

PHARMACOLOGY AND TOXICOLOGY, B.S.

Pharmacology and Toxicology (PharmTox) is an undergraduate major offered through the School of Pharmacy; successful completion of program requirements results in earning the Bachelor of Science–Pharmacology and Toxicology degree. Pharmacology and toxicology are related biomedical science 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 and rely on cutting-edge biotechnological approaches to gain insight into drug and toxicant action at the molecular level. Though the degree is titled “Pharmacology and Toxicology,” the program’s curriculum is multidisciplinary across various biomedical sciences.

The PharmTox degree/major has a selective and competitive admissions process, requiring completion of 60 college credits and specific prerequisite coursework. These typically take two academic years (freshman and sophomore years) to complete. Prerequisite coursework can be done at UW–Madison or at most accredited colleges and universities (see this website (<https://pharmacy.wisc.edu/programs/pharm-tox/admissions/transfers/>) for course equivalencies from other universities). Questions about course equivalencies from other colleges or universities can also be addressed with the PharmTox advisor.

At UW–Madison, pre–PharmTox students are usually in either the College of Letters & Science or the College of Agricultural and Life Sciences during their freshman and sophomore years while taking prerequisite coursework and preparing to apply to the major. Students can request to be assigned to the PharmTox advisor during this time, in addition to having a primary academic advisor in their current school. It is important to stay in contact with the PharmTox advisor to remain up-to-date with admission requirements and program changes. Applications are typically due in February, with students being admitted to the major and beginning core coursework in fall of the following year (typically junior year). The core major curriculum typically requires two years to complete (junior and senior years).

For those interested in becoming a licensed pharmacist, information about our Doctor of Pharmacy program (PharmD) can be found at <https://pharmacy.wisc.edu/programs/pharmd/>. The PharmD is required to be eligible to take the North American Pharmacist Licensure Examination (NAPLEX) and be registered and licensed as a pharmacist.

HOW TO GET IN

See the School of Pharmacy Academic and Admission Policies (<http://guide.wisc.edu/undergraduate/pharmacy/#enteringtheschooltext>).

APPLICATION

Application to the BS in Pharmacology and Toxicology is required as the program's size is limited. Students (both at UW–Madison and at other institutions) typically apply to the program by the beginning of February in their sophomore year for subsequent fall semester admission; students are not admitted at any other time of the year. (*Note that*

potential transfer students must also apply to UW–Madison itself (<https://www.admissions.wisc.edu/apply/transfer/deadlines.php>)). Students are notified by the end of March regarding their admission status. Applications and current due dates can be found on our website (<https://pharmacy.wisc.edu/programs/pharm-tox/admissions/>).

PREREQUISITES

To be eligible to apply, students must complete the following courses by the end of the summer semester prior to entering the program. Potential transfer students from a wide variety of regional institutions can find course equivalents (from their current university/college) on this School of Pharmacy webpage (<https://pharmacy.wisc.edu/programs/pharm-tox/admissions/transfers/equivalencies/>).

CALCULUS I

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

¹

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
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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.

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/#requirementsforundergraduatetext>) section of the *Guide*.

General Education	<ul style="list-style-type: none"> • Breadth–Humanities/Literature/Arts: 6 credits • 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 • Breadth–Social Studies: 3 credits • Communication Part A & Part B * • Ethnic Studies * • Quantitative Reasoning Part A & Part B *
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* 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: ¹		
MATH 221	Calculus and Analytic Geometry I	
MATH 171 & MATH 217	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II	

¹

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. 5) 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 ¹	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 ²	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) ¹	1
PHM SCI/PHMCMOL-M 521 & PHM SCI/PHMCMOL-M 522	Pharmacology I and Pharmacology II	6
PHM SCI 623	Pharmacology III	3
PHM SCI 581	Molecular and Cellular Principles in Pharmacology	3
PHM SCI/M&ENVTOX/ONCOLOGY/PHMCMOL-M/POP HLTH 625 & PHM SCI/M&ENVTOX/PATH/PHMCMOL-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
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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.

LEARNING OUTCOMES

1. Demonstrate a knowledge and understanding of the supportive biomedical fields.
2. Demonstrate a knowledge and understanding of Pharmacology.
3. Demonstrate a knowledge and understanding of Toxicology.
4. Understand scientific principles of laboratory design and presentation of scientific data.

FOUR-YEAR PLAN

A minimum of 120 credits is required to earn the BS in Pharmacology and Toxicology. Below are sample four-year plans for the Pharmacology and Toxicology major, incorporating both prerequisites and major coursework. They focus on science coursework sequencing and do not take into account factors such as AP or advance standing credits, additional summer courses, study abroad, or preparing for standardized tests like the MCAT or PCAT.

It is **critical** that you talk with your advisor about your tentative plan for course sequences and prerequisites, which courses are offered fall vs. spring vs. summer, etc.

EXAMPLE PLAN: CHEM 103/104**Freshman**

Fall	Credits	Spring	Credits
CHEM 103		4 CHEM 104	5
MATH 221		5 STAT 371	3
Communication A		3 Social Science	3-4
Electives		3-4 Electives	3-4
15-16		14-16	

Sophomore

Fall	Credits	Spring	Credits
CHEM 343		3 CHEM 345	3
ZOOLOGY/BIOLOGY/ BOTANY 151 (or Biocore)		5 CHEM 344	2
Ethnic Studies		3-4 ZOOLOGY/BIOLOGY/ BOTANY 152 (or Biocore)	5
Electives		3 Humanities	3-4
14-15		13-14	

Junior

Fall	Credits	Spring	Credits
BIOCHEM 507		3 BIOCHEM 508	3
ANAT&PHY 335 (or Biocore)		5 PATH 404	3
PHM SCI 558		2 PHM SCI 679	1
Humanities		3 PHYSICS 103	4
Research (699) credits		2-3 Electives in the Major or add'l research credits	2-3
15-16		13-14	

Senior

Fall	Credits	Spring	Credits
PHM SCI/PHM COL- M 521		3 PHM SCI/PHM COL- M 522	3
PHM SCI/M&ENVTOX/ ONCOLOGY/PHM COL- M/POP HLTH 625		3 PHM SCI/M&ENVTOX/ PATH/PHM COL-M/ POP HLTH 626	3
PHM SCI 623 ¹		3 PHM SCI 679	1
PHYSICS 104		4 GENETICS 466 (not req. if Biocore taken)	3
Electives in the Major or add'l research credits		2-3 Electives	3
15-16		13	

Total Credits 112-120

1

PHM COL-M/PHM SCI 521 Pharmacology I and PHM SCI 623 Pharmacology III are taken concurrently/in the same semester; PharmTox students can take PHM SCI 623 Pharmacology III before taking PHM COL-M/PHM SCI 522 Pharmacology II.

EXAMPLE PLAN: CHEM 109; BIOLOGY IN FIRST YEAR**Freshman**

Fall	Credits	Spring	Credits
CHEM 109		5 CHEM 343	3
MATH 221		5 ZOOLOGY/BIOLOGY/ BOTANY 151	5
Communication A		3 Social Science	3-4
Electives		3-4 Electives	3-4
16-17		14-16	

Sophomore

Fall	Credits	Spring	Credits
ZOOLOGY/BIOLOGY/ BOTANY 152		5 CHEM 344	2
CHEM 345		3 PHYSICS 103 or 207	4-5
Ethnic Studies		3-4 STAT 371	3
Humanities		3-4 Humanities	3-4
		Electives	2-3
14-16		14-17	

Junior

Fall	Credits	Spring	Credits
BIOCHEM 507		3 BIOCHEM 508	3
PHM SCI 558		2 PATH 404	3
ANAT&PHY 335		5 PHM SCI 679	1
Research (699) credits		2 PHYSICS 104 or 208	4-5
Electives		3 Electives in the Major or add'l research credits	2-3
15		13-15	

Senior

Fall	Credits	Spring	Credits
PHM SCI/PHM COL- M 521		3 PHM SCI/PHM COL- M 522	3
PHM SCI/M&ENVTOX/ ONCOLOGY/PHM COL- M/POP HLTH 625		3 PHM SCI/M&ENVTOX/ PATH/PHM COL-M/ POP HLTH 626	3
PHM SCI 623 ¹		3 PHM SCI 679	1
Electives in the Major or add'l research credits		2-3 GENETICS 466	3
Electives		3 Electives	3-4
14-15		13-14	

Total Credits 113-125

1

PHM COL-M/PHM SCI 521 Pharmacology I and PHM SCI 623 Pharmacology III are taken concurrently/in the same semester; PharmTox students can take PHM SCI 623 Pharmacology III before taking PHM COL-M/PHM SCI 522 Pharmacology II.

EXAMPLE PLAN: CHEM 103 SPRING OF FIRST YEAR**Freshman**

Fall	Credits	Spring	Credits
MATH 112, 113, 114, or 171		3-5 CHEM 103	4

Social Science	3-4 MATH 221 or 217	5	
Communication A	3 Humanities	3-4	
Electives	3-4 Electives	3-4	
12-16		15-17	
Sophomore			
Fall	Credits	Spring	Credits
CHEM 104	5	CHEM 343	3 CHEM 345
ZOOLOGY/ BIOLOGY/ BOTANY 151	5	ZOOLOGY/ BIOLOGY/ BOTANY 152	5 CHEM 344
Ethnic Studies	3-4	Humanities	3-4
Electives	3	Electives in the Major	3
16-17		14-15	
13		13-14	
Junior			
Fall	Credits	Spring	Credits
BIOCHEM 507	3	BIOCHEM 508	3
PHM SCI 558	2	PATH 404	3
ANAT&PHY 335	5	PHM SCI 679	1
STAT 371	3	PHYSICS 103	4
		Research (699) credits	2-3
13		13-14	
Senior			
Fall	Credits	Spring	Credits
PHM SCI/ PHM COL-M 521	3	PHM SCI/ PHM COL-M 522	3-4
PHM SCI/ M&ENVTOX/ ONCOLOGY/ PHM COL-M/ POP HLTH 625	3	PHM SCI/ M&ENVTOX/ PATH/ PHM COL-M/ POP HLTH 626	3
PHM SCI 623 ¹	3	PHM SCI 679	1
PHYSICS 104	4	GENETICS 466	3
Electives in the Major or add'l research credits	2-3	Electives	3-4
15-16		13-15	

Total Credits 116-128

1

PHM SCI/PHM COL-M 521 Pharmacology I and PHM SCI 623 Pharmacology III are taken concurrently/in the same semester; PharmTox students can take PHM SCI 623 Pharmacology III before taking PHM SCI/PHM COL-M 522 Pharmacology II.

THREE-YEAR PLAN

Below is a sample 3 year plan for the Pharmacology and Toxicology major, incorporating prerequisites, major coursework, and university-wide breadth and general education requirements. Students interested in graduating in three years should meet with the PharmTox academic advisor early and often to discuss feasibility, appropriate course

sequencing, post-graduation plans (careers, graduate school, etc.), and other considerations.

While there are many advantages to attending four years of college, including making the most of research and study abroad opportunities, exploring alternative majors, completing additional majors and certificates, developing skills and interests through student groups, and personal growth, students may have various reasons for wanting to graduate in three years, and the PharmTox advisor will work with students to help them prioritize their goals.

This example plan assumes that students will:

- Enter their first year at UW-Madison with at least 25 advanced standing credits (to be able to meet the PharmTox application prerequisite of 60 credits by the start of their second year), including equivalency credit for Introductory Biology (ZOOLOGY/BIOLOGY/BOTANY 151). Entering with fewer credits would require more credits in the fall, spring, and/or summer terms in the first year than in the example plan.
- Place into or are eligible to enroll in MATH 221 for first semester.
- Apply to the PharmTox major during their first year for admission for fall of their second year and have all prerequisite coursework complete by the end of the summer term after the first year.
- Enroll in enough credits each term to earn 120 total credits. Some terms may require more or less credits than the example plan, depending on the number of advanced standing credits a student brings in.

Summer coursework will be required after the first year for students without chemistry advanced standing credits, in order to complete general and organic chemistry before the start of the second year. Other summer coursework is not necessarily required, but may be helpful to alleviate credit loads and course combinations in fall or spring terms.

First Year

Fall	Credits	Spring	Credits	Summer	Credits
MATH 221	5	CHEM 343	3	CHEM 345	3
CHEM 109	5	ZOOLOGY/ BIOLOGY/ BOTANY 152	5	CHEM 344	2
Communication A	3	Social Science	3-4		
Humanities	3-4	Ethnic Studies	3-4		
16-17		14-16		5	

Second Year

Fall	Credits	Spring	Credits
BIOCHEM 507	3	BIOCHEM 508	3-4
ANAT&PHY 335	5	PATH 404	3
PHM SCI 558	2	PHM SCI 679	1
STAT 371 or 301	3	PHYSICS 103	4
Research (699) credits	2	Electives in the Major or add'l research credits	2-3
15		13-15	

Third Year

Fall	Credits	Spring	Credits
PHM SCI/ PHM COL- M 521	3	PHM SCI/ PHM COL- M 522	3-4
PHM SCI/ M&ENVTOX/ ONCOLOGY/ PHM COL-M/ POP HLTH 625	3	PHM SCI/ M&ENVTOX/ PATH/ PHM COL-M/ POP HLTH 626	3
PHM SCI 623 ¹	3	PHM SCI 679	1
PHYSICS 104	4	GENETICS 466	3
Humanities	3-4	Electives in the Major or add'l research credits	2-3
		Electives	3
16-17		15-17	

Total Credits 94-102

1

PHM SCI/PHM COL-M 521 Pharmacology I and PHM SCI 623 Pharmacology III are taken concurrently/in the same semester; PharmTox students can take PHM SCI 623 Pharmacology III before taking PHM COL-M/PHM SCI 522 Pharmacology II.

ADVISING AND CAREERS**ADVISING**

Pre-PharmTox students are often in the College of Letters & Science or the College of Agricultural and Life Sciences during their freshman and sophomore years while they are taking prerequisite coursework and preparing to apply to the major. Students can request to be assigned to the PharmTox advisor during this time, in addition to having a primary academic advisor in their current school/college, and are welcome to meet with the PharmTox advisor at any time.

The PharmTox advisor advises both current undergraduates and prospective high school/transfer students interested in learning more about the major. Appointments may be scheduled by calling (608) 262-6234 (for prospective high school/transfer students) or scheduled online via Starfish (<https://wisc.starfishsolutions.com/starfish-ops/>) (for current students). Advising is also available at SOAR for incoming students and includes curriculum planning and introductions to enrollment tools. The advisor can connect prospective undergraduate students with upperclassmen and alumni with similar interests. Once admitted to the major, students will have the PharmTox advisor assigned as their primary academic advisor.

CAREERS

Students completing the program will be well qualified to pursue entry-level scientific career employment (<https://pharmacy.wisc.edu/programs/pharm-tox/careers-in-pharm-tox/>) in industry (e.g., biomedical; biotechnology; consumer products; contract research organizations; regulatory affairs; pharmaceutical), in academic basic science and clinical research laboratories, or in various agencies of government focused on science, health, or the environment. The program's depth and breadth has proved to be an excellent foundation for graduate work in pharmacology, toxicology, or other related biomedical sciences, as well

as for medical school, veterinary medicine, and other health professions schools (e.g., pharmacy, dental, optometry, public health). For students who tailor their general education and elective coursework appropriately, the Pharmacology and Toxicology program can also uniquely launch students into scientific writing, business or regulatory positions, environmental positions, or law school. As future professionals aware of the pharmacological and toxicological sciences, pharmacology and toxicology graduates are well poised to make meaningful improvements in human and animal health.

Statistical information about immediate post-degree work or advanced degree attainment for alumni in the last decade may be found on the School website (<https://pharmacy.wisc.edu/programs/pharm-tox/student-outcomes/>). Due in part to its small size, the program has strong connections with its 400+ alumni who are located across the country and the globe. The PharmTox advisor can help students connect with alumni to explore careers and learn about employers.

Available career resources:

- The PharmTox advisor can assist with resume building, interview preparation, and career exploration, and also gives all PharmTox students access to a virtual career center via Canvas.
- Many L&S and CALS career workshops and fairs are open to all students, including PharmTox students. The Career Exploration Center (<https://cec.ccas.wisc.edu/>) (CEC) is also available to students who are in the early stages of career exploration, especially those who have lots of ideas or no ideas yet.
- Current students can join the Pharmacology and Toxicology LinkedIn group (<https://www.linkedin.com/groups/12266662/>) to network with fellow students and alumni.
- Handshake (<https://app.joinhandshake.com/auth/?auth=648>) features employer job postings specifically available to UW-Madison students, and is a great place to browse for internships and full-time jobs. Students can also post resumes and allow employers to contact them regarding potential employment.
- The Center for Prehealth Advising (<http://www.prehealth.wisc.edu>) assists students with preparing for and applying to professional healthcare programs, including medicine, physical therapy, physician assistant, dentistry, and more.

PEOPLE**FACULTY DIRECTOR**

Johnson, Jeffrey (Professor, Pharmaceutical Sciences)

ACADEMIC STAFF AFFILIATED WITH PROGRAM

Gurnee, Kendra (Program Manager and Advisor)

Kopacek, Karen (Associate Dean for Student Affairs)

de Villiers, Melgardt (Vice Dean and Associate Dean for Academic Affairs)

ADMISSIONS/OVERSIGHT COMMITTEE

Altschafli, Jeremy (Assistant Dean - Admissions)

Dai, Jun (Assistant Professor, Pharmaceutical Sciences)

Gitter, Christopher (Alumnus)

Gurnee, Kendra (Advisor and Program Coordinator)

Hong, Seungpyo (Professor, Pharmaceutical Sciences)

Johnson, Jeffrey (Professor, Pharmaceutical Sciences)

Vežina, Chad (Associate Professor, Comparative Biosciences)

de Villiers, Melgardt (Vice Dean and Associate Dean for Academic Affairs)

WISCONSIN EXPERIENCE

The following opportunities can help students connect with other students interested in pharmacology, toxicology, and other biomedical sciences, build relationships with faculty and staff, and contribute to out-of-classroom learning:

- The program's small size and cohort-based model makes it easy to arrange study groups, tutoring, and social events, and funds can be requested to support these activities.
- Students have access to a student commons, group study rooms, lockers, and a variety of gathering spaces in Rennebohm Hall. Ebling Library, located adjacent to Rennebohm Hall in the Health Sciences Learning Center, serves the School of Pharmacy student body, in addition to that of students from medicine, veterinary medicine, and nursing.
- The School of Pharmacy hosts a variety of student organizations (<https://pharmacy.wisc.edu/student-organizations/>), several of which are available to PharmTox students. Junior and senior class presidents are elected each year and represent each cohort by providing feedback, as well as serve on various School of Pharmacy committees to represent the PharmTox program.
- Students are required to participate in a scientific research experience for at least one semester after being admitted to the major, though continued research involvement before and after admission to the major is highly encouraged. The Biocommons website (<http://biology.wisc.edu/finding-mentor/>) has step-by-step information on how to find a research opportunity, and students can also speak with the advisor for additional guidance.
- Study abroad is definitely possible, although a winter session, spring break, or summer session experience fits most easily with the PharmTox curriculum. Visit the Study Abroad Major Advising Page for PharmTox (<https://studyabroad.wisc.edu/academics/major-advising-pages-maps/pharmacology-and-toxicology/>) to learn more.
- One to two travel awards are given annually to allow seniors to attend a national conference in the field of pharmacology and toxicology, and funding is often available to facilitate travel for interested students to regional conferences near Madison.
- The annual PharmD/PharmTox Research Symposium provides students with an opportunity to present their research projects each spring.