

BIBC 194 – Structure, Medicine, Disease
Fall Quarter 2023
York 3010
Tuesdays 11 am to 12:20 pm

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Course Description

Whatever biology-related career you envision for yourself, your work is likely to revolve around disease and medicine. But what is medicine and what is a disease? How do drugs work? Why do mutations disrupt protein function or cause drug resistance? How do we talk about *any* of this when we address non-scientists?

This class revolves around student presentations. We'll aim to start with well understood diseases and medicines, such as small molecules with known mechanisms of action. We'll model those mechanisms and sure up our basic understanding of structural biochemistry, enzyme inhibition, and some important biological pathways. Then we'll address some less well understood topics.

Not all drugs have known mechanisms. Some drugs are stigmatized or feared. Not all diseases can be cured or even treated. Nevertheless, it's our job, as scientists, to be informed, persuasive, and culturally aware. This seminar is a staging ground for the doctor-patient and scientist-layperson interactions that many of you plan to have in the future. Listening, presenting, and responding thoughtfully—those are hard-won skills, and we'll practice each.

Course Materials and Tools

Every article used in the class is available online, but most journals are behind paywalls. Download articles while on campus or use the [UCSD VPN](#).

There are two programs you can use to visualize macromolecular structures. One is UCSF Chimera. The other is Mol*. Both generate nice images, and have good features for investigating binding and mutations. I am more familiar with Chimera.

Contacting me

If possible, please schedule office hours if you have questions related to course material. It is much easier to explain concepts in person than by email. If you need to send me an email, please include “BIBC 194” in the subject line and allow a business day for me to reply. If I have not replied in a business day, please send the email again. I don't respond to email on weekends.

Grading Information

97%-100%	A+	77-80%	C+
93-97%	A	73-77%	C
90-93%	A-	70-73%	C-
87-90%	B+	60-70%	D
83-87%	B	<60%	F
80-83%	B-		

Assignment	Weight
Attendance	75
Presentation sign up	5
Presentation	10
Participation	5
	100%

Attendance and Participation

This is an in-person course. Attendance accounts for 80% of your grade, but I know that life happens. People have jobs, get sick, etc. So, **two absences from class will be excused without question**. Absences for any sincerely held religious belief, observance, or practice will be accommodated.

Course Format

This is *your* class. I'm here to provide some background and to help curate topics, but class time will focus on student presentations and discussions. We'll have about nine meetings for y'all to present on the topics below. I'll post associated papers to Canvas. Your task is to be *interested* and to put together talks that are *interesting*. Telling stories is a major part of *all* STEM careers. Now's the time to start sharpening that skill.

Possible presentation topics and associated papers are on Canvas. Ideally, you will work with a review article and a research article. Draw relevant background from the review—convince us the topic matters!—and present one or two key findings from the article. If possible, show us the mechanism of action at the macromolecular level using Chimera or Mol*. I'll demonstrate how to do so in class.

Presentations should include, when possible:

- The molecular basis of a disease state
- Cocrystal structures of a drug and its target protein (visualized with mol*)
- An explanation of the drug's molecular mechanism of action
- An explanation of how the drug ameliorates the disease state

Possible diseases and medicines include but are not limited to:

- Hypertension and Ca²⁺ channel inhibitors
- Hypertension and ACE inhibitors
- Retroviruses and antivirals, such as chain terminators
- Edema and loop diuretics
- Cholesterol dysregulation and statins
- β -lactam antibiotics
- Sickle Cell Anemia and CRISPR
- **Proteolysis Targeting Chimeras (PROTACs)**
- CAR-T Cells
- Antisense oligonucleotide therapies
- Chiral switching – pharmacological and economic perspectives

<p>Learning and Academic Support</p>	
<p><u>Ask a Librarian: Library Support</u></p> <p><i>Chat or make an appointment with a librarian to focus on your research needs</i></p> <p><u>Course Reserves, Connecting from Off-Campus and Research Support</u></p> <p><i>Find supplemental course materials</i></p> <p><u>First Gen Student Success Coaching Program</u></p> <p><i>Peer mentor program that provides students with information, resources, and support in meeting their goals</i></p> <p><u>Office of Academic Support & Instructional Services (OASIS)</u></p> <p><i>Intellectual and personal development support</i></p>	<p><u>Writing Hub Services in the Teaching + Learning Commons</u></p> <p><i>One-on-one online writing tutoring and workshops on key writing topics</i></p> <p><u>Supplemental Instruction</u></p> <p><i>Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses</i></p> <p><u>Tutoring – Content</u></p> <p><i>Drop-in and online tutoring through the Academic Achievement Hub</i></p> <p><u>Tutoring – Learning Strategies</u></p> <p><i>Address learning challenges with a metacognitive approach</i></p>
<p>Support for Well-being and Inclusion</p>	
<p><u>Basic Needs at UCSD</u></p> <p><i>Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live is encouraged to contact: foodpantry@ucsd.edu basicneeds@ucsd.edu (858) 246-2632</i></p> <p><u>Counseling and Psychological Services</u></p> <p><i>Confidential counseling and consultations for psychiatric service and mental health programming</i></p>	<p><u>Community and Resource Centers</u></p> <p><u>Office of Equity, Diversity, and Inclusion</u></p> <p><i>As part of the Office of Equity, Diversity, and Inclusion the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus</i></p> <p>(858).822-.3542 diversity@ucsd.edu</p>

<p><u>Triton Concern Line</u> <i>Report students of concern: (858) 246-1111</i></p> <p><u>Office for Students with Disabilities (OSD)</u> <i>Supports students with disabilities and accessibility across campus</i></p>	<p><u>Get Involved</u> <i>Student organizations, clubs, service opportunities, and many other ways to connect with others on campus</i></p> <p><u>Undocumented Student Services</u> <i>Programs and services are designed to help students overcome obstacles that arise from their immigration status and support them through personal and academic excellence</i></p>
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Subject to Change Policy

The information contained in this course syllabus, other than the grade and absence policies, may be—under certain circumstances such as mutual agreement to enhance student learning—subject to change with reasonable advance notice.