

Pharmacology & Toxicology Bachelor of Science Degree

What are Pharmacology and Toxicology?

Pharmacology and toxicology are biomedical sciences often referred to as sister disciplines. Pharmacology is the study of the sites, properties, effects, and mechanisms of drug action—the interactions of chemicals with biological systems. Toxicology addresses adverse effects of chemicals on humans and animals and includes exposure assessment, hazard identification, dose response assessment, and risk characterization. Both subjects integrate multiple scientific disciplines. Both fields rely on cutting-edge biotechnological approaches to gain insight into drug and toxicant action at the molecular level.

About the Program

The Bachelor of Science Pharmacology & Toxicology program at UW-Madison is constructed as an upper-level four-semester undergraduate sequence, administered by the School of Pharmacy. It is one of few such baccalaureate programs in the nation. Science-rich and research-oriented, the program features a broad interdisciplinary 40-credit core curriculum (including biochemistry, genetics, pathology, physiology, statistics and pharmacology & toxicology coursework) and is considered among the most challenging of biological science undergraduate majors at UW-Madison. Unique components of the program include pharmacology courses in the company of Pharm.D. students, toxicology coursework at the graduate level, and a one semester independent study research experience in a campus laboratory. The program provides considerable flexibility in electives, allowing students to tailor their degree towards personal interests and goals.

Admission to the Major

Entry to the major is competitive; applications are due February 1 for fall admission. A minimum of 60 credits of prerequisite coursework is required to apply, including biology (with lab), general and organic chemistry (with lab), physics (with lab), calculus, communications, and social science courses. For prerequisite specifics, course equivalencies and details, see www.pharmacy.wisc.edu/admissions. The admissions committee considers a number of factors when making decisions, with academic achievement as the central criterion. Applicants are expected to present credentials that demonstrate strong success in math and science courses. Other admissions criteria include oral and written communications skills, personal attributes, and diversity of background and experiences.

Career Opportunities

Students completing the program will be well qualified to pursue entry-level scientific career employment in industry (e.g., biomedical, biotechnology, consumer products, contract research organizations, or pharmaceutical), in academic research laboratories, or in various agencies of government.

The program's depth and breadth has proved to be an excellent foundation for graduate work in pharmacology, toxicology, or other related biomedical sciences, for medical school, veterinary medicine, and other health profession schools (e.g., pharmacy, public health, etc.). For students who tailor their general education and elective coursework appropriately, the Pharmacology & Toxicology program can also uniquely launch students into scientific writing, business positions, or law school. As future professionals aware of the pharmacological and toxicological sciences, Pharmacology & Toxicology graduates are well poised to make meaningful improvements in human and animal health.



Bachelor of Science Pharmacology & Toxicology Curriculum – effective fall 2008

JUNIOR YEAR COURSES	
FALL SEMESTER	
BIOCHEM 507, <i>General Biochemistry I</i> . Chemistry of biological materials, intermediary metabolism and protein structure. First semester of a year long course in biochemistry.	3 cr.
PHM SCI 558, <i>Laboratory Techniques in Pharmacology & Toxicology</i> . Basic laboratory techniques employed in pharmacological and toxicological research.	2 cr.
PHYSIOL 335, <i>Physiology (with lab)</i> . Lectures, recitations, demonstrations, and labs.	5 cr.
ELECTIVES*	2-8 cr.
Semester Total	12-18 credits, with 2 labs
SPRING SEMESTER	
BIOCHEM 508, <i>General Biochemistry II</i> . Chemistry and metabolism of nucleic acids and protein synthesis. Molecular and cellular biology.	3 cr.
BOTANY/GENETICS/ZOOLOGY 466, <i>General Genetics</i> . Genetics in eukaryotes and prokaryotes. Includes Mendelian genetics, mapping, molecular genetics, genetic engineering, cytogenetics, quantitative genetics, and population genetics. Illustrative material includes viruses, bacteria, plants, fungi, insects, and humans.	3 cr.
PATH 404, <i>Pathophysiologic Principles of Human Diseases</i> . Primarily for students of pharmacy and nursing to provide a basic understanding of the causes, pathophysiology, pathology and clinical manifestations of disease states.	3 cr.
STAT 371, <i>Introductory Applied Statistics for the Life Sciences</i> . Provides students in the life sciences with an introduction to modern statistical practice. Topics include: exploratory data analysis, probability and random variables; one-sample testing and confidence intervals, role of assumptions, sample size determination, two-sample inference; basic ideas in experimental design, analysis of variance, linear regression, goodness-of-fit; biological applications.	3 cr.
ELECTIVES*	0-6 cr.
Semester Total	12-18 credits

SENIOR YEAR COURSES	
FALL SEMESTER	
BIOCHEM/PHMCOL-M/ZOOLOGY 630, <i>Cellular Signal Transduction Mechanisms</i> . Comprehensive coverage of human hormones, growth factors and other mediators; emphasis on hormone action and biosynthesis, cell biology of hormone-producing cells.	3 cr.
PHM SCI 521, <i>Pharmacology I</i> . Pharmacological actions of important drugs, including drugs that affect the peripheral nervous system, the central nervous system, and the gastro-intestinal tract.	3 cr.
PHM SCI/M&ENVTOX 625, <i>Toxicology I</i> . Basic principles of toxicology and bio-chemical mechanisms of toxicity in mammalian species and man. Correlation between morphological and functional changes caused by toxicants in different organs of the body.	3 cr.
PHM SCI 699, <i>Advanced Independent Study</i> .	2-3 cr.
ELECTIVES*	0-7 cr.
Semester Total	12-18 credits
SPRING SEMESTER	
PHM SCI 522, <i>Pharmacology II</i> . Pharmacological actions of important drugs, including hematopoietic, thrombolytic, antihyperlipidemic, immunopharmacologic, anticancer, anti-inflammatory, diuretic, antihypertensive, antianginal, and anti-arrhythmic agents, and agents used to treat congestive heart failure.	3 cr.
PHM SCI/M&ENVTOX 626, <i>Toxicology II</i> . A course surveying the basic methods and fundamental biochemical mechanisms of toxicity. Toxicity in mammalian organ systems, techniques for evaluating toxicity, as well as mechanisms of species specificity, and environmental interactions (with toxicant examples) are presented.	3 cr.
PHM SCI 679, <i>Pharmacology & Toxicology Senior Seminar</i> . Students review current pharmacological and toxicological literature and research in academia, industry, and government. Student presentations of independent research.	1 cr.
ELECTIVES*	5-11 cr.
Semester Total 12-18 credits	12-18 credits

*"Electives" consist of any remaining pre-pharmacology & toxicology course requirements and 6 credits of electives in the major; any remaining non-major curriculum graduation requirements (Communication "B", humanities, and ethnic studies); and any free choice electives needed to reach the required total of 120 degree credits.