

PHD IN MEDICINAL CHEMISTRY

Satisfactory completion of a bachelor's degree in chemistry, biology, pharmacy or a related discipline is required. It is assumed that the undergraduate training will include differential and integral calculus, college physics, a one-year course in general and inorganic chemistry including a laboratory, a one-year course in organic chemistry including a laboratory, and training in analytical chemistry. An undergraduate course in physical chemistry is recommended.

The ability to excel in graduate studies and research must be evident based on grades from undergraduate studies, recommendations from college faculty, results from standardized aptitude and achievement examinations (Graduate Record Examination), and performance in research and independent study.

Students with M.S. degrees in medicinal chemistry or related fields may also be admitted directly to the Ph.D. program. Students without M.S. degrees may be admitted directly to the Ph.D. program, but must take 30 credits at the master's level prior to accruing doctoral level credits.

Ph.D. students need to complete the following courses as partial fulfillment of their requirement for a Ph.D. degree. Additional graduate courses (5000 to 8000 level) may be required, as advised during the development of each student's plan of study.

Code	Title	Hours
MBC 5100/7100	Ethical Conduct Research	1
MBC 5900/7900	Medicinal Chemistry Seminar ((6-8 hours, 1 each semester)) ¹	1
MBC 6190/8190	Advanced Medicinal Chemistry	4
MBC 6200/8200	Biomedical Chemistry	4
MBC 6300/8300	Biomedical Chemistry Laboratory I	1
MBC 6310/8310	Biomedical Chemistry Laboratory II	3
MBC 6550/8550	Biochemistry	4
MBC 8960	Ph.D. Dissertation Research In Medicinal Chemistry (minimum of 30 hours) ²	1-15
Electives ³		8

¹ One hour can be taken during each semester (fall or spring, not summer). A minimum of 6 hours, taken over 6 semesters, are required, up to 8 hours count towards degree completion.

² A minimum of 30 hours are required, but more than 30 hours can be taken and count towards degree completion.

³ Other 5000- and above level courses should be taken as electives, as advised. A minimum of 8 hours are required, but more than 8 hours can be taken and will be counted towards degree completion. See list below.

The following is a list of recommended elective courses:

Code	Title	Hours
Chemistry Courses		
CHEM 6330	Spectroscopic Methods And Analysis Of Spectra	4
CHEM 6400/8400	Advanced Organic Chemistry	4
CHEM 6410/8410	Organic Synthesis	4
CHEM 6510/8510	Protein Chemistry	4
CHEM 6520/8520	Enzymology	4
CHEM 6530/8530		
Biology Courses		
BIOL 6010/8010	Advanced Molecular Biology	4
BIOL 6020	Advanced Molecular Biology Laboratory	2
BIOL 6090/8090	Advanced Cell Biology	4
BIOL 6100/8100	Research Methodology: Cell And Molecular Biology	3
Medicinal and Biological Chemistry Courses		
MBC 5380	Medicinal And Poisonous Plants	3
MBC 6100/8100	Advanced Immunology	2
MBC 6450/8450	Advanced Synthetic and Medicinal Chemistry	2
Other 5000/7000 or 6000/8000 level courses as advised		

In addition, all students must satisfy the following:

- Minimum of 60 semester hours of graduate credit beyond the master's level (course numbers 7000 and above), including a minimum of 15 hours of courses, laboratories and seminars (exclusive of dissertation research) and a minimum of 30 hours of Ph.D. dissertation research.
- Satisfactory overall performance on a written qualifying examination covering graduate-level medicinal chemistry, biochemistry and either organic chemistry or advanced cell/molecular biology.
- Selection of a doctoral research adviser, preparation of an acceptable written Ph.D. dissertation proposal in consultation with the adviser, and the satisfactory oral defense of the proposal before the dissertation advisory committee. The written qualifying examination and the defense of the dissertation proposal will constitute the examination requirements necessary for advancement to candidacy for the Ph.D. in medicinal chemistry. The chair of the doctoral dissertation advisory committee will be the student's doctoral research adviser. The dissertation advisory committee will consist of two additional Medicinal and Biological Chemistry Department faculty plus one member from outside the student's department or college.
- Subsequent to admission to candidacy for the Ph.D. degree, the student is expected to spend a minimum of two semesters in full-time study at The University of Toledo.
- Preparation of a Ph.D. dissertation based on the results of an original research investigation performed by the student during his/her Ph.D. program at The University of Toledo.
- Presentation of the results of the dissertation research in a public seminar before the Department of Medicinal and Biological Chemistry and successful oral defense of the dissertation before the dissertation advisory committee.
- Acceptance of the dissertation by the Ph.D. dissertation adviser and the dissertation advisory committee.
- Maintenance of a cumulative graduate GPA of 3.0 or higher.

9. Three semesters of experience as a teaching assistant. The program believes experience in teaching is critical to solidifying the student's understanding of the basics of the field and improving communication skills.
- PLO 1. Interpret and critically evaluate literature in the respective discipline and identify gaps in current knowledge.
 - PLO 2. Design, implement, and analyze the results of an independent research project in the respective discipline.
 - PLO 3. Effectively communicate and defend research findings orally and in writing.
 - PLO 4. Describe and comply with standards of ethical conduct of research.
 - PLO 5. Effectively work in a team of colleagues within the discipline.
 - PLO 6. Demonstrate ability to independently design, plan, and execute a research program in the area of specialization.
 - PLO 7. Lead the ability to lead a research team and delegate components of a research program.
 - PLO 8. Describe new developments in the general field of pharmaceutical sciences and related fields.
 - PLO 9. Communicate and negotiate with leaders in these fields to find employment.