

DRUG DISCOVERY & DEVELOPMENT

Drug Discovery & Development Overview

The Master of Science in Drug Discovery and Development program is organized as a collaboration between the Departments of Biochemistry and Structural Biology (BSB) (<https://lsom.uthscsa.edu/biochemistry/>) and Pharmacology (<https://lsom.uthscsa.edu/pharmacology/>) at The University of Texas at San Antonio, and as an educational arm of the Center for Innovative Drug Discovery (CIDD) (<https://cidd.uthscsa.edu/>). This two-year program, 32-credit hour, thesis-based program combines rigorous classroom instruction with hands-on laboratory research. The program is designed to cultivate critical thinkers and problem solvers prepared to enter the rapidly expanding biotechnology sector—particularly in South Texas, where San Antonio is emerging as a key hub, as well as in the broader national market. Students receive comprehensive training (coursework and research) in the principles and practices of drug discovery and development, including the design, characterization, testing, and commercialization of pharmacotherapeutic agents. The curriculum focuses on addressing some of the most pressing medical challenges of our time, including cancer, neurodegenerative disorders, cardiovascular disease, diabetes, osteoporosis, and infectious diseases. There are also enrichment components where students are exposed to the variety of job opportunities in the broad field of drug discovery, from the earliest phases of discovery at the bench, to the stages of development of a successful drug, and the regulatory and legal aspects of drug development. In this way, it maximizes early training for the diverse range of jobs within medical therapeutics.

Drug Discovery & Development Admission Requirements

All of the required application information, including official transcripts from all institutions attended, must be submitted in order for an applicant to be considered by the M.S. Drug Discovery & Development program Admissions Committee. In general, students should have a sufficient educational background in the biological or biochemical sciences prior to admission to the program. The following are the minimal requirements:

1. A baccalaureate degree from an accredited institution in the United States or proof of an equivalent degree and training at a foreign institution.
2. Required prior coursework: 2 years of biological science for science majors with labs; organic and inorganic chemistry with labs. Highly recommended: biochemistry and physiology
3. Minimal grade point average (GPA): No lower than B (3.0 on a 4.0 scale).
4. International applicants from countries where English is not the native language must earn a minimum score of 84 on the Test of English as a Foreign Language (TOEFL), a score of 7.0 on the Academic version of the International English Language Testing System (IELTS) or a score of 115 on the Duolingo English Test. International applicants who have completed or will complete their degree prior to matriculation at an accredited U.S. Institution may be exempted from the TOEFL/IELTS requirement.
5. Letters of recommendation (three) attesting to the applicant's readiness for graduate level studies. These letters should be submitted with the online application to the GSBS.

6. Research experience is not required, but will be considered.
7. Application deadlines can be found on the program's admission page.

Drug Discovery & Development Degree Requirements

Over a 2-year (4-semester) period, students are expected to fulfill all requirements of the M.S. in Drug Discovery & Development Program. Each semester will include a minimum of 8.0 credit hours, approximately 32 credit hours for the entire program.

Year 1: Students must enroll in all required courses and maintain a grade point average at or above 3.0 for all class work. In addition, in order to maintain satisfactory research/academic progress, students are required, prior to the end of the Year 1 fall semester, to identify and engage a faculty member in the program who will serve as the student's research advisor. Students must perform original research in the laboratory of their research advisors starting in spring of year 1. Guidance and evaluation of research progress will be aided by a Research Supervising Committee. Students are required to meet with the committee each semester from spring, Year 1 onwards, and obtain an S grade. Any I or U grade will result in probation and must be remedied by the following meeting. Successive I or U grades for Research, without approved extenuating circumstances, can be grounds for dismissal from the program.

Year 2: In addition to monitoring regular student progress, the Research Supervising Committee, together with the research advisor, will determine if the thesis research is adequate for granting the M.S. degree. This decision is confirmed by a public presentation of the thesis research and a closed-door oral defense of the thesis to be evaluated by the Research Supervising Committee.

First Year		Credit Hours
Fall		
BIOC 6035	Target Identification and Hit/Lead Discovery	2
TSCI 5070	Responsible Conduct of Research	2
BIOC 5094	Research Presentations and Career Opportunities	1
ELECTIVE		2
PHAR 6097	Research	1
Use PHAR or BIOC 6097, depending on Department of Mentor		
Total Credit Hours:		8.0
First Year		Credit Hours
Spring		
PHAR 5024	Principles of Pharmacology 1/Principles of Pharmacology 1 (first half of PHAR 5013)	1.5
ELECTIVE		1
CSAT 5095	Experimental Design And Data Analysis	3
BIOC 5094	Research Presentations and Career Opportunities	1
PHAR 6097	Research	1.5
Use PHAR 6097 or BIOC 6097 depending on Department of mentor		
Total Credit Hours:		8.0

Second Year

Fall		Credit Hours
PHAR 5023	Drug Discovery and Development	3
BIOC 5094	Research Presentations and Career Opportunities	1
PHAR 6097	Research (Use PHAR or BIOC 6097, depending on Department of Mentor)	4
Total Credit Hours:		8.0

Second Year

Spring		Credit Hours
BIOC 5094	Research Presentations and Career Opportunities	1
ELECTIVE		2
PHAR 6097	Research (Use PHAR or BIOC 6097, depending on Department of Mentor)	4
BIOC 6098	Thesis (Use PHAR or BIOC 6098, depending on Department of Mentor)	1
Total Credit Hours:		8.0

Elective Course List:

PHARM TBD-2 Principles of Pharmacology II (1.5 SCH)

INTD 6033 Cell Signaling Mechanisms (2 SCH)

BIOC 6037 Integration of Metabolic Pathways (2 SCH)

BIOC 5085 Biophysical Methods (2 SCH)

BIOC 6036 Macromolecular Structure and Mechanisms (2 SCH)

BIOC 6010 Gene Regulatory & Omics (2 SCH)

PHAR 6020 Molecular and pharmacological basis of therapeutics (2 SCH)

PHAR 6025 Molecular Pharmacology (2 SCH)

- The curriculum consists of 3 Drug Discovery-Specific Core Courses(6.5 SCH), courses in Experimental Design/Statistics and Ethical Conduct/Rigor, and Responsible Conduct of Research (5 SCH), a Seminar/Career guidance course each semester(4 SCH total), elective courses (4 SCH), research (11.5 SCH) and Thesis (1 SCH).
- Elective courses will allow students to specialize in a variety of areas, ranging from structure-based drug design and synthetic chemistry to the physiological basis of drug action, as well as information on the regulatory and legal aspects of drug development. In addition to the limited list above, all courses offered within the Integrated Biomedical Sciences Program of the Graduate School are available to MSD3 students, as long as approved by their advisor and COGS.