter, 1961, except for students who can complete requirements by spring, 1964)

Completion of requirements for the baccalaureate program in nursing administration usually requires 9 academic quarters for the beginning registered nurse student. Courses in general education and courses prerequisite to upper division courses should be taken in the sophomore and junior years. Clinical nursing courses should be taken

in the junior year, and the major sequence in administration including field experience in the senior year.

General Course Requirements

(Credits shown in parentheses)

Comm 1-2-3, Engl A-B-C, Engl 1A-2A-3A, or Engl 1B-2B-3B (12-15) or exemption	Psy 1-2—General Psychology (6)
CD 80—Child Psychology (3)	Human physiology (4-6)
Political science, history, or economics (5)	Sociology or social science (6-8)
	Total (36-43)

Requirements for the Nursing Administration Major

(Credits shown in parentheses)

NuAd 170—Foundations of Nursing Administration (3)	NuAd 175-176—Elements of Nursing Administration (10)
NuAd 177—Practicum in Nursing Administration (15)	NuEd 162—Personnel Work in Nursing (3)
Nurs 165—Work Simplification in Nursing (4)	PubH 53—Introduction to Public Health (5)
Clinical nursing (12)	Elective in nursing, nursing education, or public health (3)
NuEd 69—Survey of Conditions and Trends in Nursing (3)	Total (58)

Electives—The student usually has about 40 elective credits available in the nursing administration program. Of these, at least 25 quarter credits are to be chosen from fields outside nursing and nursing administration. The total credit requirement, including electives in general or professional courses, is 180 quarter credits. It is recommended that half of this requirement be in general or liberal education courses.

NURSING EDUCATION PROGRAM

(Admission to be discontinued after September, 1961, except for those students who can complete requirements by spring, 1964)

Completion of requirements for the baccalaureate program in nursing education usually requires 9 academic quarters for the nurse who has received a diploma in nursing. Courses in general education and courses prerequisite to Upper Division offerings should be taken in the sophomore and junior years. Clinical nursing courses should be taken in the junior year, and the major sequence in nursing education, including practice teaching, in the senior year.

General Course Requirements

(Credits shown in parentheses)

Comm 1-2-3, Engl A-B-C, Engl 1A-2A-3A, or Engl 1B-2B-3B (12-15) or exemption	Sociology or social science (6-8)
CD 80—Child Psychology (3)	Physical education (5)
Psy 1-2—General Psychology (6)	Human physiology (4-6)
	Total (36-43)

Requirements for the Nursing Education Major

(Credits shown in parentheses)

Ed 55N—Introduction to Teaching Nursing (5)	NuAd 160—Ward Administration (3)
EdT 51A-B—The Teaching of Nursing (10)	PubH 53—Introduction to Public Health (5)
NuEd 69—Survey of Conditions and Trends in Nursing (3)	HED 180—The School and Society (3)
NuEd 171—Curriculum of the School of Nursing (3)	Clinical nursing (12)
NuAd 170—Foundations of Nursing Administration (3)	Elective in nursing, nursing education, nursing administration, or public health (3)
	Total (50)

Electives—The student has about 50 elective credits available in the nursing education program. It is recommended that all students, and especially those anticipating further study at the graduate level plan to include courses that are foundational to a liberal education. The total credit requirement, including electives in general or professional courses is 186 quarter credits. Desirably half of this requirement should be in general or liberal education courses.

IV. Programs Leading to Graduate Professional Degrees

Candidates for the graduate programs 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 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.

MASTER OF NURSING ADMINISTRATION PROGRAM

The course of study is so organized as to provide a central group of courses in nursing service administration with complementary instruction in such areas as public administration, educational administration, business administration, hospital administration, and personnel administration. Emphasis is placed on the development of increased understanding of human behavior, skill in identification and solving of nursing problems, and appreciation of the role of professional nursing in improving patient care.

The course requires a minimum of 45 quarter credits distributed as follows:

(Credits shown in parentheses)

Nursing (3)	Related fields (9)
Nursing administration (12)	Electives (6)
Field experience in nursing administration (15)	Total (45)

Variation in the distribution of credits requires approval of the major adviser and the School of Nursing 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)	NuAd 199D—Field Experience in Nursing Service Administration (15)
NuAd 191, 192—Principles of Administration Applied to Nursing Service Administration (12)	(or) NuAd 199S—Field Experience in Nursing Service Administration (15)
PubH 161—History and Development of Hospitals (3)	BA 152—Principles of Industrial Relations: Labor Marketing (3)
Pol 121—Municipal Administration (3) (or) Pol 131—Public Administration (3)	

Other courses are to be selected by the student in consultation with a major adviser from any course offerings numbered 100 and above.

Candidates who did not complete an undergraduate major in nursing administration or its equivalent (including field experience) will be required to include the following in addition:

NuAd 193—Principles of Administration Applied to Nursing Service Administration (6)	Electives (5-6)
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MASTER OF EDUCATION PROGRAM IN NURSING EDUCATION

The course of study is so organized as to provide a central group of courses in nursing education with an opportunity for study in related fields. Emphasis is placed on the 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 the equivalent of Ed 55N or B, EdT 51A-B, and at least 3 credits in other education courses in an accredited college or university before admission will be required to include them in the master of education program. These courses do not constitute a part of the 45 required credits.

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 Science, Literature, and the 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 possibly 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 bulletins, is used throughout the course descriptions and will not carry any page footnotes:

† To receive credit, all courses after the single dagger must be completed.

§ 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.

Practical Nursing (PN)

1. **Introduction to Practical Nursing.** Orientation to role of practical nurse as 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 com-

munity; 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 ¶15A, or ¶15B, or ¶15C)

Nursing (Nurs)

- 17-18. **Introduction to Clinical Nursing.** Principles and practice of selected nursing skills utilizing classroom and hospital laboratory; overview of development of nursing; responsibilities of the nurse in prevention of illness and care of sick. (6 cr per qtr)
- 50-51. **Medical-Surgical Nursing.** Progressive development of understandings and skills used in identifying and meeting needs of adult patients in medical-surgical areas with application of principles from natural and behavioral sciences. (10 cr per qtr)
- 52-53. **Fundamentals of Relationships in Nursing.** Recognition and understanding of common behavioral responses of individuals in illness; development of some of the skills used in establishing a helpful relationship. (1½ cr per qtr)
- 54-55. **Physiopathology of Illness.** Structural and physiological changes producing illness; measures used in identification, prevention, and control. (2 cr per qtr)
56. **Nursing in the Operating Room.** Principles of aseptic technique; knowledge and skill in performing nursing functions in operating rooms; broad perspective of social, economic, and emotional factors in nursing care of surgical patients. (6 cr)
58. **Orthopedic Nursing.** Principles in nursing care of orthopedic patients; clinical learning experiences in their care. (2 cr)
59. **Gynecologic Nursing.** Development of understandings and skills necessary for meeting the needs of women with disorders of the generative system; nursing measures of radiation therapy; psychological aspects of normal physiological processes. (4 cr)
60. **Maternity Nursing.** Assisting patients' physiological and psychological adjustment in the maternity cycle through identification of needs and selection of appropriate nursing approaches to meet these needs. (12 cr)
61. **Pediatric Nursing.** Application of knowledge from natural, behavioral, and medical sciences in care of ill infant, preschool and school-age child, and adolescent; identification and solution of problems related to illness, handicapping conditions, maintenance of health in infancy and childhood. (12 cr; prereq CD 80)
66. **Psychiatric Nursing.** Principles of nursing care as these relate to the psychiatric patient; understanding of therapeutic, rehabilitative, and preventive aspects; dynamics of human behavior; effect of psychological stress upon the nursing needs of the mentally ill. (4 cr)
67. **Neuropsychiatric Nursing.** Principles of nursing care of neurological and psychiatric patients. Directed observation and participation in care of neuropsychiatric patients. (8 cr)
68. **Nursing Care of Psychiatric Patients.** Classes, observation, and experience in care of psychiatric patients. (4 cr [open for credit to registered nurses who have not had psychiatric nursing experience in basic program]; prereq Δ)
87. **Public Health Nursing.** (Same as PubH 62 and PubH 65). Instruction and supervised experience in public health nursing in selected public health agencies. (12 cr)
88. **Rural Nursing.** Experience in nursing patients in rural community hospital; study of health needs and community resources in a rural area. (5 cr)

95. **Orientation to Nursing Management.** Experience in analyzing needs of patients with complex nursing problems and in planning programs of nursing care to meet these needs; experience in functioning as a leader of a team in executing plans of nursing care; orientation to the role of head nurse as she relates to team leader. (5 cr)
96. **Outpatient Nursing.** Study and observation of the ways in which the nurse works with others on the health team in planning care for patients in the outpatient department. (5 cr)
98. **The Nursing Profession.** Factors and values in society as these relate to the development of professions generally and to the professionalizing process in nursing. Examination of the responsibilities of nurses and organized nursing in terms of historical influences, changing needs, and altering interrelationships within the health fields. (3 cr)
111. **Special Educational Experiences in Nursing.** Various learning experiences planned to meet individual needs. For persons registering for irregular dates of attendance. Maximum of 12 weeks. (1-6 cr; prereq grad nurse and Δ)
- 151A, B, C. **Medical Nursing.** Identification of nursing needs of medical patients. Application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr; prereq Phsl 4 or 51, CD 80)
- 152A, B, C. **Maternity Nursing.** Identification of nursing needs of maternity patients; application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr; prereq Phsl 4 or 51, CD 80)
- 153A, B, C. **Operating Room Nursing.** Identification of nursing needs of surgical patients. Application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr; prereq Phsl 4 or 51, CD 80)
- 154A, B. **Pediatric Nursing.** Identification of nursing needs of pediatric patients. Application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr; prereq Phsl 4 or 51, CD 80)
- 157A, B, C. **Surgical Nursing.** Identification of nursing needs of surgical patients. Application of selected scientific principles and concepts to the solution of nursing care problems. (6 cr per qtr; prereq Phsl 4 or 51, CD 80)
165. **Work Simplification in Nursing.** Studies in nursing; methods of analyzing and improving practices; individual problems or participation in group studies. (4 cr)
190. **Foundations of Nursing.** Investigation of the role of nursing in promotion of health and care of the ill or helpless. (3 cr; prereq regis in grad program)
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. (10-15 cr; 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; prereq 170)
170. **Foundations of Nursing Service Administration.** Principles of administration as applied to hospital nursing service. (3 cr [no cr to grad students in nursing administration])
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; prereq 170 or #)

175. **Elements of Administration in Nursing.** Organization and role of nursing service in hospitals; role of team leader, head nurse, and supervisor in planning and directing patient care. (5 cr; prereq 170)
176. **Elements of Administration in Nursing.** Role of research in improving nursing services; administration of personnel services; evaluation of nursing service. (5 cr; prereq 177)
177. **Practicum in Nursing Administration.** Field experience and seminar. Observation and participation in selected nursing service activities in a hospital under guidance of field preceptor and faculty. (15 cr; prereq 175)
191. **Principles of Administration Applied to Nursing Service Administration.** Aims and organization of nursing service; staffing; planning and directing nursing care. (6 cr; prereq regis in M.N.A. program or #)
192. **Principles of Administration Applied to Nursing Service Administration.** In-service education; standardization of nursing procedures; communications; budgeting for nursing service. (6 cr; prereq 191)
193. **Principles of Administration Applied to Nursing Service Administration.** Community resources and agencies; planning for emergency nursing; problems in nursing service. (6 cr; prereq 192)
195. **Problems in Nursing Administration.** Individual study of a problem in administration of hospital nursing service. (1-9 cr; prereq regis in grad program and Δ)
- 199D. **Field Experience in Nursing Service Administration.** Field experience and seminar. Observation and participation in selected activities of a director or assistant director of nursing service in a hospital; individual or group investigation of a nursing problem. (15 cr; prereq 192)
- 199S. **Field Experience in Nursing Service Administration.** Field experience and seminar. Observation and participation in selected activities of an administrative supervisor of nursing service; individual or group investigation of a nursing problem. (15 cr; prereq 192)

Nursing Education (NuEd)

69. **Survey of Conditions and Trends in Nursing.** Exploration of nursing problems in contemporary society; historical development; factors in the social structure affecting nursing; evolving professional nursing obligations. (3 cr)
162. **Personnel Work in Nursing.** Overview of principles and techniques of personnel work applied to problems in nursing. Emphasizes the major personnel functions of recruitment and selection, orientation, motivation, communications, evaluation, and morale maintenance. (3 cr)
168. **Evaluation of Achievement.** Principles and techniques for construction of classroom tests; evaluation methods in addition to written tests; and factors influencing reliability and validity of evaluation. (3 cr; prereq sr, Ed 55N or NuAd 173 or #)
171. **The Curriculum of the School of Nursing.** Principles of curriculum development applied to educational programs in nursing. (3 cr; prereq 69, EdT 51A-B or #)
175. **Educational Administration in Nursing.** General orientation to the functions involved in administering educational programs in nursing; responsibilities of faculty members. (3 cr; prereq sr or #)
190. **The Survey in Nursing Education.** Survey techniques in evaluating an educational field. (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 program and Δ)

- 197E. Advanced Teaching of Nursing.** Investigation of research in learning and teaching; implications for nursing. (3 cr; prereq regis in M.Ed. prog 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 51A-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 sr, Ed 55N)
- EdCI 199E. Internship.** Advanced supervised teaching and practice work for candidates for the master of education degree. (9 cr; prereq regis in M.Ed. program, NuEd 197E)