

Biology 4375/5375 – Molecular Toxicology

11:10 am-12:30 pm Tues/Thurs

Wooten 314

Fall 2026

Dr. Brianne Soulen

EESAT 320 D (third floor, hang a left)

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Office Hours: Tuesday and Thursday before and after class, **By appt.**

Textbook (optional)

Mechanistic Toxicology 2nd Ed. U Boelsterli. Informa Healthcare, USA.

****A digital copy is available through the library website. You can send yourself chapters as needed. ****

Course Description

The goal of this course is to introduce students to toxicology at the biochemical and molecular level. This will include covering some basics in toxicology, molecular biology, and physiology. The course will include a discussion of a variety of toxic modes of action, modern techniques used in molecular toxicology, and a discussion of current toxicological research literature. Students will be evaluated based on performance on exams and written assignments.

Grades

Grades will be based on 3 regular exams (60%) and a mock grant proposal (40%).

Letter grades will be assigned on the following scale:

90-100% = A

80-89% = B

70-79% = C

60-70% = D

<60% = F

If you do poorly on an exam or are concerned about your grade, I encourage you to come see me. It is much easier to get a student back on track for a good grade earlier in the semester than later.

Regular Exams (60%)

Exams will consist of a mixture of definition, short answer, and essay questions. Three in-class exams will be given over the course of the semester. Students may “fix” one of the regular exam grades and receive “half credit” back on that exam (I will discuss the details of this in class). Undergraduate exams will be curved; graduate students will not. Make-up exams will be allowed in cases of illness, emergency, or conflict with another university-sponsored activity. The student **MUST** notify the instructor either prior to the exam or within 24 hours of the original exam time. For university sponsored activities, a letter from a coach/sponsor/etc should be provided.

Written Assignments (40%)

Over the course of the semester, each student will write a mock grant proposal. Guidelines/formatting instructions for the proposal will be distributed in class. For graduate students, the proposal should detail either some area within your own research or an extension of your research. For undergraduate students, the proposal should be

based on something you are interested in, have seen in the news, etc. Dr. Soulen will help you narrow down a topic as needed. The proposal should include **at least one molecular-mechanistic endpoint**. The grade breakdown for the proposal will be:

Graduate Students

10% - General topic/idea – due Sept. 4 through email or Canvas message by 11:59 pm
10% - Draft Specific Aims page – due Sept. 30 through Canvas by 11:59 pm
15% - Complete draft of written product- due Nov. 22 through Canvas by 11:59 pm
25% - 3MT Presentation – in class Dec. 1
40% - Final written product – due Dec. 6 through Canvas by 11:59 pm

Undergraduate Students

10% - General topic/idea – due Sept. 4 through email or Canvas message by 11:59 pm
12.5% - Draft Specific Aims page – due Sept. 30 through Canvas by 11:59 pm
12.5% - Draft of introduction- due Oct. 25 through Canvas by 11:59 pm
12.5% - Draft of methods- due Nov. 15 through Canvas by 11:59 pm
12.5% - Draft of expected outcomes- due Nov. 29 through Canvas by 11:59 pm
15% - 3MT Presentations – in class Dec. 1
25% - Final written product – due Dec. 6 through Canvas by 11:59 pm

Policy on Scholastic Dishonesty and AI:

Scholastic dishonesty will not be tolerated. Students who are found to be cheating (all forms, including but not limited to copying from another student's exam or homework, or plagiarism) will fail this course. The term 'plagiarism' includes but is not limited to: (1) the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment; and (2) the knowing or negligent unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

AI tools (e.g., ChatGPT, Claude, Gemini, etc) are not to be used on any portions of the mock grant proposal assignment. Do not:

- Submit AI-generated content without substantial revision or your own input
- Use AI to complete an entire assignment with minimal human engagement
- Any student with a submission with high AI percentages may lose points on the assignment and will be required to meet with the instructor.

Unauthorized Aids During Examinations and Assessments

Students may use only those materials and resources that are expressly authorized by the instructor for a particular examination or assessment. Touching, holding, or accessing any unauthorized aid during the examination period constitutes a violation of the Student Code of Conduct, regardless of whether the aid is used.

Any item that may be considered an unauthorized aid must be kept out of view and in a closed container (e.g. zipped backpack, buttoned purse, etc.) during the entirety of the examination or assessment.

Unless specifically authorized in writing by the instructor, prohibited aids include, but are not limited to:

- Mobile phones and smartphones
- Smartwatches and fitness trackers with communication, recording, or internet capabilities
- Tablets, laptops, and other computing devices
- Earbuds, headphones, and other audio devices
- Smart glasses, cameras, recording devices, and wearable technology

- Artificial intelligence (AI) tools, chatbots, and other generative AI technologies
 - Notes, textbooks, study guides, formula sheets, or reference materials
 - Any other device, material, or resource not expressly permitted by the instructor
- Students are responsible for clarifying any questions about permitted materials before the examination begins.

Extra Credit: A total of 9 points of extra credit will be offered throughout the semester.

Lecture and Exam Schedule

Dates	Topic
Aug. 18	Course Introduction
Aug. 20	Science of Toxicology
Aug. 25	Toxic Responses/Mock Grant Proposal
Aug. 27, Sept. 1	Cellular Transport
Sept. 3, 8	Phase 1-2 Metabolism
Sept. 10	Guest Lecture
Sept. 15	Review 1
Sept. 17	Exam 1
Sept. 22, 24	Oxidative Stress
Sept. 29, Oct. 1	Calcium Homeostasis
Oct. 6, 8	Necrosis-Apoptosis-Repair
Oct. 13	Review 2
Oct. 15	Exam 2
Oct. 20	Covalent Binding
Oct. 22	Protein Inactivation
Oct. 27	Ion Transporters
Oct. 29, Nov. 3	Nuclear Receptors
Nov. 5, 10	Immune Toxicity
Nov. 12	Guest Lecture
Nov. 17	Review 3
Nov. 19	Exam 3
Nov. 24, 26	Thanksgiving Holiday
Dec. 1	3MT Presentations
Dec. 3	Guest Lecture
Dec. 6	Final Mock Grant Proposal Due