

# PHARMACOLOGY AND TOXICOLOGY, B.S.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

- |                   |  |
|-------------------|--|
| General Education | <ul style="list-style-type: none"> <li>• Breadth–Humanities/Literature/Arts: 6 credits</li> <li>• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits</li> <li>• Breadth–Social Studies: 3 credits</li> <li>• Communication Part A &amp; Part B *</li> <li>• Ethnic Studies *</li> <li>• Quantitative Reasoning Part A &amp; Part B *</li> </ul> |
|-------------------|--|

\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

### OVERVIEW OF REQUIREMENTS

The Pharmacology and Toxicology BS degree requires the following groups of coursework:

- University General Education requirements (above - those that are also prerequisite requirements will be completed before entering the program; remaining gen ed requirements can be completed at any time prior to graduation)
- Prerequisite requirements (completed prior to admittance/entrance to the program)
- Pharmacology and Toxicology major requirements (mostly completed after entering the program, though some courses can be completed earlier)

The PharmTox degree does not require any additional breadth courses beyond the University General Education requirements. Foreign language coursework can count towards the "Humanities/Literature/Arts" gen ed requirement.

School of Pharmacy academic policies (regarding matters such as academic and professional conduct, academic progress/probation, honor roll, pass/fail registration, and independent study coursework) are found

in the PharmTox student policy handbook (<https://pharmacy.wisc.edu/student-resources/>).

### PREREQUISITES CALCULUS I

Code	Title	Credits
Select one of the following options: <sup>1</sup>		
MATH 221	Calculus and Analytic Geometry I	
MATH 171 & MATH 217	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II	

<sup>1</sup>

MATH 211 Calculus taken at UW-Madison does not fulfill the Calculus I requirement for this major.

### GENERAL AND ORGANIC CHEMISTRY

Code	Title	Credits
Select one of the following general chemistry options:		
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
CHEM 109	Advanced General Chemistry	
CHEM 115	Chemical Principles I	

Select ALL of the following organic chemistry courses:

CHEM 343	Organic Chemistry I	3
CHEM 345	Organic Chemistry II	3
CHEM 344	Introductory Organic Chemistry Laboratory	2

### INTRODUCTORY BIOLOGY

Code	Title	Credits
Select one of the following options:		
BIOLOGY/ BOTANY/ ZOOLOGY 151 & BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology and Introductory Biology	
BIOLOGY/ ZOOLOGY 101 & BIOLOGY/ ZOOLOGY 102 & BOTANY/ BIOLOGY 130	Animal Biology and Animal Biology Laboratory and General Botany	
BIOCORE 381 & BIOCORE 382 & BIOCORE 383 & BIOCORE 384	Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics Laboratory and Cellular Biology and Cellular Biology Laboratory	

### COMMUNICATION

The UW–Madison Communication Part A requirement must be fulfilled.

## SOCIAL SCIENCE

Any course that qualifies as social science (S or Z) credit, 3 credits required.

## OTHER COLLEGE COURSES

Sixty (60) credits must be completed by the end of the summer semester prior to entering the program. AP, IB, retrocredits, and credit-granting transfer coursework from other institutions (including coursework completed while in high school) all count toward the 60 credits.

## PHARMACOLOGY AND TOXICOLOGY MAJOR REQUIREMENTS

**Students must take most of their major-level coursework in very specific semesters in order to graduate within four semesters of starting the program, due to prerequisites and fall or spring-only courses - see four year plans (p. ) for course sequences.** It may be possible to take some major-level courses earlier if prerequisites are met; consult the advisor. The five credits of elective coursework, statistics, genetics, and physics requirements can be completed at any time, including prior to admission to the program. The directed/independent study requirement must be performed after matriculation into the program (i.e. the first fall semester officially declared in the major or any semester thereafter).

## DIRECTED/INDEPENDENT STUDY (699), 2 CREDITS

Must be completed after matriculation into the major (i.e. the first fall semester officially declared in the major or any semester thereafter) and have prior approval to meet PharmTox major requirements. Students should not wait until the final semester to try to fulfill this requirement, as it can be difficult to find a research opportunity close to graduation. The research-based directed/independent study (typically a course numbered 699) must be in a biological, chemical, or biomedical sciences department, and can include laboratory-based research, library or literature-based research, or clinical research. Experiences such as peer mentoring or teaching assistance, even if a 699 course is used for credit, cannot fulfill this requirement.

## PHYSICS I AND II

Code	Title	Credits
Select one of the following options (consult with advisor on recommended sequences):		
PHYSICS 103 & PHYSICS 104	General Physics and General Physics	8
PHYSICS 201 & PHYSICS 202	General Physics and General Physics	10
PHYSICS 207 & PHYSICS 208	General Physics and General Physics	10

## STATISTICS

Code	Title	Credits
Select one of the following:		
STAT 240	Data Science Modeling I	4
STAT 301	Introduction to Statistical Methods	3

STAT 371	Introductory Applied Statistics for the Life Sciences (recommended)	3
STAT 324	Introductory Applied Statistics for Engineers	3
STAT/B M I 541	Introduction to Biostatistics	3

## BIOCHEMISTRY

Code	Title	Credits
BIOCHEM 507 & BIOCHEM 508	General Biochemistry I and General Biochemistry II	6

## PHYSIOLOGY

Code	Title	Credits
Select one of the following:		
ANAT&PHY 335	Physiology	5
BIOCORE 485 & BIOCORE 486	Principles of Physiology and Principles of Physiology Laboratory	5

## GENETICS

Code	Title	Credits
Select one of the following:		
GENETICS 466	Principles of Genetics	3
GENETICS 467 & GENETICS 468	General Genetics 1 and General Genetics 2 <sup>1</sup>	6
BIOCORE 381 & BIOCORE 382 & BIOCORE 383 & BIOCORE 384	Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics Laboratory and Cellular Biology and Cellular Biology Laboratory <sup>2</sup>	10

1

If students choose GENETICS 467 & GENETICS 468, 3 credits from this sequence will count towards the 5 required elective credits.

2

Students who have taken BIOCORE for introductory biology will have typically also completed the genetics requirement via BIOCORE courses taken sophomore/second year.

## PATHOLOGY

Code	Title	Credits
PATH 404	Pathophysiologic Principles of Human Diseases	3

## PHARMACUETICAL SCIENCES

Code	Title	Credits
All of the following are required:		
PHM SCI 558	Laboratory Techniques in Pharmacology and Toxicology	2
PHM SCI 679	Pharmacology and Toxicology Seminar (taken twice) <sup>1</sup>	1
PHM SCI/PHMCOL-M 521 & PHM SCI/PHMCOL-M 522	Pharmacology I and Pharmacology II	6
PHM SCI 623 or PHM SCI 581	Pharmacology III Molecular and Cellular Principles in Pharmacology	3

PHM SCI/ M&ENVTOX/ ONCOLOGY/ PHM COL-M/ POP HLTH 625 & PHM SCI/ M&ENVTOX/PATH/ PHM COL-M/ POP HLTH 626	Toxicology I and Toxicology II	6
--	-----------------------------------	---

1

Students need to take PHM SCI 679 in both their first and second years in the major in spring semesters (typically junior and senior years); the course is repeatable for degree credit.

## ELECTIVES IN THE MAJOR

Students must complete at least 5 elective credits in the pharmacology and toxicology major from the below list. Electives in the pharmacology and toxicology major are available within the School of Pharmacy and in many departments. It is suggested that students select electives in consultation with their advisor. Another option for fulfilling a portion or all of these 5 credits are additional directed/independent study (699) credits beyond the minimum 2 credits required for the major. Additional 699 credits must be approved by the PharmTox program to count towards the elective requirement if they are not done under the same principle investigator that was approved for the original two credits required.

### Pharmaceutical Sciences/Pharmacy

Code	Title	Credits
PHM SCI 420	Physicochemical Principles of Drug Formulation and Delivery	3
PHM SCI/B M E 430	Biological Interactions with Materials	3
PHM SCI 531	Medicinal Chemistry I	3
PHM SCI 532	Medicinal Chemistry II	2
PHARMACY 640	Appropriate Use of Abused Drugs	2

### Anatomy & Physiology

Code	Title	Credits
ANAT&PHY 337	Human Anatomy	3
ANAT&PHY 338	Human Anatomy Laboratory	2

### Animal Sciences

Code	Title	Credits
AN SCI/DY SCI 434	Reproductive Physiology	3

### Biochemistry

Code	Title	Credits
BIOCHEM/ NUTR SCI 510	Nutritional Biochemistry and Metabolism	3
BIOCHEM 550	Principles of Human Disease and Biotechnology	2
BIOCHEM 551	Biochemical Methods	4
BIOCHEM 570	Computational Modeling of Biological Systems	3
BIOCHEM/ M M & I 575	Biology of Viruses	2
BIOCHEM 601	Protein and Enzyme Structure and Function	2

BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	3
---------------------------------------	-------------------------------	---

### Biology Core Curriculum (BIOCORE)

Code	Title	Credits
BIOCORE 587	Biological Interactions	3

### Chemistry

Code	Title	Credits
CHEM 547	Advanced Organic Chemistry	3
CHEM 561	Physical Chemistry	3
CHEM 565	Biophysical Chemistry	4
CHEM 562	Physical Chemistry	3
CHEM 563	Physical Chemistry Laboratory I	1
CHEM 564	Physical Chemistry Laboratory II	1

### Environmental Studies

Code	Title	Credits
ENVIR ST/ POP HLTH 471	Introduction to Environmental Health	3
ENVIR ST/ POP HLTH 502	Air Pollution and Human Health	3

### Food Science

Code	Title	Credits
FOOD SCI 550	Fermented Foods and Beverages	2

### Genetics

Code	Title	Credits
GENETICS 545	Genetics Laboratory	2

### Math

Code	Title	Credits
MATH 605	Stochastic Methods for Biology	3

### Medical Microbiology & Immunology

Code	Title	Credits
M M & I 301	Pathogenic Bacteriology	2
M M & I 341	Immunology	3
M M & I/PATH- BIO 528	Immunology	3

### Medical Physics

Code	Title	Credits
MED PHYS/ H ONCOL 410	Radiobiology	2-3

### Microbiology

Code	Title	Credits
MICROBIO 303	Biology of Microorganisms	3
MICROBIO 304	Biology of Microorganisms Laboratory	2
MICROBIO 305	Critical Analyses in Microbiology	1

### Oncology

Code	Title	Credits
ONCOLOGY 401	Introduction to Experimental Oncology	2

ONCOLOGY/ PL PATH 640	General Virology-Multiplication of Viruses	3
--------------------------	---	---

### Psychology

Code	Title	Credits
PSYCH 450	Primates and Us: Insights into Human Biology and Behavior	3
PSYCH 454	Behavioral Neuroscience	3
PSYCH/ ZOOLOGY 523	Neurobiology	3

### Toxicology (Molecular & Environmental Toxicology)

Code	Title	Credits
M&ENVTOX/ CIV ENGR/ SOIL SCI 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects	3
M&ENVTOX/ AGRONOMY/ ENTOM/ F&W ECOL 632	Ecotoxicology: The Chemical Players	1
M&ENVTOX/ AGRONOMY/ ENTOM/ F&W ECOL 633	Ecotoxicology: Impacts on Individuals	1
M&ENVTOX/ AGRONOMY/ ENTOM/ F&W ECOL 634	Ecotoxicology: Impacts on Populations, Communities and Ecosystems	1

### Zoology

Code	Title	Credits
ZOOLOGY 425	Behavioral Ecology	3
ZOOLOGY 430	Comparative Anatomy of Vertebrates	5
ZOOLOGY 470	Introduction to Animal Development	3
ZOOLOGY 555	Laboratory in Developmental Biology	3
ZOOLOGY 570	Cell Biology	3

## QUALITY OF WORK REQUIREMENTS AND PASS/FAIL

Students must have a 2.000 cumulative grade point average at the time of graduation in order to earn a Pharmacology and Toxicology BS degree.

No course that is used for Pharmacology and Toxicology degree requirements may be taken as pass/fail and must be taken for a letter grade (AP, IB, or other test credits or placement exemptions are excluded from this requirement). This includes all prerequisite coursework, major requirements, and University General Education requirements.

## UNIVERSITY DEGREE REQUIREMENTS

**Total Degree** To receive a bachelor's degree from UW-Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW-Madison. "In residence" means on the UW-Madison campus with an undergraduate degree classification. "In residence" credit also includes UW-Madison courses offered in distance or online formats and credits earned in UW-Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.