Twin Cities Campus

Medicinal Chemistry Ph.D.

Graduate Studies in Medicinal Chemistry

College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-626-3114)
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Website: http://z.umn.edu/medchemgrad

- Program Type: Doctorate
- Requirements for this program are current for Spring 2021
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants should have a BS or MS degree in an appropriate related science field such as pharmacy, chemistry, or biology. Students majoring in other degree programs that encompass chemical, biochemical, or biological fields of study are also encouraged to apply. All applicants should have completed undergraduate chemistry through elementary organic chemistry. Undergraduate coursework in biochemistry and physical chemistry is also a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students may apply for admission to the PhD program only and are only admitted fall semester.

Special Application Requirements:
Scores from the General (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty, a complete set of official transcripts, and a statement of immediate and long range career objectives are required. All application materials should be submitted by the admissions deadline listed on the departmental website in order to be considered for fellowship, teaching, and research assistantships awarded in the next academic year.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 95

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations(GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Program Requirements

24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must take all courses for an A-F grade, unless the course is only offered on the S/N grading basis.

Required Courses (15 credits)

MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8050 - Physical and Mechanistic Organic Chemistry (2.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8100 - Medicinal Chemistry Seminar (1.0 cr)
CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)

Biochemistry Requirement (2 to 4 credits)

Take at least one of the following courses or select a different 2 to 4 credit course in consultation with the advisor and director of graduate studies.
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)

Additional Course Requirements

Take three additional courses, two of which must be from the following list, to complete the 24 course-credit requirement.
MEDC 5185 - Principles of Biomolecular Simulation (3.0 cr)
MEDC 5494 - Advanced Methods in Quantitative Drug Analysis (2.0 cr)
MEDC 8070 - The Chemistry and Biology of Infectious Diseases (3.0 cr)
MEDC 8420 - Natural Products Chemistry (3.0 cr)
MEDC 8471 - High Throughput Drug Discovery (3.0 cr)
MEDC 8413 - Chemistry of Nucleic Acids (3.0 cr)
MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
MEDC 8700 - Advanced Concepts in Drug Design (2.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
MEDC 8401 - Chemistry of Counterterrorism: Chemical, Biological, Radiological, Nuclear & High Explosive Threats (2.0 cr)

Thesis Credits

Take at least 24 doctoral thesis credits.
MEDC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

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