

New Academic Program Workflow Form

General

Proposed Name: Med Pharmacology & Toxicology

Transaction Nbr: 00000000000237

Plan Type: Major

Academic Career: Undergraduate

Degree Offered: Bachelor of Science

Do you want to offer a minor? Y

Anticipated 1st Admission Term: Fall 2025

Details

Department(s):

PHRM

DEPTMNT ID	DEPARTMENT NAME	HOST
1903	Pharmacology & Toxicology	Y

Campus(es):

MAIN

LOCATION	DESCRIPTION
TUCSON	Tucson

Admission application terms for this plan: Spring: Y Summer: Y Fall: Y

Plan admission types:

Freshman: Y Transfer: Y Readmit: Y Graduate: N

Non Degree Certificate (UCRT only): N

Other (For Community Campus specifics): N

Plan Taxonomy: 26.1007, Pharmacology and Toxicology.

Program Length Type: Program Length Value: 0.00

Report as NSC Program:

SULA Special Program:

Print Option:

Diploma: Y Medical Pharmacology and Toxicology

Transcript: Y Medical Pharmacology and Toxicology

Conditions for Admission/Declaration for this Major:

Typical university admission criteria apply for incoming undergraduate applicants. Continuing students must have a minimum 2.0 cumulative GPA to declare the major.

Requirements for Accreditation:

N/A

Program Comparisons

University Appropriateness

The Medical Pharmacology & Toxicology major aligns with three of the U of A pillars: Driving Student Success for a Changing World; Tackling Critical Problems at the Edges of Human Endeavor; and Ensuring UA lives it values and innovative culture. First, our major will attracts NEW students who are passionate about understanding drug mechanisms and toxic substances at a deep biological level, often from diverse academic, cultural, and socioeconomic backgrounds. This discipline naturally draws students with a wide range of interests, such as medicine, biotechnology, pharmacology, and healthcare. This allows us to enhance student diversity and taps into high-potential individuals. As the field evolves, pharmacology and toxicology will increasingly incorporate artificial intelligence, big data analytics, and biotechnological innovations. Students in this major will develop critical thinking, problem-solving, and research and communication skills that will allow them to lead in healthcare, biotechnology, and pharmaceutical industries--key sectors in the 4th Industrial Revolution.

Next, UA's goal of becoming a research leader can be substantially supported by our major as we directly address human health by exploring drug interactions, toxic exposure effects, and mechanisms of disease. This knowledge can be used to enhance therapeutic approaches, drug development, and personalized medicine. Students in this field, often involved in laboratory work, contribute to the university's research output by participating in projects that study cutting-edge therapies, drug repurposing, or new toxicological findings. Then, toxicology uses big data to model chemical safety, while pharmacology utilizes bioinformatics to understand how drugs interact with genetic information. These technological applications make this major a vital part of UA's research strategy

in health and biomedicine.

Finally, our major can help UA cultivate a dynamic educational and research environment in several key ways. First, we will train students to delve into pressing health problems caused by drugs (antibiotic resistance) and chemicals (environmental pollution). The work of our graduates will increase the visibility of our training programs and our university at large, enhancing our reputation as a leader in science. Then, as pharmacology and toxicology research require interdisciplinary collaboration (across medicine, chemistry, data science, and biology), our graduates will work in teams which fosters a collegial atmosphere, cultivates problem-solving skills, and creates a stimulating environment where students, researchers, and staff can thrive.

Arizona University System

NBR	PROGRAM	DEGREE	#STDNTS	LOCATION	ACCRDT
1	Pharmacology & Toxicology	BS	49	West Campus	Y

Peer Comparison

Detailed peer institution comparisons are provided in the attached PharmTox_Peer_comparison document. Enrollment numbers for ASU are not known; 49 is their total number of completions reported to IPEDS for 2020-2023.

Resources

Library

Acquisitions Needed:

Physical Facilities & Equipment

Existing Physical Facilities:

Existing facilities, including departmental and centrally scheduled classrooms, are sufficient.

Additional Facilities Required & Anticipated:

No additional facilities are required or anticipated.

Other Support

Other Support Currently Available:

Student support, including academic advising, can be absorbed by the existing College of Pharmacy Office of Student Services. Advising

caseloads will remain manageable, considering the expected major enrollment numbers.

Other Support Needed over the Next Three Years:

No additional support staff is needed within the next three years.

Comments During Approval Process

11/12/2024 3:51 PM

SCHNELLJ

Comments
Approved.

NEW ACADEMIC PROGRAM – MAJOR
Preliminary Proposal Form

- I. **Program Details**
 - a. Name (and Degree Type) of Proposed Academic Program: Bachelor of Science in Medical Pharmacology and Toxicology
 - i. Emphases (if applicable): N
 - b. Academic Unit(s)/College(s): Department of Pharmacology and Toxicology
 - c. Campus/Location(s): Main campus
 - d. First Admission Term: Fall 2025
- II. Primary Contact and Email: Jennifer G. Schnellmann, COP; schnellj@arizona.edu
- III. Executive Summary:
 - Offering core and advanced courses in pharmacology, toxicology, drug action, toxic agents, and the body's response to drugs and toxins/toxicants.
 - Emphasizing basic laboratory skills, data interpretation, analysis, and scientific research to better understand the effects of drugs and chemicals on biological systems as well as mechanisms of drug action and toxicity.
 - Preparing students for careers in healthcare, research, and regulatory fields by offering our faculty's expertise in pharmacology, toxicology, biochemistry, and related fields as well as our unique Poison Control Center in the COP.
 - Attracting students interested in careers in pharmaceuticals, healthcare, environmental science, or toxicology as well as seeking advanced degrees in pharmacology, toxicology, medicine, or related disciplines.
- IV. **Brief Program Description:**

Delve into the fascinating world of medical pharmacology and toxicology, where you'll explore the effects of venoms, poisons, drugs, and everyday chemicals on the human body and environment. Pharmacology and toxicology are complementary and interdisciplinary biomedical sciences that draw upon cell biology, systems physiology, biochemistry, molecular biology, and genetics. This major includes foundational pharmacology and toxicology coursework and electives, emphasizing reproductive, dermatological, cancer, infectious diseases, and cardiovascular foci. Whether you're interested in research, legal investigations, or setting safety standards, you'll gain an understanding of what can go wrong when exposed to harmful substances—either from pharmaceuticals, environmental factors, or occupational hazards. As the first health sciences college at the university, the College of Pharmacy offers established programs with internationally recognized pharmacologists and toxicologists. Students will work alongside researchers and our Centers of Excellence to gain expert-level toxicology instruction and training. The Bachelor of Science in Medical Pharmacology and Toxicology is the first of its kind offering a unique pathway to advanced studies or the option to jump directly into a career that significantly impacts public health and safety.

Program Rationale:

This proposed major should draw new students to the U of A who are interested in toxicology and medical pharmacology, topics not offered at most US universities. These new students will be trained in the basics of medical pharmacology as well as the specifics of drug side effects and adverse events, poisons and venoms, and deleterious chemical events that harm humans as well as our land, air, and water. Students who seek specific and rigorous training to become medical examiners, forensic or environmental toxicologists, and experts who work in pharma, industrial hygiene, consumer product

safety, regulatory affairs, poison control centers, and risk assessment will seek the U of A for this training program. Also, traditional pre-health professions students will find our program attractive because of the scientific and medical focus that prepares them uniquely for medical, pharmacy, veterinary, and graduate school, giving them a foundation not commonly taught in those later academic programs. Finally, algebra is the required math course because although these industries will require a high-quality entry point and this major will provide this compelling foundation, higher order mathematics is less emphasized.

V. Projected Enrollment for the First Three Years:

Year 1	Year 2	Year 3
20	30	50

VI. Evidence of Market Demand:

Graduates with a bachelor's degree in pharmacology and toxicology can enter many career and postsecondary educational paths. Some top fields for these graduates include but are not limited to agricultural/food science; biochemistry; clinical laboratory technology, epidemiology, biological science for academia, microbiology, medicine, pharmacy, nursing, veterinary medicine/science, medical scientists (risk assessment, pharmacology, toxicology), physician assistance, and environmental sciences. Overall, pharmacology and toxicology careers are expected to grow by approximately 12.3% between 2016 and 2026, indicating strong demand and a positive job outlook for graduates in these fields (College Factual). Also, according to the Bureau of Labor Statistics, poison control information specialists and technicians, medical courier and tissue processing technicians, blood and plasma processors, and sanitization compliance technicians are emerging careers expected to grow across the US. Nationally, pharmacology programs produce hundreds of graduates annually. For example, 479 graduates completed pharmacology programs recently (College Factual), so there is a perceived need for these degrees and this perception drives demand.

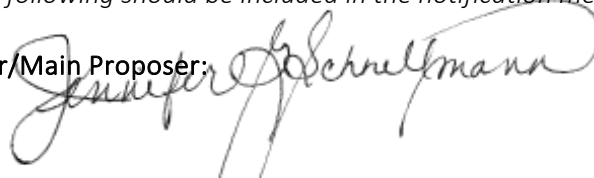
VII. Similar Programs Offered at Arizona Public Universities: ASU offers a pharmacology/toxicology major, but our proposal has more unique, stand-alone emphasis courses for specific pharmacology and toxicology topics such as reproductive, dermatological, cancer, infectious disease, and cardiovascular foci. Then, we offer rigorous scientific writing as a core course. We will leverage our placement on the University of Arizona's Health Sciences campus, along with our in-house relationship with the Arizona Poison & Drug Information Center, to offer hands-on learning and health science research opportunities that may not be readily available on the ASU West Campus.


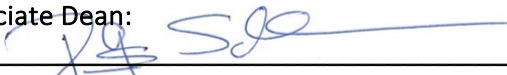
VIII. Resources

Current Pharmacology & Toxicology faculty have committed to developing the few new courses required for this program and delivering the content. The bulk of core courses in the major are already established and offered regularly. We do not anticipate any new hires or significant resources for this new major. The current advising office confirms that they are well-equipped to manage new incoming students and our core faculty are sufficient to teach these few additional courses as many have light teaching loads at this time.

IX. Required Signatures (the following should be included in the notification memo to campus after ABOR approval):

a. Program Director/Main Proposer:



- i. **Signature:** _____
 - ii. **Name and Title:** Jennifer G. Schnellmann, PhD; Associate Professor; Director, Undergraduate Studies, College of Pharmacy
 - iii. **Date:** June 28, 2024
- b. **Managing Unit/Department Head:**
 - i. **Signature:**  _____
 - ii. **Name and Title:** Xin Xin Ding, PhD, department head, Pharmacology and Toxicology, College of Pharmacy
 - iii. **Date:** July 9, 2024
- c. **College Dean/Associate Dean:**
 - i. **Signature:**  _____
 - ii. **Name and Title:** Rick. G. Schnellmann, PhD, Professor and Dean, College of Pharmacy
 - iii. **Date:** July 9, 2024



ADDITIONAL INFORMATION FORM
To be used once preliminary proposal has been approved.

I. MAJOR REQUIREMENTS–

UNDERGRADUATE

Total units required to complete the degree	120
Upper-division units required to complete the degree	42
Foundation courses	
Second language	2 nd semester proficiency
Math	M-Strand
General education requirements	Entry Course (1 unit) Exploring Perspectives (4 courses, 12 units) (one course from each domain required) -Artist -Humanist -Natural Scientist -Social Scientist Building Connections (3 courses, 9 units) Exit Course (1 unit)
List any special requirements to declare or gain admission to this major	Continuing students must have a cumulative GPA of 2.0 or higher to declare the major.
Major requirements	
Minimum # of units required in the major (units counting towards major units and major GPA)	38
Minimum # of upper-division units required in the major (upper division units counting towards major GPA)	35
Minimum # of residency units to be completed in the major	18

ADDITIONAL INFORMATION FORM

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<p>Required supporting coursework (courses that do not count towards major units and major GPA, but are required for the major).</p>	<ul style="list-style-type: none"> •CHEM 151 (4) General chemistry I •CHEM 152 (4) General chemistry II •CHEM 241A (3) Organic chemistry I •CHEM 243A (1) Organic chemistry lab I •CHEM 241B (3) Organic chemistry II •CHEM 243B (1) Organic chemistry lab II •MCB 181R (3) General biology I •MCB 181L (1) General biology I lab •ECOL 182R (3) General biology II •ECOL 182L (1) General biology II lab •PSIO 201 (4) Anatomy & physiology I + •PSIO 202 (4) Anatomy & physiology II Or •PSIO 380 (4) Fundamentals of human physiology • BIOC 384 (3) Foundations in biochemistry OR •BIOC 385 (3) Metabolic biochemistry
<p>Major requirements. List all major requirements including core and electives. Courses listed count towards major units and major GPA.</p>	<p>CORE: Complete all three (11 units)</p> <ul style="list-style-type: none"> •PCOL 305 (3) Scientific writing •PCOL 350 (3) Human ADME & toxicology •PCOL 406 (5) Comprehensive human pharmacology <p>Pharmacology category—complete at least three of the following: (9 units)</p> <ul style="list-style-type: none"> •PCOL 427 (3) Dermatological pharmacology—NEW •PCOL 429 (3) Neuropsychopharmacology •PCOL 434 (3) Pharmacology of sex •PCOL 436 (3) Cardiovascular pharmacology •PCOL 465 (3) Infectious disease pharmacology •PCOL 467 (3) Pharmacology of anti-cancer drugs <p>Toxicology category—complete at least two of the following: (6 units)</p> <ul style="list-style-type: none"> •PCOL 320 (3) Toxicology of the substances that surround us •PCOL 420 (3) Environmental toxicology—NEW •PCOL 451 (3) Forensic toxicology



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	<ul style="list-style-type: none"> • PCOL TBD (3) Poisoning diagnosis—NEW • PCOL TBD (3) Risk assessment & Medical Statistics—NEW <p>Major electives—complete at least four courses. (12 units) Electives may include extra courses from the pharmacology and toxicology category lists, or courses from the following list:</p> <ul style="list-style-type: none"> • PCOL 200 (3) Drugs & humanity • PCOL 300 (3) Pharmacology of cosmetics & self-care products • PCOL 445 (3) OTC drug information • PCOL 473 (3) Pharmacogenomics • PCOL TBD (3) Herbal supplements —NEW
Internship, practicum, applied course requirements (Yes/No).	No
Senior thesis or senior project required (Yes/No).	No
Additional requirements (provide description)	N/A
Minor (specify if optional or required)	Optional
Any restrictions on multiple use of courses (Yes/No)? If yes, provide description.	Yes. A maximum of 17 major units may be double-dipped with other majors or minors within the same degree. The remaining 21 major units must be unique to the Medical Pharmacology & Toxicology major.

II. CURRENT COURSES—

Course prefix and number (include cross-listings)	Units	Title	Pre-requisites	Modes of delivery (online, in-person, hybrid)	Dept signed party to proposal? (Yes/No)
PCOL 305	3	Scientific Writing for Health Sciences	ENGL 102/108/109H and CHEM 151	Hybrid	N/A



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PCOL 350	3	Human ADME & Toxicology	CHEM 241B and PSIO 202 or 380	In-person	N/A
PCOL 406	5	Comprehensive Human Pharmacology	CHEM 241A and PSIO 202 or 380	In-person	N/A
PCOL 434	3	Pharmacology of Sex	PSIO 202 or 380 and CHEM 241A	Hybrid	N/A
PCOL 436	3	Cardiovascular Pharmacology	CHEM 152 and MCB 181R	Hybrid	N/A
PCOL 465	3	Infectious Disease Pharmacology	CHEM 241A and MCB 181R	In-person	N/A
PCOL 467	3	Pharmacology of Anti-Cancer Drugs	CHEM 241A and MCB 181R	In-person	N/A
PCOL 320	3	What's Your Poison? Toxicology of the Substances that Surround Us	CHEM 151 and MCB 181R	Hybrid	N/A
PCOL 200	3	Drugs & Humanity	None	In-person	N/A
PCOL 300	3	Pharmacology of Cosmetics & Self-Care Products	CHEM 152	Online	N/A
PCOL 445	3	Over the Counter Drug Information	PSIO 202	Hybrid	N/A
PCOL 473	3	Pharmacogenomics: Predicting a Patient's Future	PCOL 406 and PCOL 350	In-person	N/A

III. NEW COURSES NEEDED—

Course prefix and number	Units	Title	Pre-requisites	Modes of delivery (online, in-person, hybrid)	Status*	Anticipated first term offered	Dept signed party to proposal? (Yes/No)
PCOL 420	3	Environmental Toxicology	MCB 181R and CHEM 152	TBD	S	Spring 2026	N/A
PCOL 427	3	Dermatological Pharmacology	PSIO 202 or 380	TBD	A	Fall 2026	N/A
PCOL 429	3	Neuropsychopharmacology	PSIO 202 or 380	Hybrid	A	Fall 2025	N/A
PCOL 451	3	Introduction to Forensic Toxicology	CHEM 241A and PSIO 202 or 380	In-person	A	Spring 2025	N/A
PCOL 4XX	3	Poisoning Diagnosis	PSIO 202 or 380	TBD	D	Fall 2026	N/A



ADDITIONAL INFORMATION FORM

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PCOL 4xx	3	Risk Assessment & Medical Statistics	MATH 112	TBD	D	Spring 2027	N/A
PCOL 4xx	3	Herbal and Dietary Supplements	PSIO 202 or 380	Live online	D	Fall 2026	N/A

*In development (D); submitted for approval (S); approved (A)

IV. FACULTY INFORMATION-

Faculty Member	Involvement	UA Vitae link or Box folder link
Jennifer Schnellmann	Teach PCOL 305, 320, 434, and 300	Box folder link
George Watts	Teach PCOL 406, 350, 465, and 467	Box folder link
Ashley Campbell	Teach PCOL 429	Box folder link
Qin Chen	Teach PCOL 436	Box folder link
Sarrah Hannon	Teach PCOL 451	Box folder link
Bernard Futscher	Teach PCOL 200 and 473	Box folder link
Bernadette Cornelison	Teach PCOL 445	Box folder link
Beth Zerr	Teach PCOL 4xx (Herbal & Dietary Supplements)	Box folder link



ADDITIONAL INFORMATION FORM
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V. GRADUATION PLAN—

Semester 1		Semester 2		Semester 3		Semester 4	
Course prefix and number	Units	Course prefix and number	Units	Course prefix and number	Units	Course prefix and number	Units
UNIV 101	1	ENGL 102	3	CHEM 241A	3	CHEM 241B	3
ENGL 101	3	Language 2	4	CHEM 243A	1	CHEM 243B	1
Language 1	4	CHEM 152	4	PSIO 201	4	PSIO 202	4
MATH 112	3	MCB 181R	3	Major elective	3	Pharma category	3
CHEM 151	4	MCB 181L	1	Gen ed	3	Gen ed	3
						Gen ed	3
Total	15	Total	15	Total	14	Total	17

Semester 5		Semester 6		Semester 7		Semester 8	
Course prefix and number	Units	Course prefix and number	Units	Course prefix and number	Units	Course prefix and number	Units
ECOL 182R	3	BIOC 384 or 385	3	PCOL 305	3	Tox category	3
ECOL 182L	1	PCOL 350	3	Pharma category	3	Major elective	3
PCOL 406	5	Pharma category	3	Major elective	3	Major elective	3
Tox category	3	Gen ed	3	Upper-division elective	3	Upper-division elective	3
Gen ed	3	Gen ed	3	General elective credit	4	UNIV 301	1
Total	15	Total	15	Total	16	Total	13



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VI. LEARNING OUTCOMES AND CURRICULUM MAP—

Learning Outcomes

Learning Outcome #1	Describe the foundational principles of pharmacology and toxicology and their applications to public health and the environment.
	Concepts: Cell biology, molecular biology, physiology, biochemistry, genetics.
	Competencies: Explain how drugs, venoms, poisons, and environmental chemicals affect biological systems; describe mechanisms of drug action, adverse effects, and toxicity.
	Assessment Methods: Exams, class discussions, research presentations (direct) and student exit survey (indirect).
	Measures: Instructor grading of assignments, exams, and evaluation of discussions; responses to student exit survey.
Learning Outcome #2	Analyze the effects of toxic substances and drugs on human physiology and apply their knowledge to medical situations.
	Concepts: Reproductive, dermatological, cardiovascular, neurological, and cancer-related, and infectious diseases.
	Competencies: Analyze case studies involving drug side effects, adverse events, poisons, venoms, and environmental toxins; assess physiological responses and predict outcomes.
	Assessment Methods: Case study analyses, exams, research projects (direct) and student exit survey (indirect).
	Measures: Instructor grading of case analyses, exams, and projects; responses to student exit survey.
Learning Outcome #3	Recognize the intersections among plants, animals, drug-like chemicals, and humans and the outcomes that can arise in these intersections.
	Concepts: Peer-reviewed literature reading and research; data analysis, communication of scientific findings using scientific writing.
	Competencies: Design and execute experiments; analyze and interpret data related to drug efficacy, toxicity, and environmental health risks.
	Assessment Methods: Research papers, lab reports, experimental design projects (direct) and student exit survey (indirect).



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	Measures: Instructor grading of research reports, experiments, and presentations; responses to student exit survey.
Learning Outcome #4	Research topics in pharmacology and toxicology and communicate findings for experts and patients.
	Concepts: Occupational hazards, regulatory standards, consumer product safety, environmental toxicology.
	Competencies: Evaluate and communicate risks of toxic substances in occupational and environmental settings; assess compliance with safety regulations.
	Assessment Methods: Regulatory compliance assignments, policy analysis reports, public health risk assessments (direct) and student exit survey (indirect).
	Measures: Instructor grading of assignments and reports; responses to student exit survey.
Learning Outcome #5	Apply the pharmacological basis of toxicology and toxic outcomes such as side effects and adverse events.
	Concepts: Toxicology in environmental health, pharmaco/toxicogenomics, biomarkers of exposure, public safety, risk assessment.
	Competencies: Identify and evaluate the consequences of exposure to harmful substances in humans and ecosystems; develop recommendations for minimizing public health risks.
	Assessment Methods: Capstone projects, public health reports, environmental risk assessments (direct) and student exit survey (indirect).
	Measures: Instructor grading of final projects, reports, and assessments; responses to student exit survey

Curriculum Map

		LO#1: Students will apply the foundational principles of pharmacology and toxicology to public health and the environment.	LO#2: Students will analyze the effects of toxic substances and drugs on human physiology and apply their knowledge to medical situations.	LO#3: Students will understand the intersections among plants, animals, drug-like chemicals, and humans and the outcomes that can arise in these intersections.	LO#4: Students will demonstrate the ability to research topics in pharmacology and toxicology and communicate their findings for experts and patients.	LO#5: Students will apply the pharmacological basis of toxicology and toxic outcomes such as side effects and adverse events.
CORE	305 Writing			M	M	
	350 ADME	I	I	R	I	
	406 Pharmacology			I	R	
	427	R	R			



ADDITIONAL INFORMATION FORM
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	Derma					
	429	R	R			
	Neuro					
	434	R	R			
	Sex					
	436	R	R			
	Cardio					
Toxicology category	465	R	R			R
	Infectious					
	467	R	R			I
	Cancer					
	320			I		
	Tox					
	420	M		R		
Enviro Tox						
Electives	451			R		R
	Forensic Tox					
	XXX-1		M	R		R
	Poisoning					
	XXX-2			R		M
	Risk Assmt					
	200			R		
Drugs & Hums						
300			R			
Cosmetics						
445		R	R			
OTC						
473		R				I
Genomics						
XXX-3						R
Supplements						

Mastery of LO#3 in PCOL 305 (Scientific Writing) occurs because the foundational knowledge for writing about drugs occurs in a course that is typically taken in the junior year in the fall, often in tandem with PCOL 406. Students who have taken PCOL 406 prior to PCOL 305 simply fare better, but it is highly feasible to be learning pharmacology while learning to write about it, and the most intense writing about pharmacology occurs in the last 5 weeks when most of the course is complete. We have had much success with this order thus far in the BSPS.



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VII. PROGRAM ASSESSMENT PLAN-

Assessment Measure	Source(s) of Evidence	Data Collection Point(s)
Job placement and grad school admission statistics	Graduation survey	In students' final semester
Academic Program Review	Reviewers' responses	Every 7 years
Learning Outcome Assessment	Direct and Indirect measures	Every year via the graduation survey, and on a biennial basis for course-embedded assessments
Student interest	Enrollment numbers	Every year

VIII. ANTICIPATED STUDENT ENROLLMENT-complete the table below. What concrete evidence/data was used to arrive at the numbers?

5-YEAR PROJECTED ANNUAL ENROLLMENT					
	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
Number of Students	30	60	70	70	80

Data/evidence used to determine projected enrollment numbers:

We've looked at peer programs across the country, which tend to be small, and used an average of these numbers in our estimation; however, we also considered the increasing trend in enrollment in STEM and health science-focused majors in general. Our first-year projected enrollment reflects a small number of incoming students for fall 2025 due to the late roll-out of the program, along with some major changes from continuing students. In future years we expect to attract an average of 20 new freshmen per year.

IX. ANTICIPATED DEGREES AWARDED-

PROJECTED DEGREES AWARDED ANNUALLY					
	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year



ADDITIONAL INFORMATION FORM

To be used once preliminary proposal has been approved.

Number of Degrees		10	10	10	20
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Data/evidence used to determine the number of anticipated degrees awarded annually:

Projected degrees awarded are a direct reflection of our projected enrollment numbers. The 20 incoming freshmen students we anticipate admitting each year, beginning in year 2, will reach their four-year graduation goal in year 5. In the earlier years, we will only be graduating those students who joined the program by changing their majors in their sophomore and junior years, which we anticipate will be a smaller number.

X. SUPPORT FACULTY/STAFF—please list name, title, and email for applicable positions below.

Lead Academic Advisor: Rebecca Field, M.Ed. — Director of Undergraduate Student Services

Director of Graduate Studies: N/A

Graduate Coordinator: N/A

Appendix A. Minor Requirements. Complete if requesting a new minor with the same name as this proposed major.

MINOR

Minimum total units required	18
Minimum upper-division units required	9
Total transfer units that may apply to the minor	15
List any special requirements to declare/admission to this minor	Students must have a cumulative GPA of 2.0 or higher to declare the minor
Minor requirements. List all minor requirements including core and electives.	<p>Students must complete at least one course (3 units) from the Pharmacology Category and at least one course (3 units) from the Toxicology Category. The remaining 12 units can include additional courses from the Pharmacology and Toxicology categories, and courses from the PharmTox Minor Elective category.</p> <p>Pharmacology category (complete at least one) (3 units)</p> <ul style="list-style-type: none"> •PCOL 427 (3) Dermatological pharmacology—NEW • PCOL 429 (3) Neuropsychopharmacology •PCOL 434 (3) Pharmacology of sex •PCOL 436 (3) Cardiovascular pharmacology •PCOL 465 (3) Infectious disease pharmacology •PCOL 467 (3) Pharmacology of anti-cancer drugs



ADDITIONAL INFORMATION FORM

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	<p>Toxicology category (complete at least one) (3 units)</p> <ul style="list-style-type: none"> •PCOL 320 (3) Toxicology of the substances that surround us •PCOL 420 (3) Environmental toxicology—NEW •PCOL 451 (3) Forensic toxicology • PCOL TBD (3) Poisoning diagnosis—NEW •PCOL TBD (3) Risk assessment—NEW <p>Minor electives (12 units; courses listed above should also be included in electives course list)</p> <ul style="list-style-type: none"> •PCOL 305 (3) Scientific writing •PCOL 350 (3) Human ADME & toxicology •PCOL 406 (5) Comprehensive human pharmacology •PCOL 200 (3) Drugs & humanity •PCOL 300 (3) Pharmacology of cosmetics & self-care products •PCOL 445 (3) OTC drug information •PCOL 473 (3) Pharmacogenomics •PCOL TBD (3) Herbal supplements—NEW
<p>Internship, practicum, applied course requirements (Yes/No).</p>	<p>No</p>
<p>Additional requirements (provide description)</p>	<p>None</p>
<p>Any restrictions on multiple use of courses (Yes/No)? If yes, provide description.</p>	<p>At least 6 units must be unique to the minor and not double-dipped with any other requirements within the same degree.</p>



Course Use/Collaboration/Concern Form

Course #	Units	Exp Enrollment for Yr 1	Exp Enrollment for Yr 2	Exp Enrollment for Yr 3
<i>ECOL 182R</i>	3	10	10	15
ECOL 182L	1	10	10	15

VIII. **Opportunities for Interdisciplinary Collaboration (leave blank if none):**

IX. **Concerns about Proposed Program (leave blank if none):**

X. **Representative(s) reviewing request:** Who is representative reviewing the request? (Should be Associate Dean / Dean)

Signature: _____ Date: _____



**THE UNIVERSITY
OF ARIZONA**

BUDGET PROJECTION FORM

Name of Proposed Program or Unit: Medical Pharmacology and Toxicology

Budget Contact Person: Stacy Lauver	Projected		
	1st Year 2025 - 2026	2nd Year 2026 - 2027	3rd Year 2027 - 2028
METRICS			
Net increase in annual college enrollment UG	30	60	70
Net increase in college SCH UG	167	352	490
Net increase in annual college enrollment Grad	-	7	8
Net increase in college SCH Grad			
Number of enrollments being charged a Program Fee			
New Sponsored Activity (MTDC)			
Number of Faculty FTE			
FUNDING SOURCES			
Continuing Sources			
UG AIB Revenue	41,395	107,120	139,150
Grad AIB Revenue			
Program Fee Revenue (net of revenue sharing)			
F and A AIB Revenues			
Reallocation from existing College funds (attach description)			
Other Items (attach description)			
Total Continuing	\$ 41,395	\$ 107,120	\$ 139,150
One-time Sources			
College fund balances			
Institutional Strategic Investment			
Gift Funding			
Other Items (attach description)			
Total One-time	\$ -	\$ -	\$ -
TOTAL SOURCES	\$ 41,395	\$ 107,120	\$ 139,150
EXPENDITURE ITEMS			
Continuing Expenditures			
Faculty			
Other Personnel			
Employee Related Expense			
Graduate Assistantships			
Other Graduate Aid			
Operations (materials, supplies, phones, etc.)			
Additional Space Cost			
Other Items (attach description)			
Total Continuing	\$ -	\$ -	\$ -
One-time Expenditures			
Construction or Renovation			
Start-up Equipment			
Replace Equipment			
Library Resources			
Other Items (attach description)			
Total One-time	\$ -	\$ -	\$ -
TOTAL EXPENDITURES	\$ -	\$ -	\$ -
Net Projected Fiscal Effect	\$ 41,395	\$ 107,120	\$ 139,150



New Academic Program PEER COMPARISON

Program name, degree, and institution	University of Arizona BS in Medical Pharmacology and Toxicology	Arizona State University BS in Pharmacology & Toxicology	University of Wisconsin – Madison BS in Pharmacology & Toxicology	University at Buffalo BS in Pharmacology & Toxicology	Penn State BS in Pharmacology & Toxicology
Current number of students enrolled		In 2020–2021 awarded 10 BS, up from 7 the previous year <i>*Note: Were not able to obtain enrollment numbers directly from ASU.</i>	Average 40-50 admitted majors, 100 pre-majors	Currently 26	Approximately 80
Program Description	Delve into the fascinating world of medical pharmacology and toxicology, where you'll explore the effects of venoms, poisons, drugs, and everyday chemicals on the human body and environment. Pharmacology and toxicology are complementary and interdisciplinary biomedical sciences that draw upon cell biology, systems physiology, biochemistry, molecular biology, and genetics. This major includes foundational pharmacology and toxicology coursework and electives,	Students in the BS degree program in pharmacology and toxicology study how foreign materials react with human bodies. To have a thorough understanding of the interactions of chemicals in the biological system, students in the program study both biology and chemistry, and they become familiar with chemical interactions at physiological, molecular and cellular levels.	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	Pharmacology is often confused with pharmacy, but they are separate professions. Pharmacology is a research-oriented biomedical scientific discipline, where pharmacy is concerned with the preparation, dispensing and use of medications in health care. Pharmacologists study how chemical agents affect our bodies. We study the action of natural substances such as hormones and neurotransmitters as well as drugs and toxic agents in the environment. Our	The fields of pharmacology and toxicology are by nature interdisciplinary biomedical sciences, drawing upon the foundations and approaches of cell biology, systems physiology, biochemistry, molecular biology, and genetics. A primary objective of pharmacology is to investigate fundamental aspects of cellular and molecular regulatory mechanisms for the purpose of understanding how

	<p>emphasizing reproductive, dermatological, cancer, infectious diseases, and cardiovascular foci. Whether you're interested in research, legal investigations, or setting safety standards, you'll gain an understanding of what can go wrong when exposed to harmful substances—either from pharmaceuticals, environmental factors, or occupational hazards. As the first health sciences college at the university, the College of Pharmacy offers established programs with internationally recognized pharmacologists and toxicologists. Students will work alongside researchers and our Centers of Excellence to gain expert-level toxicology instruction and training. The Bachelor of Science in Medical Pharmacology and Toxicology is the first of its kind offering a unique pathway to advanced studies or the option to jump directly into a career that significantly</p>		<p>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.</p>	<p>discipline interacts with many other fields—physiology, biochemistry, immunology, psychology, microbiology, chemistry and medicine, to name only a few.</p> <p>Our department has particular strengths in neuropharmacology, drug discovery and translational research—research that seeks to rapidly translate laboratory discoveries into treatments. Our faculty strive to understand and regulate circadian rhythms, ameliorate the effects of drug addiction and treat the effects of environmental pollutants, among other areas of research.</p>	<p>drugs act and in order to develop new drugs for treatment of disease. Toxicology examines how chemical agents produce adverse effects on the organism, and studies mechanisms by which these materials contribute to cancer, neurological diseases, metabolic disorders and many other diseases and conditions. Our program is truly unique. One of the only eight majors in toxicology and pharmacology in the United States, it is the only one that blends molecular/cellular and environmental studies of toxicology and pharmacology.</p>
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	impacts public health and safety.				
Target Careers	<p><u>Established careers</u> including: agricultural/food science; biochemistry; clinical laboratory technology, epidemiology, biological science for academia, microbiology, medicine, pharmacy, nursing, veterinary medicine/science, medical scientists (risk assessment, pharmacology, toxicology), physician assistance, and environmental sciences and <u>emerging careers</u>: poison control information specialists and technicians, medical courier and tissue processing technicians, blood and plasma processors, and sanitization compliance technicians</p>	<p>With a heavy focus on experiential learning within the laboratory, graduates of the pharmacology and toxicology degree program are better prepared for careers in diverse areas such as government, industry, health care and business and for a number of career paths, including:</p> <ul style="list-style-type: none"> • environmental risk assessor or consultant • laboratory researcher • pharmacist • physician • physician's assistant • toxicologist • veterinarian <p>Graduates also may work at governmental agencies or at private companies in areas such as:</p> <ul style="list-style-type: none"> • Arizona Department of Environmental Quality • City government • Clinical trials 	<p>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; 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</p>	<p>Many students go to medical school, dental school or another health-related professional school, or they go to graduate school to earn an advanced degree in pharmacology, biochemistry or a similar field.</p> <p>There are various careers available to you; some might require additional training/certification.</p> <ul style="list-style-type: none"> • Biochemist. • Drug information specialist. • Medical patent attorney. • Pharmaceutical sales representative. • Pharmacologist. • Product safety advisor. • Regulatory advisor. • Research scientist. • Teacher. • Technical advisor. • Toxicologist. <p>Many different types of organizations hire pharmacology majors,</p>	<p>Concerns over drug safety, environmental quality, and occupational exposure to chemicals all lead to a high demand for specialists. Our major in Toxicology is one of only a handful of such programs in the United States. Graduates distinguish themselves with focused courses in toxicology and pharmacology while retaining the freedom to choose from a wide variety of courses in biomedicine and biotechnology.</p> <p>Thanks to the specialization students can obtain in toxicology and pharmacology, there are plentiful employment opportunities for graduates after four years. Some of these opportunities include research positions in biotechnology or pharmaceutical firms,</p>

		<ul style="list-style-type: none"> • Environmental Protection Agency • Product safety evaluation • Regulatory affairs • Teaching 	appropriately, the Pharmacology and Toxicology program can also uniquely launch students into scientific writing, business or regulatory positions, environmental positions, or law school.	including pharmaceutical companies, hospitals, government agencies and university laboratories.	government or international health and environmental agencies, and academic research laboratories. Career possibilities can be found in the pharmaceutical industry, the biomedical industry, government laboratories, academic research and education, and private research organizations.
Emphases? (Yes/No)	No	No	No	No	No
Minimum # of units required	120 total (73 covered by major and foundation science)	120 total (75 covered by major and foundation science)	120 total (51 covered by major and supporting science)	122 total (93 covered by major and supporting science)	120 total (88 covered by major and supporting science)
Level of Math required	MATH 112 – College Algebra	Brief Calculus or Calculus for Life Sciences	Calculus & Analytical Geometry I	Survey of Calculus I & II or College Calculus I & II	Calculus I and II
Level of Second Language required	Second-semester proficiency	None	None	None	May be fulfilled with 2 units (one year) of high school language coursework or one college-level language course
Pre-Major? (Yes/No)	No	No	No, but Pre-PharmTox students declare a major in Letters & Sciences or Agriculture & Life Sciences while waiting to apply for major. Prerequisite	No	No

			course list available HERE.		
Special requirements to declare/gain admission? (i.e. pre-requisites, GPA, application, etc.)	Continuing students must have a cumulative GPA of 2.0 or higher to declare the major.	No	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.	Application required. You must have a minimum prerequisite GPA of 2.5 to be considered, but this does not guarantee acceptance into the program.	In order to be eligible for entrance to the Pharmacology and Toxicology major, a student must have: attained at least a 2.00 cumulative grade point average and earned a C grade or better in: BIOL 110, BIOL 230W, CHEM 110, CHEM 111, CHEM 112, CHEM 113, MATH 140, and MATH 141.
Internship, practicum, or applied/experiential requirements?	No	No	2-credit directed/independent study requirement	Our majors get hands-on research experience in PMY 409 (Experimental Pharmacology), a requirement for the BS.	2 credit internship OR independent study required

Additional questions:

1. How does the proposed program align with peer programs? Briefly summarize the similarities between the proposed program and peers, which could include curriculum, overall themes, faculty expertise, intended audience, etc.

Similarities Among BS in Pharmacology & Toxicology Programs:

1. **Curriculum:**
 - Core courses in pharmacology, toxicology, chemistry, biology, and physiology.
 - Emphasis on laboratory skills, data analysis, and scientific research.
 - Advanced courses in drug action, toxic agents, and the body's response to drugs and toxins.
2. **Overall Themes:**
 - Understanding the effects of drugs and chemicals on biological systems.
 - Studying the mechanisms of drug action and toxicity.
 - Preparing students for careers in healthcare, research, and regulatory fields.
3. **Faculty Expertise:**
 - Professors with backgrounds in pharmacology, toxicology, biochemistry, and related fields.
 - Faculty involved in cutting-edge research and often collaborate with industry and government agencies.
 - Opportunities for students to engage in faculty-led research projects.
4. **Intended Audience:**
 - Students interested in careers in pharmaceuticals, healthcare, environmental science, or toxicology.
 - Those planning to pursue advanced degrees in pharmacology, toxicology, medicine, or related disciplines.
 - Individuals aiming to work in research, regulatory agencies, or industry settings.

2. How does the proposed program stand out or differ from peer programs? Briefly summarize the differences between the proposed program and peers, which could include curriculum, overall themes, faculty expertise, intended audience, etc.

1. **Curriculum:**
 - Specialty courses in neuropharmacology, cardiovascular pharmacology, dermatological pharmacology, cancer drugs, infectious disease, OTC drug information, etc offer our students in-depth explorations of medicine and science beyond introductory or survey courses.
 - Special training in scientific communication, reading and interpreting the scientific literature, and conveying complex health information to experts and patients.

- Advanced courses in toxicology such as environmental and forensic toxicology along with medical and plant/animal toxicology.
- 2. **Overall Themes:**
 - Heavy medical emphasis on drugs and toxicants with real-world applications and examples.
 - Focused studies on poisons and toxic molecules and antidotes with case studies and discussions.
- 3. **Faculty Expertise:**
 - Faculty who perform toxicology and pharmacology research.
 - Poison control staff who manage exposures 24/7 and make hospital referrals.
 - Scientific communication and guidance for opportunities for students to be published authors before they graduate college.
- 4. **Intended Audience:**
 - Students otherwise unrepresented in careers in pharmaceuticals, healthcare, environmental science, or toxicology
 1. Example: our major does not require calculus which allows more talented students who are not strong at math to still pursue preliminary degrees prior to medical school.
 - Students otherwise not selected for advanced degrees in pharmacology, toxicology, medicine, or related disciplines.
 1. Example: Our students will receive repeated and direct guidance regarding how to find a research laboratory and how to gain professionally positive attention from the PI.
 - Students who want variety, flexibility, and strong mentorship and advising.
 1. Example: Our highly efficacious student services office provides constant and superior advising and monitors student success to ensure students choose their courses wisely, minimizing time and money spent on a degree.

3. How do these differences make this program more applicable to the target student population and/or a better fit for the University of Arizona?

This program is an excellent fit for our student population and for our University. First, we will draw from expertise on our health-sciences campus which includes medicine, nursing, pharmacy, and soon, a school for training physician assistants. Only seven other US universities offer a Bachelor of Science in Pharmacology & Toxicology. ASU is one of those schools, offering a BS in Pharmacology & Toxicology on their West Campus; however our proposed Medical Pharmacology & Toxicology major differs from ASU's due to our integration on UArizona's Health Sciences campus. Our health sciences researchers are nationally and internationally recognized in their fields and teach in our graduate programs so research opportunities and peer-mentors (graduate students, postdoctoral fellows) can be found. These can be facilitated by the current Director of Undergraduate Studies. Our student population is large, so our target population is abundant. We have had success in recruiting minority and underserved undergraduates who stay to pursue pharmacy, medicine, and graduate school, and we expect to maintain that success or exceed it. Our talented Student Services Specialist for Recruitment, Luz

Maria Hernandez, will be a source of contact for high school science teachers across the state who will learn of our new degree program. From past undergraduate major implementation and successes, we know that having Major Ambassadors who are upperclassmen in the major will be key recruitment and retention strategies as they form personal relationships with our new students and support their achievement.

As of 2023, the U of A enrolled 3,554 men and 5,071 women as full-time, first-year, degree-seeking students. We enrolled 263 men and 270 women as first-time, degree-seeking, part-time students. The rest of the undergraduate population totals more than 35,000 full-time and 8,000 part-time students. In the spring of 2024, these enrollments increased 2.5%. Thus, we have an ample student population within which to recruit to our major. Of our total undergraduates, we have almost 2,000 that arrive from out of state, and more than one-quarter are Hispanic/Latino and 6% identify as American Indian, Alaskan Native, or two or more races that are non-Hispanic. This is a promising population to recruit and elevate traditionally educationally underserved students and support them as they seek jobs in science and healthcare. This is critical because, even today, minorities—especially women—are underrepresented in the sciences and in healthcare (McKinsey and Co, 2023 workforce data).

Request to Establish New Academic Program in Arizona

University: University of Arizona

Name of Proposed Academic Program: BS in Medical Pharmacology and Toxicology
Academic Department: Pharmacology and Toxicology, College of Pharmacy
Geographic Site: Tucson - Main
Instructional Modality: In-person and hybrid
Total Credit Hours: 120
Proposed Inception Term: Fall 2025
Brief Program Description: Delve into the fascinating world of medical pharmacology and toxicology, where you'll explore the effects of venoms, poisons, drugs, and everyday chemicals on the human body and environment. Pharmacology and toxicology are complementary and interdisciplinary biomedical sciences that draw upon cell biology, systems physiology, biochemistry, molecular biology, and genetics. This major includes foundational pharmacology and toxicology coursework and electives, emphasizing reproductive, dermatological, cancer, infectious diseases, and cardiovascular foci. Whether you're interested in research, legal investigations, or setting safety standards, you'll gain an understanding of what can go wrong when exposed to harmful substances—either from pharmaceuticals, environmental factors, or occupational hazards. As the first health sciences college at the university, the College of Pharmacy offers established programs with internationally recognized pharmacologists and toxicologists. Students will work alongside researchers and our Centers of Excellence to gain expert-level toxicology instruction and training. The Bachelor of Science in Medical Pharmacology and Toxicology is the first of its kind offering a unique pathway to advanced studies or the option to jump directly into a career that significantly impacts public health and safety.
Learning Outcomes and Assessment Plan:

Learning Outcome #1	Describe the foundational principles of pharmacology and toxicology and their applications to public health and the environment.
	Concepts: Cell biology, molecular biology, physiology, biochemistry, genetics.
	Competencies: Explain how drugs, venoms, poisons, and environmental chemicals affect biological systems; describe mechanisms of drug action, adverse effects, and toxicity.
	Assessment Methods: Exams, class discussions, research presentations (direct) and student exit survey (indirect).
	Measures: Instructor grading of assignments, exams, and evaluation of discussions; responses to student exit survey.
Learning Outcome #2	Analyze the effects of toxic substances and drugs on human physiology and apply their knowledge to medical situations.
	Concepts: Reproductive, dermatological, cardiovascular, neurological, and cancer-related, and infectious diseases.
	Competencies: Analyze case studies involving drug side effects, adverse events, poisons, venoms, and environmental toxins; assess physiological responses and predict outcomes.
	Assessment Methods: Case study analyses, exams, research projects (direct) and student exit survey (indirect).
	Measures: Instructor grading of case analyses, exams, and projects; responses to student exit survey.
Learning Outcome #3	Recognize the intersections among plants, animals, drug-like chemicals, and humans and the outcomes that can arise in these intersections.
	Concepts: Peer-reviewed literature reading and research; data analysis, communication of scientific findings using scientific writing.
	Competencies: Design and execute experiments; analyze and interpret data related to drug efficacy, toxicity, and environmental health risks.
	Assessment Methods: Research papers, lab reports, experimental design projects (direct) and student exit survey (indirect).
	Measures: Instructor grading of research reports, experiments, and presentations; responses to student exit survey.
Learning Outcome #4	Research topics in pharmacology and toxicology and communicate findings for experts and patients.
	Concepts: Occupational hazards, regulatory standards, consumer product safety, environmental toxicology.
	Competencies: Evaluate and communicate risks of toxic substances in occupational and environmental settings; assess compliance with safety regulations.
	Assessment Methods: Regulatory compliance assignments, policy analysis reports, public health risk assessments (direct) and student exit survey (indirect).
	Measures: Instructor grading of assignments and reports; responses to student exit survey.
Learning Outcome #5	Apply the pharmacological basis of toxicology and toxic outcomes such as side effects and adverse events.
	Concepts: Toxicology in environmental health, pharmaco/toxicogenomics, biomarkers of exposure, public safety, risk assessment.

	Competencies: Identify and evaluate the consequences of exposure to harmful substances in humans and ecosystems; develop recommendations for minimizing public health risks.
	Assessment Methods: Capstone projects, public health reports, environmental risk assessments (direct) and student exit survey (indirect).
	Measures: Instructor grading of final projects, reports, and assessments; responses to student exit survey

Assessment Measure	Source(s) of Evidence	Data Collection Point(s)
Job placement and grad school admission statistics	Graduation survey	In students' final semester
Academic Program Review	Reviewers' responses	Every 7 years
Learning Outcome Assessment	Direct and Indirect measures	Every year via the graduation survey, and on a biennial basis for course-embedded assessments
Student interest	Enrollment numbers	Every year

Projected Enrollment for the First Three Years:

Year 1: 30
Year 2: 60
Year 3: 70

Evidence of Market Demand:

1. Evidence of Student Interest:

We administered a student interest survey to measure perceptions of the proposed major and received 413 responses. 26% of respondents are current College of Pharmacy undergraduates with 74% from colleges including Science, CALES, Public Health, Medicine, Engineering, and A-Center (Undecided); 17% freshman, 9% sophomore, 33% junior, and 40% senior. Survey highlights include:

- 65% are "very interested" in the proposed PharmTox major topics and 34% are "somewhat interested."
- 97% think this major is unique, and not something they could easily find at another university.
- 26% report that they would have "seriously considered" this major if it had been available when they initially enrolled at UA. 60% report that they would have given it some consideration.
- Only 5% of respondents would want to change their major right now if the Medical Pharmacology & Toxicology major were approved this year, demonstrating that this major would not poach a significant number of enrolled students from other majors. However, 21% said they would be interested in adding it as a second major.

Overall survey results demonstrate that this major's subject areas are of interest to students. Most respondents perceive the major as unique to the University of Arizona, indicating we may attract new students who were otherwise not planning to attend U of A.

2. Evidence of Industry Interest and Market Demand:

The Society of Toxicology, a professional and scholarly organization of scientists from academic institutions, government, and industry representing the great variety of scientists who practice toxicology in the US and abroad, supports all academic endeavors to train future toxicologists. To this end, they have supplied a file with various opportunities for young toxicology/pharmacology scholars, which is included in this proposal.

Graduates with a bachelor's degree in pharmacology and toxicology can enter many career and postsecondary educational paths. Some top fields for these graduates include but are not limited to agricultural/food science; biochemistry; clinical laboratory technology, epidemiology, biological science for academia, microbiology, medicine, pharmacy, nursing, veterinary medicine/science, medical scientists (risk assessment, pharmacology, toxicology), physician assistance, and environmental sciences.

Overall, pharmacology and toxicology careers are expected to grow by approximately 12.3% between 2016 and 2026, indicating strong demand and a positive job outlook for graduates in these fields (College Factual). Also, according to the Bureau of Labor Statistics, poison control information specialists and technicians, medical courier and tissue processing technicians, blood and plasma processors, and sanitization compliance technicians are emerging careers expected to grow across the US. Nationally, pharmacology programs produce hundreds of graduates annually. For example, 479 graduates completed pharmacology programs recently (College Factual), so there is a perceived need for these degrees and this perception drives demand.

The job outlook from *2022 to 2032* is given below for each field/career choice a graduate of this proposed program may choose to pursue (Bureau of Labor Statistics).

Field	Growth (%)	Rate Exceeds Other Occupations	Annual Job Openings
Agricultural/food science	6	YES	3,000
Medical science	10	YES	7,500
Biochemistry	7	YES	2,800
Physician assistance	27	YES	12,200
Biological science professors	15.1	YES	—
Medicine	3	SAME	24,000
Chemistry/materials science	6	YES	7,200
Environmental science	6	YES	6,900
Pharmacy	3	SAME	13,400
Forensic science	13	YES	2,600
Veterinary science/medicine	20	YES	5,000
Microbiology	5	YES	1,700
Epidemiology	27	YES	800
Clinical laboratory technology	5	YES	24,000

Factors contributing to the growth of these fields include the needs of an aging population, new and increased challenges related to climate change, and emerging areas of research and discovery across STEM fields. Graduates of a Medical Pharmacology and Toxicology BS at the University of Arizona will be well prepared to address these grand challenges. We will leverage our placement on the University of Arizona's Health Sciences campus, along with our in-house relationship with the Arizona Poison & Drug Information Center, to offer hands-on learning and health science research opportunities.

Similar Programs Offered at Arizona Public Universities:
Arizona State University – BS in Pharmacology and Toxicology

Objection(s) Raised by Another Arizona Public University?		YES	NO
Has another Arizona public university lodged a written objection to the proposed program with the proposing university and the Board of Regents within seven days of receiving notice of the proposed program?			
If Yes, Response to Objections: Please provide details of how the proposing university has addressed the objection. If the objection remains unresolved, please explain why it is in the best interests of the university system and the state that the Board override it.			
New Resources Required? (i.e. faculty and administrative positions; infrastructure, etc.): No new resources are required. We will use the existing undergraduate studies infrastructure and personnel to recruit, retain, and teach these courses and any new courses. Advising for this major can be absorbed by current college advising staff. They will maintain manageable caseloads, even with the addition of this new major, based on enrollment projections.			
Plan to Request Program/College Fee?		YES	NO
Estimated Amount: n/a			
Fee Justification: n/a			
Specialized Accreditation?		YES	NO
Accreditor: n/a			

Requirements for the Medical Pharmacology & Pharmacology Minor are included in the “Academic Program Additional Info – Med Pharm Tox Major” document.

Appendix A. Minor Requirements. Complete if requesting a new minor with the same name as this proposed major. Delete **EXAMPLE** column and verbiage as it applies to your level degree (i.e., undergraduate vs graduate) before submitting.

MINOR

Minimum total units required	18
Minimum upper-division units required	9
Total transfer units that may apply to the minor	15
List any special requirements to declare/admission to this minor (completion of specific coursework, minimum GPA, interview, application, etc.)	Students must have a cumulative GPA of 2.0 or higher to declare the minor
Minor requirements. List all minor requirements including core and electives. Courses listed must include course prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.	<p>Students must complete at least one course (3 units) from the Pharmacology Category and at least one course (3 units) from the Toxicology Category. The remaining 12 units can include additional courses from the Pharmacology and Toxicology categories, and courses from the PharmTox Minor Elective category.</p> <p>Pharmacology category (complete at least one)</p> <ul style="list-style-type: none"> •PCOL 427 (3) Dermatological pharmacology—NEW • PCOL 429 (3) Neuropsychopharmacology •PCOL 434 (3) Pharmacology of sex •PCOL 436 (3) Cardiovascular pharmacology •PCOL 465 (3) Infectious disease pharmacology

- PCOL 467 (3) Pharmacology of anti-cancer drugs

Toxicology category (complete at least one)

- PCOL 320 (3) Toxicology of the substances that surround us
- PCOL 420 (3) Environmental toxicology—NEW
- PCOL 451 (3) Forensic toxicology
- PCOL TBD (3) Poisoning diagnosis—NEW
- PCOL TBD (3) Risk assessment—NEW

Minor electives

- PCOL 305 (3) Scientific writing
- PCOL 350 (3) Human ADME & toxicology
- PCOL 406 (5) Comprehensive human pharmacology
- PCOL 200 (3) Drugs & humanity
- PCOL 300 (3) Pharmacology of cosmetics & self-care products
- PCOL 445 (3) OTC drug information
- PCOL 473 (3) Pharmacogenomics
- PCOL TBD (3) Herbal supplements—NEW

Internship, practicum, applied course requirements (Yes/No). If yes, provide description.	No
Additional requirements (provide description)	None
Any restrictions on multiple use of courses (Yes/No)? If yes, provide description.	At least 6 units must be unique to the minor and not double-dipped with any other requirements within the same degree.

Document of Support—The Society of Toxicology

The Society of Toxicology (SOT), a professional and scholarly organization of scientists from academic institutions, government, and industry representing the great variety of scientists who practice toxicology in the US and abroad, supports all academic endeavors to train future toxicologists. To this end, they have supplied a file with various opportunities for young toxicology/pharmacology scholars, which is included here, in this new academic major proposal.

In this supporting document, SOT has highlighted the various opportunities they have created to ignite interest in toxicology as well as support undergraduate and graduate students as they progress through their training. Then, SOT provides continuing education for professionals, offering more than 120 courses entirely online. Finally, the SOT endowment supplies scholarships, fellowships, and travel awards to students, and has done so for decades. I hope you agree that this signals a strong industry interest in our potential students and a fine support network for our future graduates.

SOT | Society of
Toxicology

Diversity Initiatives Career Development Award

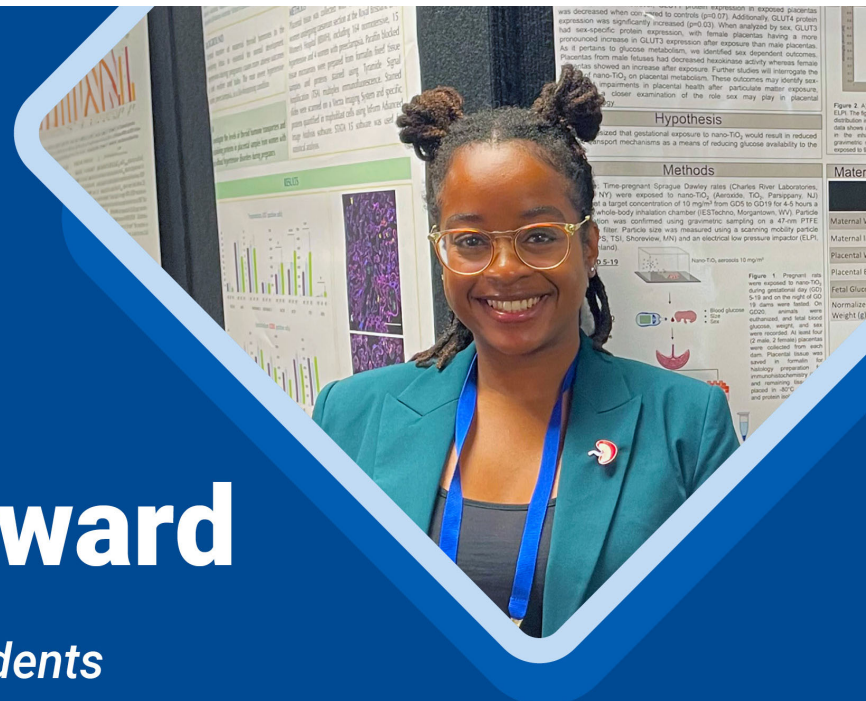
*Provides funding to undergraduate and graduate students
for professional development*

Deadline: April 15, 2025



SOT | Society of
Toxicology
ENDOWMENT
Investing in the Future ...

www.toxicology.org/awards



SOT Provides Opportunities for Undergraduates



SOT Undergraduate Student Affiliate status, providing access to toxicology news and resources



Poster presentation and other award opportunities through SOT and its Regional Chapters, Special Interest Groups, and Specialty Sections



Internships and research experiences in SOT members' labs



Activities at the SOT Annual Meeting and Regional Chapter meetings, as well as professional development opportunities and resources



SOT | Society of Toxicology

www.toxicology.org/undergraduate

Boost Undergraduate Education with SOT Resources

- SOT Undergraduate Educator Network
- Toxicology Learning Framework
- Recorded lectures and webinars for classroom use
- Awards for educators and students

www.toxicology.org/educators

SOT | Society of Toxicology



Doctoral Student Training Funds

The SOT Supplemental Training for Education Program (STEP) enables outstanding doctoral students to pursue toxicology training in identified areas of professional/scientific development that are outside the immediate scope of their graduate training and research program.

Awards of up to \$1,000 each
Application Deadlines: April 15 and September 15





New Experiences in Toxicology (NEXT)

The New Experiences in Toxicology (NEXT) program enables postdoctoral trainees to obtain training outside their current sector and outside the available resources of the applicant's postdoctoral training and research project.

Awards of up to \$1,000 each
Application Deadlines: April 15 and September 15

Up to \$3,000 for internship support

GRADUATE INTERN FELLOWSHIP IN TOXICOLOGY (GIFT)

Each year, the SOT Graduate Intern Fellowship in Toxicology (GIFT) enables a graduate student to engage in an internship to advance their professional and scientific development.

Application Deadline: February 15

SOT | Society of Toxicology

www.toxicology.org

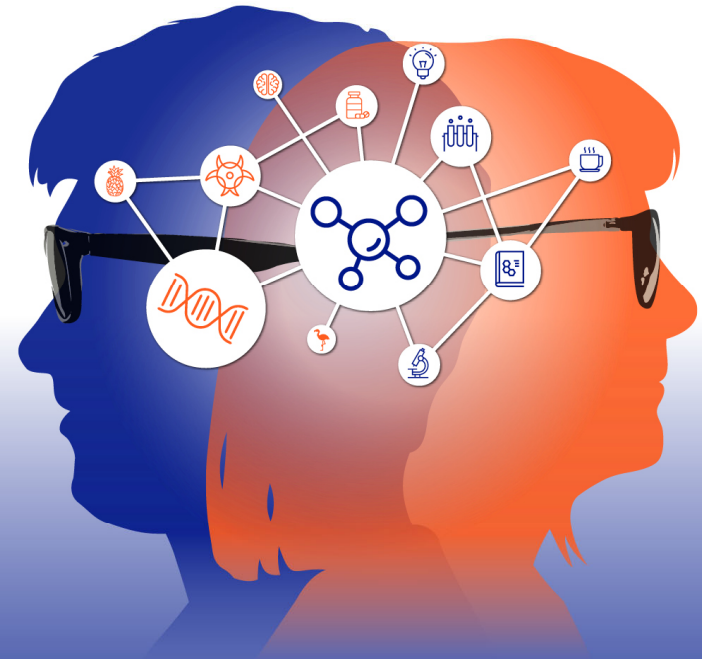


PRESENTED BY SOT

EXPLORING STORIES OF THE PEOPLE AND SCIENCE OF TOXICOLOGY

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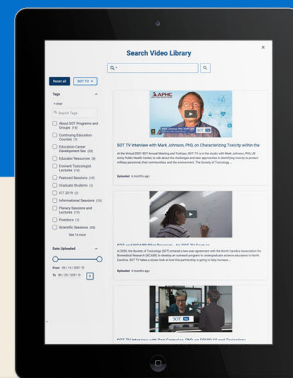
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Explore and Apply for SOT Awards in a Whole New Way

New online system makes it easier than ever to search for awards and to submit your application.

The image shows a laptop displaying the SOT Awards website. The page title is "Search for SOT Awards". The navigation bar includes "Home", "Awards & Funding", and "Search for SOT Awards". The main content area is titled "Search for Awards" and contains a search bar with the placeholder text "Enter an Award Name or Keyword" and a magnifying glass icon. Below the search bar, there are instructions: "Each year, the Society recognizes scientists who are making a positive impact on the field of toxicology through the SOT Awards program." and "SOT Awards are distributed by a variety of groups within and connected to SOT and often consist of a stipend and application instructions, visit the individual award pages by using the search or filter options." There is a link to "these instructions" and a note to "Please read these instructions, which provide information on how to create or modify your SOT Apply account, before opening a specific award application or submission page." Below this, there is another search bar with the placeholder "Enter an Award Name or Keyword" and a magnifying glass icon. To the left of the search bar, there is a "Filter by" section with two sub-sections: "Career Designation" and "Award Type". The "Career Designation" section has five options: "All Scientists", "Educators", "Graduate Students", "Postdoctoral", and "Undergraduate Students". The "Award Type" section has three options: "SOT Awards", "SOT Endowment Awards", and "Supported Awards". To the right of the search bar, there is a "Sort by" dropdown menu with the selected option "Deadline Soonest". Below the search bar, there is a list of awards. The first award is "NCSOT Graduate Student Platform Presentation" with a blue box indicating an "AUG 14 DEADLINE". The description for this award is "From submitted abstracts, members of the NC SOT Executive Committee will select up to three students to give presentations at the Annual NC SOT Meeting." There is a "Read more >" button next to the award listing. The laptop keyboard is visible at the bottom of the image.

Filter by Clear All

Career Designation

- All Scientists
- Educators
- Graduate Students
- Postdoctoral
- Undergraduate Students

Award Type ⓘ

- SOT Awards
- SOT Endowment Awards
- Supported Awards

Search for Awards

Enter an Award Name or Keyword

Enter an Award Name or Keyword

Sort by Deadline Soonest

AUG 14 DEADLINE NCSOT Graduate Student Platform Presentation

From submitted abstracts, members of the NC SOT Executive Committee will select up to three students to give presentations at the Annual NC SOT Meeting.

Read more >

www.toxicology.org/awards

Awards & Fellowships

Call for 2026 Nominations

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*Nominations and applications
due October 9, 2025.*



www.toxicology.org/awards

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SOT is a professional and scientific society dedicated to:

- Serving the needs of the scientific discipline and our members to enhance human, animal, and environmental health
- Lifelong learning and intellectual scientific stimulation
- Diversity of representation in all activities of the Society
- Integrity



SOT Commitment to Diversity, Equity, and Inclusion



SOT is committed to diversity, equity, inclusiveness, and accessibility in all its activities, Committees, groups, and communities. Embracing diversity, optimizing inclusion, and providing accessibility maximizes engagement, creativity, and innovation among our members.

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