Pharm.D. Curriculum

The professional program’s graduates are prepared to enter pharmacy practice, advanced professional training programs, graduate education, and research. The program covers the chemical, biological, physical, social, and clinical sciences that underlie pharmacy. A common patient care process is used to teach students how to meet drug-related needs at a patient-specific level. Students develop skills in problem solving, communication, and analytical thinking. The program emphasizes professional ethics, social responsibility, professional citizenship, and commitment to lifelong learning.

The first three years of the curriculum provide the fundamental components of pharmacy education needed to practice in a variety of settings. Beginning in the second year, students focus on their anticipated career pathway by taking courses in one of four emphasis areas: general pharmacotherapy, community and ambulatory care, management, and research. The majority of emphasis-related courses are taken during the final two years.

The curriculum is subject to change.

First Professional Year
(Course credits are listed in parentheses. A minimum of 12 credits per term is required for full-time status.)

Fall Semester (16 credits)
Phar 6100—Computer and Internet Skills ................... (1)
Phar 6111—Practice of Pharmaceutical Care I ............ (4)
Phar 6131—Pharmacy and the Health Care System .... (3)
Phar 6151—Biochemistry of Medicinals I ................... (3)
Phar 6161—Drug Delivery I ........................................ (3)
Phar 6171—Pharmaceutical Care Lab I ....................... (1)
Phsl 6041—Neurophysiology .................................... (1)

Spring Semester (19 credits)
Phar 6112—Practice of Pharmaceutical Care II ........... (4)
Phar 6152—Biochemistry of Medicinals II ................. (3)
Phar 6153—Pharmaceutical Immunology .................... (2)
Phar 6158—Recombinant DNA-Derived Drugs .......... (1)
Phar 6162—Drug Delivery II .................................... (3)
Phar 6172—Pharmaceutical Care Lab II .................... (2)
Phsl 6051—Systems Physiology ................................ (4)

Second Professional Year

Fall Semester (17 credits)
Phar 6121—Pharmacotherapy I ................................. (5)
Phar 6132—Biostats and Drug Literature Evaluation .. (2)
Phar 6154—Medicinal Agents I ................................. (3)
Phar 6163—Pharmacokinetics .................................. (3)
Phar 6173—Pharmaceutical Care Lab III .................... (1)
Phcl 5101—Pharmacology I ................................. (3)

Spring Semester (14 credits)
Phar 6122—Pharmacotherapy II .................................. (5)
Phar 6133—Pharmacy Practice Management ............... (3)
Phar 6155—Medicinal Agents II ................................. (2)
Phar 6174—Pharmaceutical Care Lab IV ..................... (2)
Phcl 5102—Pharmacology II ................................. (2)

Emphasis area courses

Third Professional Year

Fall Semester (13 credits)
Phar 6121—Pharmacotherapy I ................................. (5)
Phar 6156—Medicinal Agents III ................................. (4)
Phar 6164—Biopharmaceutics .................................. (3)
Phar 6175—Pharmaceutical Care Lab V ....................... (1)

Emphasis area courses

Spring Semester (14 credits)
Phar 6124—Pharmacotherapy IV ................................. (5)
Phar 6134—Law and Ethics in Pharmacy Practice ...... (2)
Phar 6157—Human Nutrition and Drug Therapy ....... (3)
Phar 6176—Patient Assessment ................................ (3)
Phar 6181—Intro to Clerkships, Seminar and Paper ... (1)

Emphasis area courses

Fourth Professional Year

Summer Session
Required externships or clerkships
Emphasis area clerkships or courses

Fall Semester
Phar 6182—Pharm.D. IV Seminar ............................. (1)
Required externships or clerkships
Emphasis area clerkships or courses

Spring Semester
Phar 6183—Pharm.D. IV Paper ................................. (2)
Required externships or clerkships
Emphasis area clerkships or courses

Emphasis Areas

The general pharmacotherapy emphasis prepares pharmacists for patient care activities in a variety of settings. Required classroom courses include applied pharmacokinetics and non-prescription drug therapy. Elective courses are available in areas such as communications, new drug development process, management, and pharmacotherapy for the elderly.
The **community and ambulatory care emphasis** prepares pharmacists to practice in community pharmacy and outpatient settings. Required courses include community pharmacy management, non-prescription drug therapy, and ambulatory care practice.

The **management emphasis** prepares pharmacists for careers in managing pharmacy services and drug therapy benefits. Required courses include community or institutional management, drug use review and management, and pharmaceutical economics and public policy. Elective courses are available in areas such as business law, marketing, health economics, personnel management, and organizational behavior.

The **research emphasis** provides students the opportunity to participate in pharmaceutical research and prepares them for graduate education. Students plan individualized programs with faculty advisers.

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**Emphasis Area Requirements**

<table>
<thead>
<tr>
<th></th>
<th>General Pharmaotherapy</th>
<th>Community and Ambulatory Care</th>
<th>Management</th>
<th>Research*</th>
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<tr>
<td><strong>Required didactic courses</strong></td>
<td>Phar 6211 (2)</td>
<td>Phar 6211 (2)</td>
<td>Phar 6231 (2) or 6232 (2)</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Phar 6215 (2)</td>
<td>Phar 6213 (2)</td>
<td>Phar 6233 (2)</td>
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<td>Phar 6231 (2)</td>
<td>Phar 6234 (2)</td>
<td>Phar 6234 (2)</td>
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<tr>
<td><strong>Required experiential courses</strong></td>
<td>Phar 7211 (4)</td>
<td>Phar 7211 (4)</td>
<td>Phar 7221 (4) or 7222 (4)</td>
<td>Phar 7231</td>
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<tr>
<td></td>
<td>Phar 7212 (4)</td>
<td>Phar 7215 (4)</td>
<td>Phar 7223 (4)</td>
<td>Phar 7232</td>
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<tr>
<td></td>
<td>Phar 7221 (4)</td>
<td>Phar 7221 (4)</td>
<td>Phar 7233</td>
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<tr>
<td><strong>Elective didactic credits</strong></td>
<td>6 credits</td>
<td>4 credits</td>
<td>4 credits</td>
<td>10 credits</td>
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<tr>
<td><strong>Elective experiential credits</strong></td>
<td>4 credits</td>
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<td>4 credits</td>
<td>none</td>
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<tr>
<td><strong>Seminar</strong></td>
<td>Phar 6182 (1)</td>
<td>Phar 6182 (1)</td>
<td>Phar 6182 (1)</td>
<td>Phar 6182 (1)</td>
</tr>
<tr>
<td><strong>Paper</strong></td>
<td>Phar 6183 (2)</td>
<td>Phar 6183 (2)</td>
<td>Phar 6183 (2)</td>
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</tr>
<tr>
<td><strong>Total credits</strong></td>
<td>25 credits</td>
<td>25 credits</td>
<td>25 credits</td>
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*All courses in the research emphasis area are tailored to the individual student's research interests and must be approved by a faculty member.*
College of Pharmacy Courses

Phar 1001. Orientation to Pharmacy. (1 cr; S-N only) Pharmacy career opportunities, pharmacist's role, issues faced by pharmacy profession, information about College of Pharmacy.

Phar 1002. Health Sciences Terminology. (2 cr; SP–§ 5201) A self-study course designed to provide students with a working knowledge of terminology used in the Health Sciences.

Phar 5201. Health Sciences Applied Terminology. (2 cr; SP–1002 or anatomy and physiology) A self-study course designed to provide students with advanced knowledge of medical terminology and its application in the content of patient medical records and clinical cases.

Phar 5270. Therapeutics of Herbal and Other Natural Medicinals. (2 cr; SP–Phsl 6051, organic chem, pathophysiology of disease states, 3rd yr pharmacy student; A-F only) Herbal products/supplements. Pharmacology, clinical indications, and drug interactions of most commonly used products in nontraditional complementary health care. Historical significance and evidenced-based role of these products in health care. Case studies of clinical applications.


Phar 6100. Computer and Internet Skills in Pharmacy. (1 cr; A-F only) Computer applications in pharmacy.

Phar 6111. The Practice of Pharmaceutical Care I. (4 cr; SP–1st yr pharmacy student, ¶6171; A-F only) The practice of pharmaceutical care, the pharmacy profession, drug information retrieval, professional communications, problem-solving skills, introductory clerkship.

Phar 6112. The Practice of Pharmaceutical Care II. (4 cr; SP–1st yr pharmacy student, 6111, ¶6172; A-F only) Comprehensive pharmaceutical care, health belief model, legal issues, prescription processing, clerkship continued and introduction to pharmacotherapy issues.

Phar 6121. Pharmacotherapy I: Patient-Centered Pathophysiologic Approach. (5 cr; SP–2nd yr pharmacy student, ¶6131, ¶6142, ¶6163, ¶6173; A-F only) Pathophysiology and pharmacotherapy of common fluid-electrolyte, renal, acid-base, immunologic and hematologic disorders.


Course Descriptions

The college’s courses are offered by four departments: Medicinal Chemistry, Pharmaceutics, Pharmaceutical Care and Health Systems, and Experimental and Clinical Pharmacology. Medicinal chemistry courses (biochemistry of medicinals, medicinal agents, biotechnology, immunology) and pharmacology courses focus on understanding the actions and therapeutic uses of various types of medications that affect organ systems, immune functions, and infectious disease-related problems. Pharmaceutics courses (drug delivery, pharmacokinetics, biopharmaceutics) concentrate on principles involved in drug dosage formulations; dosage form design; and how drugs are absorbed, distributed, and eliminated from the body. The experimental and clinical pharmacology courses include the pharmacotherapy sequence that applies basic and clinical sciences principles to the patient by focusing on the nature and cause of various disease states and the treatment of these disorders. Pharmaceutical care and health systems encompasses a pharmaceutical care sequence which examines the various roles of the pharmacist, current and future pharmacy practice, and a pharmacy management and public policy sequence.

Course Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>QP</td>
<td>Quarter Prerequisite (before fall 1999)</td>
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<tr>
<td>SP</td>
<td>Semester Prerequisite (after fall 1999)</td>
</tr>
<tr>
<td>§</td>
<td>Credit will not be granted if credit has been received for the course listed after this symbol.</td>
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<tr>
<td>¶</td>
<td>Concurrent registration is required (or allowed) in the course listed after this symbol.</td>
</tr>
<tr>
<td>#</td>
<td>Approval of the instructor is required for registration.</td>
</tr>
</tbody>
</table>

A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

A class rank prerequisite (e.g., 3rd yr) states the minimum class standing a student must hold to register for a course without special permission from the Academic Standing Committee.

A self-study course designed to provide students with a working knowledge of terminology used in the Health Sciences.

A self-study course designed to provide students with advanced knowledge of medical terminology and its application in the content of patient medical records and clinical cases.

Herbal products/supplements. Pharmacology, clinical indications, and drug interactions of most commonly used products in nontraditional complementary health care. Historical significance and evidenced-based role of these products in health care. Case studies of clinical applications.


Computer applications in pharmacy.

The practice of pharmaceutical care, the pharmacy profession, drug information retrieval, professional communications, problem-solving skills, introductory clerkship.

Comprehensive pharmaceutical care, health belief model, legal issues, prescription processing, clerkship continued and introduction to pharmacotherapy issues.

Pathophysiology and pharmacotherapy of common fluid-electrolyte, renal, acid-base, immunologic and hematologic disorders.

Pathophysiology/pharmacotherapy of common cardiovascular, endocrine, and gastrointestinal disorders.

Pathophysiology/pharmacotherapy of common neurologic, psychiatric, pulmonary, and geriatric disorders.
Phar 6124. Pharmacotherapy IV: Patient-Centered Pathophysiologic Approach. (5 cr; SP–Phar 6121, 6122, 6123, 6155, 6163; A-F only)
Pathophysiology and pharmacotherapy of common infectious diseases, oncologic and toxicologic disorders.

Phar 6131. Pharmacy and the Health Care System. (3 cr; SP–1st yr pharmacy student; A-F only)
Delivery of pharmaceuticals and pharmacy services in the U.S. health care system, issues in hospital and community practice, characteristics of the pharmaceutical industry, economic and financial issues in delivering pharmaceutical services.

Phar 6132. Biostatistics and Drug Literature Evaluation. (2 cr; SP–6111, ¶6173; A-F only)
Biostatistical methods for data analysis and principles of study design for clinical research. Use of small computers to analyze and present data. Methods of searching for and evaluating drug-related information.

Phar 6133. Pharmacy Practice Management. (3 cr; SP–2nd yr pharmacy student; A-F only)
Principles of pharmacy management, including inventory control, purchasing, pricing, financial analysis, and personnel management.

Phar 6134. Law and Ethics in Pharmacy Practice. (2 cr; A-F only)
Minnesota and federal laws, rules, regulations and court decisions affecting pharmacy practice. Moral and ethical considerations that affect and influence pharmacy practice.

Phar 6150H. Honors Course: Medicinal Chemistry Seminar. (1 cr [max 2 cr]; SP– #; A-F only)
Current topics in medicinal chemistry.

Phar 6151. Biochemistry of Medicinals I. (3 cr; SP–1st yr pharmacy student, ¶6171; A-F only)
Biochemistry topics required for understanding pharmacodynamic action and therapeutic use of medicinal agents.

Phar 6152. Biochemistry of Medicinals II. (3 cr; SP–6151, ¶6172; A-F only)
Intermediary metabolism of carbohydrates, lipids, amino acids and nucleic acids and how these pathways are affected by therapeutic agents. Introduction to bioenergetics and drug metabolism.

Phar 6153. Pharmaceutical Immunology. (2 cr; SP–6151; A-F only)
Basic biological mechanisms of immune system. Emphasizes drug allergies, immunosuppressives, monoclonal antibodies, and preparation/use of immunologic derived agents in diagnosing/treating disease.

Phar 6154. Medicinal Agents I. (3 cr; SP–6152, ¶Phcl 5101; A-F only)
Basic principles of drug design, metabolism of action, and receptor interaction. Chemical/biological properties and therapeutic uses of autonomic, antihistaminic, renal, and cardiovascular drugs.

Phar 6155. Medicinal Agents II. (2 cr; SP–6154, ¶6174, ¶Phcl 5102; A-F only)
Chemical/biological properties and therapeutic uses of drugs affecting central nervous, endocrine, and intermediary metabolism systems.

Phar 6156. Medicinal Agents III. (4 cr; SP–6152, 6153, 6154; A-F only)
 Therapeutic properties and uses of antiviral, anti-infective and antineoplastic agents.

Phar 6157. Human Nutrition and Drug Therapy. (3 cr; SP–6152; A-F only)
Basic concepts of human nutrition and clinical application.

Phar 6158. Recombinant DNA-Derived Drugs. (1 cr; SP–6151; A-F only)
Biotechnology as it relates to basic/clinical pharmaceutical sciences. Emphasizes recombinant DNA techniques and preparation/use of biotechnology-derived agents in diagnosing/treating disease.

Phar 6161. Drug Delivery I. (3 cr; SP–¶6171; A-F only)
Mathematics associated with drug dispensing; technology of common pharmaceutical dosage forms. Phenomenological and theoretical basis of equilibrium and steady-state processes controlling drugs and dosage forms.

Phar 6162. Drug Delivery II. (3 cr; SP–6161, ¶6172; A-F only)
Phenomenological and theoretical basis of kinetic and dynamic processes controlling drugs and dosage forms.

Phar 6163. Pharmacokinetics. (3 cr; SP–Calculus II (quarter), calculus I (semester) or equiv, 6162; A-F only)
Physiological basis for drug absorption, distribution, metabolism and excretion; use of mathematical principles and equations to describe these processes as well as design dosage regimens for individual patients.

Phar 6164. Biopharmaceutics. (3 cr; SP–6163, ¶6175; A-F only)
Applied theory of dosage form design for optimal drug activity and bioavailability for all routes of drug administration.

Phar 6171. Pharmaceutical Care Lab I. (1 cr; SP–¶6151, ¶6111, ¶6161; A-F only)
Integrating basic and clinical science curriculum in a lab setting.

Phar 6172. Pharmaceutical Care Lab II. (2 cr; SP–6112, 6152, 6162; A-F only)
Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting.

Phar 6173. Pharmaceutical Care Lab III. (1 cr; SP–¶6121, ¶6132; A-F only)
Integrating basic and clinical science curriculum in a lab setting.

Phar 6174. Pharmaceutical Care Lab IV. (2 cr; SP–6122; A-F only)
Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting.

Phar 6175. Pharmaceutical Care Lab V. (1 cr; SP–¶6123, ¶6164; A-F only)
Integrating basic and clinical science curriculum in a lab setting.

Phar 6176. Patient Assessment. (3 cr; SP–5102, Phcl 5101, Phsl 6051; A-F only)
Physical assessment skills. Patient assessment skills as they relate to provision of pharmaceutical care.

Phar 6181. Introduction to Clerkships, Seminar, and Paper. (1 cr; SP–3rd yr pharmacy; A-F only)
Professional behavior, patient confidentiality, universal precautions.

Phar 6182. Pharm.D. IV Seminar. (1 cr; SP–¶6182; A-F only)
Students present thesis topics to peers and faculty evaluators.
Phar 6183. Pharm.D. IV Paper. (2 cr; SP—4th yr pharmacy student, 6181; S-N only) Final paper describing a hypothesis-driven research project, patient-care oriented project, management project, drug-usage evaluation, or extensive literature review.

Phar 6211. Non-Prescription Drug Therapy: Focus on Patient Self-Care. (2 cr; SP—6112; A-F only) Expands on over-the-counter medications presented in 6112. Diagnostic and durable medical equipment available in community pharmacies as well as the use of alternative medications is discussed.

Phar 6212. Dermatology. (1 cr; SP—2nd or 3rd yr pharmacy student; A-F only) Pathophysiology and pharmacotherapy of dermatologic disorders.

Phar 6213. Pharmacy Practice in Ambulatory Setting. (2 cr; SP—2nd or 3rd yr pharmacy student; A-F only) Pharmaceutical care in an ambulatory (community) setting, and the role of a general pharmacy practitioner.

Phar 6214. Pharmaceutical Care Clinic. (1–2 cr; SP—Pharmacy student) Patients make appointments for pharmacy students to provide pharmaceutical care in presence of practitioner. Second/third year students learn “gold standard” for patient care. First year students participate in patient assessments as care plan team members. Weekly student case presentations/discussions.


Phar 6216. Pharmacokinetic Data Analysis and Simulation With SAAM II. (2 cr; SP—6163 with grade of at least B or #; A-F only) Introduction to SAAM II: an application for modeling, simulating, and analyzing pharmacokinetic/pharmacodynamic data.

Phar 6217. Advanced Pharmaceutical Care Clinic. (1 cr; SP—6214, advanced standing) Expanded, direct patient care opportunities. Students conduct comprehensive pharmaceutical care assessments in presence of practitioners. Weekly student case presentations/discussions.


Phar 6220. Pediatric Drug Therapy. (2 cr; SP—3rd yr pharmacy student; A-F only) Pathophysiology/therapeutics of disease states. Common issues encountered in providing pharmaceutical care to pediatric patients.

Phar 6221. Geriatric Pharmacotherapy. (2 cr; SP—3rd yr pharmacy student; A-F only) Pharmacokinetic/pharmacodynamic changes and their implications in elders. Effects of drug-drug/drug-disease interactions. Drug adherence barriers to provide optimum pharmacotherapy to elderly persons.

Phar 6222. Advanced Pharmaceutical Compounding. (2 cr; SP—2nd or 3rd yr pharmacy student; A-F only) Expands compounding skills beyond those gained in Pharmaceutical care lab.

Phar 6231. Community Pharmacy Management. (2 cr; SP—6133; A-F only) Management techniques needed in community pharmacy practice, with emphasis on marketing and service.

Phar 6232. Institutional Pharmacy Management. (2 cr; SP—6133; A-F only) Management techniques needed in various institutional pharmacy settings. Integrating distributive and clinical components of institutional practice.


Phar 6234. Pharmaceutical Economics and Public Policy. (2 cr; A-F only) Economic and public policy aspects of the U.S. health care system. Health economic principles and trends applied to the pharmaceutical market.

Phar 6246. Honors Course: Chemical Aspects of Drug Metabolism and Bioactivity. (2 cr; SP—#A-F only) Chemical/enzymatic mechanisms of biotransformation/bioactivation of drugs/other xenobiotics. Reactivity/fate of bioactivated metabolites.

Phar 6246H. Honors Course: Chemical Aspects of Drug Metabolism and Bioactivity. (2 cr; SP—#A-F only) Chemical/enzymatic mechanisms of biotransformation/bioactivation of drugs and other xenobiotics. Reactivity/fate of bioactivated metabolites. Taught every other year.

Phar 6247H. Honors Course: Advanced Concepts in Drug Design. (2 cr; SP—#A-F only) Current approaches to rational design of drugs.

Phar 6250H. Honors Course: Social and Administrative Pharmacy Seminar. (1 cr; SP—#A-F only) Current topics in hospital pharmacy.

Phar 6260H. Honors Course: Advancement of Pharmacy. (1–5 cr; SP—#) Contemporary topics in pharmacetics research.

Phar 6293. Directed Research I. (1–5 cr; SP—#) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental clinical pharmacology.

Phar 6294. Directed Study I. (1–5 cr; SP—#) Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

Phar 6393. Directed Research II. (1–5 cr; SP—#) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology.

Phar 6394. Directed Study II. (1–5 cr; SP—#) Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

Phar 6493. Directed Research III. (1–5 cr; SP—#) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology.
COURSE DESCRIPTIONS

Phar 6494. Directed Study III. (1-5 cr; SP-#)
Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

Phar 7120. Community Externship. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Students assigned to participating community pharmacies and involved in community practice activities full-time for 5 weeks.

Phar 7121. Institutional Externship. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Students assigned to participating hospital pharmacies.
Students participate in drug distribution, IV compounding, clinical services and administrative activities full-time for 5 weeks.

Phar 7122. Acute Patient Care Clerkship I. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients full-time for 5 weeks.

Phar 7123. Ambulatory Patient Care Clerkship. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in an ambulatory setting; students responsible for drug-related needs of individual patients full-time for five weeks.

Phar 7124. Geriatrics Patient Care Clerkship. (4 cr; SP–6221, 4th yr pharmacy student; A-F only)
Evaluates and pharmacotherapy of geriatric patients. Students work with other healthcare professionals/caregivers in outpatient and long-term care settings.
Rotation clerkship.

Phar 7125. Pediatrics Patient Care Clerkship. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Students responsible for drug-related needs of individual pediatric patients full-time for 5 weeks. Understanding pharmacokinetic and pharmacodynamic differences between adult and pediatric patients.

Phar 7126. Patient Care Clerkship. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Patient care experience in any setting; students responsible for drug-related needs of individual patients full-time for 5 weeks.

Phar 7127. Specialty Management Clerkship I. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7128. Acute Patient Care Clerkship II. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients full-time for 5 weeks.

Phar 7129. Specialty Management Clerkship II. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7130. Specialty Management Clerkship III. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7131. Specialty Management Clerkship IV. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7132. Specialty Management Clerkship V. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7133. Specialty Management Clerkship VI. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7134. Specialty Management Clerkship VII. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7135. Specialty Management Clerkship VIII. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7136. Specialty Management Clerkship IX. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7137. Specialty Management Clerkship X. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7138. Specialty Management Clerkship XI. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.

Phar 7139. Specialty Management Clerkship XII. (4 cr; SP–Pharm.D. I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience in a specialty pharmacy setting.
Phar 7224. Specialty Management Clerkship II. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience using management techniques in any pharmacy setting full-time for 5 weeks.

Phar 7225. Specialty Management Clerkship III. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience using management techniques in any pharmacy setting full-time for 5 weeks.

Phar 7231. Research Clerkship I. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience using research techniques in basic or clinical sciences or pharmacy practice full-time for 5 weeks.

Phar 7232. Research Clerkship II. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Experience using research techniques in basic or clinical sciences or pharmacy practice full-time for 5 weeks.

Phar 7233. Research Clerkship III. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)
Experience using research techniques in basic or clinical sciences or pharmacy practice full-time for 5 weeks.

Phar 7241. Clerkship Elective I. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Clerkship experience in one of many pharmacy-related areas full-time for 5 weeks.

Phar 7242. Clerkship Elective II. (4 cr; SP–Pharm.D.I-III, Minn Board of Pharm intern, criminal bkgr chk, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity; A-F only)
Clerkship experience in pharmacy-related area full-time. Five weeks.

Contributing Departments

MedC 5185. Principles of Biomolecular Simulation. (3 cr; QP–Chem 5521 or #; SP–Chem 3502 or #)
Molecular simulation for students in medicinal chemistry, pharmaceutics, biochemistry, and chemical physics

MedC 5200. The New Drug Development Process. (1 cr; S-N only)
New drug development process in the U.S. pharmaceutical industry.

MedC 5245. Introduction to Drug Design. (3 cr; SP–Chem; A-F only)
Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design, mechanism of action drugs.

MedC 5494. Advanced Methods in Quantitative Drug Analysis. (3 cr; QP–#; SP–#; A-F only)
Quantitative methods (HPLC, GC, TLC, and immunoassays) for analysis of drugs and metabolites in biological fluids. Advanced techniques such as capillary electrophoresis, supercritical fluid chromatography, GC-MS, LC-MS, and tandem mass spectrometry. Chromatographic theory and statistical approaches to method validation.

MedC 5495. Vistas in Medicinal Chemistry Research. (1 cr; S-N only)
Selected topics of contemporary interest in medicinal chemistry

MedC 5600. General Principles of Medicinal Chemistry. (3 cr; QP–Phcl 1009, BioC 5001; SP–MedC grad student or #, A-F only)
Fundamental principles of drug receptors as therapeutic targets, drug-receptor interactions, enzyme inhibitors, drug metabolism and disposition.

Phcl 5101. Pharmacology for Pharmacy Students. (3 cr; SP–Regis 2nd yr pharmacy student or #; A-F only)
Action/fate of drugs. Lectures, lab.

Phcl 5102. Pharmacology for Pharmacy Students. (2 cr; SP–5101 or #; A-F only)
Action/fate of drugs.

Phsl 6041. Neurophysiology. (1 cr; QP–Pharmacy student or #; SP–Pharmacy student or #; A-F only)
Introduction to neurophysiology.

Phsl 6051. Systems Physiology. (4 cr; QP–Biochemistry and human anatomy; A-F only)
Molecular, cellular, and organ level. General physiology, endocrine, circulatory, respiratory, digestive, energy metabolism, renal physiology. Homeostasis, basic regulatory aspects of physiological processes of organ systems.
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Dallas Bohnsack, New Prague
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Departments
Experimental and Clinical Pharmacology
Medicinal Chemistry
Pharmaceutics
Pharmaceutical Care and Health Systems

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625-8400

Child Care Center
1600 Rollins Avenue S.E.
627-4014

College of Continuing Education Evening Classes
150 Wesbrook Hall
625-3333

Counseling and Consulting Services
109 Eddy Hall
624-3323

Financial Aid
2-693 Moos Tower
(health professions office)
624-1665

Housing & Residential Life
Comstock Hall—East
624-2994

Office of the Registrar Service Center
200 Fraser Hall
625-5333

Registration Center
200 Fraser Hall
625-5333

Student Accounts Receivable
200 Fraser Hall
625-8500

University Information
625-5000
Publications

Catalog Use—The information in this catalog and other University catalogs, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

This publication is available in alternative formats on request. Contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail admissions@tc.umn.edu).

This catalog is also available at www.catalogs.umn.edu on the Web.

Class Schedule—This publication is published every semester and distributed with pharmacy registration materials. It lists day school courses complete with hours, rooms, instructors, prerequisites, registration instructions, examination fees, maps, grading definitions, and other useful information.

Other Catalogs—Evening and summer courses are listed in the College of Continuing Education Catalog and Summer Session Catalog, respectively. Catalogs are also published for other University colleges.

Policies

Equal Opportunity—The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to Julie Sweitzer, Director, Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

Access to Educational Records—In accordance with regents’ policy on access to student records, information about a student generally may not be released to a third party without the student’s permission. (Exceptions under the law include state and federal educational and financial aid institutions.)

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information. To do so, they must notify the records office on their campus (see below).

Students have the right to review their educational records and to challenge the contents of those records. The regents’ policy is available for review on the Web <http://onestop.umn.edu/registrar/Grades/index.html>, at 200 Fraser Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 200 Fraser Hall (612/625-5333).

Extracurricular Events—No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that students who are unable to complete course requirements because of approved events during finals week will be provided an alternative and timely opportunity to do so.

Smoke-free Campus—Smoking is prohibited in all facilities of the University of Minnesota–Twin Cities campus except for designated private residence hall rooms.
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