BIBC 100 Structural Biochemistry – WI24 Syllabus

Instructor: Enfu Hui (enfu.hui@gmail.com)
Hybrid office hours: 3:3:50pm Friday, in person location Pac Hall 3502, zoom ID 951 2462 2623
Lecture Time: Tu/Th 8:00 AM-9:20 AM
Lecture Room: Peterson 108
Website: https://canvas.ucsd.edu/courses/51447
All times posted in this syllabus is US Pacific Standard Time (PST).
Lecture format: Pre-recorded lectures + in-class active learning sessions. Pre-recorded lectures will be uploaded to Canvas at least two days before the scheduled lecture time. During the normal lecture time, I will run a review session in the classroom for Q/A and problem solving. Students are expected to study the pre-recorded lectures prior to the normal lecture time, mark their confusing points, and clarify them during the in-class active learning sessions. Attendance of the active learning session is optional but strongly encouraged. Podcast of the live lecture will be made available after class through https://podcast.ucsd.edu/

Discussion section format: on zoom meeting ID TBA

Please note that this syllabus is subject to change. Any schedule changes will be posted on the course website. Make sure to frequently check the website to keep updated.

Course overview: The goal of this course is to help you enhance your knowledge in biochemistry and structural biology, equipping you with the knowledge for success in basic research, medicine and pharmacy etc. This is a course that seek to connect chemistry and biology. Here, we will study the structure-function relationships of biomolecules, including proteins, nucleic acids, carbohydrates and lipids. We will learn the fundamental principles by which these biomolecules fold into their native structures, how such structures support their biological functions, how mutations or environmental changes alter their structures and functions, and how structural information can be utilized to guide drug design. This course has a strong emphasis on proteins, including their building blocks, their different levels of structures, their folding mechanisms, and their interactions with other proteins or a different class of biomolecules. We will dedicate several lectures in studying proteins with specialized biological functions.

How to success in this course? I will rigorously assess your understanding of the lecture content, while striving to help you succeed in this course. To this end, I will provide you with multiple venues to enhance the understanding of the course material, including pre-recorded lectures, in-class review/problem solving, weekly assignments and exams, supplemented with discussion sections and office hours to foster interactions and group learning.

1. **Understand concepts**. While memorization is an integral aspect of learning biology, to succeed in this course, it is important that you think actively to understand the how and why behind the answers, such that you will be able to answer the questions testing the same concept in a different format. You will find that the exam questions are mostly derivatives of the questions in the weekly assignments and the in-class practice, but they are not exactly the same and require true understanding of the course material.
2. **Complete and submit problem sets**. It is crucial that you work earnestly on the weekly assignments before attending discussion sections/office hours to seek clarifications/corrections. These assignments will offer you the necessary practice to understand the important concepts that will likely be tested in the exam. Moreover, they will allow you to earn plenty of points that cushion your grade especially in the case of a weak exam performance.

3. **Be prepared, stay ahead, do not procrastinate**. It is vital that you match the pace of the class from the start, as materials later on rely on the foundation laid in earlier lectures. I will strive to provide you with plenty of time to work on your weekly assignments, and it is your best interest to work on these assignments with your best ability before attending the discussion section, rather than on the due date.
   Similarly, please study the pre-recorded lectures before attending the class.
4. **Read syllabus, announcements and follow instructions**. I will send announcements on Canvas on updates/reminders/tips that will likely benefit you. Please carefully attend to these messages to stay informed and avoid isolation from the rest of the class.

SCHEDULE

Lecture	Date	Topic	Problem set	Discussion section	Wk
1	Jan 9 Tue	Course policies		No discussion section	1
2	Jan 11 Thu	Introduction	PS 1 – covers lectures 2 & 3 ***Upload: Jan 13, Sat*** ***Due: Jan 20, Sat***		
3	Jan 16 Tue	Amino acids and peptides		Discussion section 1 for PS1 (contents for lectures 2 &3) ***Jan 17 Wed***	2
4	Jan 18 Thu	Protein 2° and 3° structures	PS 2 – covers lectures 4 & 5 ***Upload: Jan 20, Sat*** ***Due: Jan 27, Sat***		
5	Jan 23 Tue	Fibrous proteins and protein folding		Discussion section 2 for PS2 (contents for lectures 4 & 5) ***Jan 24 Wed***	3
6	Jan 25 Thu	Assisted protein folding	PS 3 – covers lectures 6 & 7 ***Upload: Jan 27, Sat*** ***Due: Feb 3, Sat***		
7	Jan 30 Tue	Nucleic acids structure		Discussion section 3 for PS3 (contents for lectures 6 & 7) ***Jan 31 Wed***	4
8	Feb 1 Thu	Protein-DNA interactions	PS 4 – covers lectures 8 & 9 ***Upload: Feb 3, Sat*** ***Due: Feb 10, Sat***		
9	Feb 6 Tue	Immune recognition		Discussion section 4 for PS4 (contents for lectures 8 & 9) ***Feb 7 Wed***	5
10	Feb 8 Thu	Oxygen binding proteins	PS 5 – covers lectures 10 & 11 ***Upload: Feb 17, Sat*** ***Due: Feb 24, Sat***		
Feb 13 Tue Midterm in class @ Peterson 108 (test lectures 2-8)				No discussion section	6
11	Feb 15 Thu	Enzymes and catalysis			
12	Feb 20 Tue	Cytoskeleton and motor proteins	PS 6 – covers lectures 12 & 13 ***Upload: Feb 24, Sat*** ***Due: Mar 2, Sat***	Discussion section 5 for PS5 (contents for lectures 10 & 11) ***Feb 21 Wed***	7
13	Feb 22 Thu	Carbohydrates and Glycoproteins			
14	Feb 27 Tue	Membrane lipids and structure	PS 7 – covers lectures 14 & 15 ***Upload: Mar 2, Sat*** ***Due: Mar 9, Sat***	Discussion section 6 for PS6 (contents for lectures 12 & 13) ***Feb 28 Wed***	8
15	Feb 29 Thu	Membrane proteins			
16	Mar 5 Tue	Signaling & receptors I	PS 8 – covers lectures 16 & 17 ***Upload: Mar 9 Sat*** ***Due: Mar 16, Sat***	Discussion section 7 for PS7 (contents for lectures 14 & 15) ***Mar 6 Wed***	9
17	Mar 7 Thu	Signaling & receptors II			
18	Mar 12 Tue	Fluorescent proteins		Discussion section 8 for PS8 (contents for lectures 16 & 17) ***Mar 13 Wed***	10
19	Mar 14 Thu	Review			
March 21 Thursday 8am- 10:59pm Final in person @ room TBA					

TEXTBOOKS

Lectures will cover much of the information in the readings listed on the schedule above. **Exams will be based solely on materials covered in class.**

Textbooks are Optional. If you are interested, the following three books are recommended.

- **Lehninger Principles of Biochemistry** (Nelson and Cox) 7th Edition – listed below as Lehn
- **Introduction to Protein Structure** (Branden and Tooze) 2nd Edition – listed below as B&T
- **XBio** (a new online textbook https://explorebiology.org/).

Optional Reading Materials

Lecture 2	Introduction	Lehn 2.1, 2.2
Lecture 3	Amino acids and peptides	Lehn 3; B&T 1, 2
Lecture 4	Protein 2° and 3° structures	Lehn 4.1-4.3; B&T 3-5
Lecture 5	Fibrous proteins and protein folding	Lehn 4.4; B&T 6
Lecture 6	Assisted protein folding	Lehn 4.4; B&T 6
Lecture 7	Nucleic acids structure	Lehn 8; B&T 7

Lecture 8	Protein-DNA interactions	B&T 8-10
Lecture 9	Immune recognition	Lehn 5.2; B&T 15
Lecture 10	Oxygen binding proteins	Lehn 5.1; B&T 2
Lecture 11	Enzymes and catalysis	Lehn 6; B&T 11
Lecture 12	Cytoskeleton and motor proteins	Lehn 5.3; B&T 14
Lecture 13	Carbohydrates and Glycoproteins	Lehn 7
Lecture 14	Membrane lipids and structure	Lehn 10.2, 11.1-2
Lecture 15	Membrane proteins	Lehn 11.3, 12.5-6
Lecture 16	Signaling & receptors I	Lehn 12; B&T 13
Lecture 17	Signaling & receptors II	Lehn 12; B&T 13
Lecture 18	Fluorescent proteins	Misc, Xbio

IMPORTANT DATES:
January 17: Deadline to submit your requests to take exams at an alternative time
February 2: Deadline to drop without a W
February 13: MIDTERM
February 16: Deadline to drop with a W
March 21: FINAL EXAM
March 28: Grades available
(https://blink.ucsd.edu/instructors/courses/enrollment/calendars/2023.html)

GRADING:

POSSIBLE EARNED POINTS FOR THE QUARTER:	
160 points	Problem sets
150 points	Midterm
250 points	Final
20 points	Course citizenship
580 points	***Total, used for grade calculation***
20 points	Bonus for class attendance based on iClicker responses
600 points	***Total possible point with the bonus***

Grade will be assigned according to this scale:

Points earned	**Percentile**	**Letter grade**	**P/NP**
≥ 580	100	A+	P
≥ 522	90	A	P
≥ 505	87	A-	P
≥ 487	84	B+	P
≥ 464	80	B	P
≥ 447	77	B-	P
≥ 429	74	C+	P
≥ 406	70	C	P
≥ 389	67	C-	P
≥ 371	64	D+	NP
≥ 348	60	D	NP
≥ 331	57	D-	NP

LECTURE ATTENDENCE

Although the pre-recorded lectures in principle contain all the knowledge you need to answer questions in the exams, most students will need some help understand all the concepts to do well in the exams. In

addition, many students prefer learning in a classroom setting. With these in mind, during the normal lecture time I will run a live review session in the classroom for Q/A and problem solving. Students are expected to study the pre-recorded lectures prior to the normal lecture time, mark their confusing points, and clarify them during the in-class review sessions.

I acknowledge that the scheduled lecture time of this class is quite early; hence, attendance of the live review sessions is not strictly required, but strongly encouraged. To promote attendance, multiple choice questions will be integrated in each live lecture, and students can earn extra credits by responding to the questions using iClickers. There will be a total of ~100 iClicker points from these questions, based on both participation and correctness, but only up to 20 points will be counted towards the extra credits of this class. This means that you won't need to attend every single lecture to earn the full extra credit of this component. **However, the amount of iClicker points you will earn at the conclusion of this course will be used as evidence of your work ethic and level of commitment to this class, if a letter of recommendation from me is needed. Thus, the more points you have, the stronger evidence it is.** Please see below "letter of recommendation policy".

Podcast of the live lecture will be made available after class to all the enrolled students through https://podcast.ucsd.edu/

ICLICKERS: According to the campus policy, I will be using **iClicker Cloud** for this course since iClicker Classic is no longer be supported. Clickers are available adjacent to the textbook info counter in the Bookstore, or can be purchased new or used online. You will need a physical iClicker remote, which will come with a subscription for iClicker Student Mobile App. If you have not registered for an iClicker, please register your iClicker on the iClicker.com website ideally before the end of January 10, following instructions posted here: https://mhe.my.site.com/iclicker/s/article/How-to-Register-an-iClicker-Remote Our 1st iClicker poll will occur in our lecture on Thursday, January 11. Join code for this course: https://join.iclicker.com/KQEX

EXAMS

I will challenge you with questions that test your understanding of the course material through two exams.

MIDTERM (150 POINTS): to be administrated on paper in our classroom Peterson 108, see schedule table for time. Covers material through Lecture 8.

FINAL (250 POINTS): to be administrated on paper in person, see schedule table for time. This is cumulative, but primarily focused on lectures 9-18.

Both the midterm and final will be timed and proctored, and only test on materials covered in lecture slides. Each student will be assigned with a different version of exam as that of your immediate neighbor. You are allowed to bring one letter-sized paper with notes. You are NOT allowed to use electronic devices, or to communicate with others. Sharing or posting exam questions online is strictly prohibited. We will monitor these activities at the online sources such as Chegg and course hero etc.

To pass the course, you must take BOTH exams.

PROBLEM SETS

You can earn up to 160 points through a total of eight problem sets, 20 points each.

These problem sets serve two purposes: 1) they will allow you to check and reinforce your learning; 2) they will allow you to earn plenty of easier points outside of exams, and thus to build a robust cushion for

your overall grade. Thus, problem sets can be collectively considered as a second, open-book, mid-term exam. Note that you can earn more credit in the 8 problem sets (160 pts) in the midterm exam (150 pts).

Problem sets **will be posted on Canvas** each week from week 2 in both Word and PDF format.

Problem sets should be submitted electronically on Canvas, in **PDF format**. You can work on either the PDF format, the Word format, or a printed version if you have access to a printer. In the latter two cases, **you will need to convert the problem set to PDF version for submission**. If a question requires hand drawing, you can draw on a piece of paper, take a photo of your drawing, and insert the picture into the Word or PDF.

Problem sets must be submitted by the deadline listed in the table below, in order to earn full credit. Submitted problem sets will be graded by our TA/IAs. Credit will be awarded based on the accuracy of your answers.

Late submissions will incur a penalty of 1 point per hour. This means that if a submission is late by more than 19.5 hours, you will lose all the points of that problem set.

It is highly advisable and in your best interest to complete the problem sets before attending the discussion section, and use the section ONLY for clarifications and minor corrections. It is also important that you truly understand the concepts tested in the problem set questions, rather than memorizing the exact answers. You will notice that most questions in the exams are variants of problem set questions but not identical.

We expect your answers to the free response questions to be unique and not identical to the answer keys or to others' answers. We will pay close attention to plagiarism activities in the problem set answers.

DISCUSSION SECTIONS

All 8 problem sets will be discussed during our weekly discussion section, one problem set per section. Discussion section will be run on zoom, led by a graduate TA and assisted by 3 undergraduate IAs. For the entire quarter, there will be eight discussion sections **occurring at 3-3:50pm every Wednesday** except for weeks 1 and week 6, during which the midterm exam will take place. The 1st section will occur on January 17.

The main purpose of the discussion sections is to work through the problem set posted in the prior week. They will also help you develop your analysis and problem-solving ability, and provide you with the opportunity to build relationships with fellow students and your IA.

During the discussion section, the IAs will explain the corresponding problem set (coded in the same color in the schedule table). However, **you are expected to first work on these problem sets on your own prior to attending the discussion section**. It is likely that the TA/IAs will go through the questions based on a priority list due to time constraint.

Due to ongoing challenges of the This course has been assigned with a single remote discussion section. Hence, we will hold the discussion **on zoom** at the scheduled time.

I recognize that each TA/IA might grade the problem sets with varying levels of stringency. Hence, each of the 4 TA/IAs will grade 2 problem sets of yours, to ensure equitable grading throughout the entire class/quarter.

Discussion sections will not be recorded, attendance is not mandatory but strongly encouraged, the IAs will not be hold make up discussion sections.

Table. List of problem set contents, due dates, and relevant discussion sections

Problem set	Available on Canvas	Due on Canvas	Content	Relevant discussion section dates
1	Jan 13, Sat	11:59pm, Jan 20, Sat	Lectures 2 & 3	Jan 17 Wed
2	Jan 20, Sat	11:59pm, Jan 27, Sat	Lectures 4 & 5	Jan 24 Wed
3	Jan 27, Sat	11:59pm, Feb 3, Sat	Lectures 6 & 7	Jan 31 Wed
4	Feb 3, Sat	11:59pm, Feb 10, Sat	Lectures 8 & 9	Feb 7 Wed
5	Feb 17, Sat	11:59pm, Feb 24, Sat	Lectures 10 & 11	Feb 21 Wed
6	Feb 24, Sat	11:59pm, Mar 2, Sat	Lectures 12 & 13	Feb 28 Wed
7	Mar 2, Sat	11:59pm, Mar 9, Sat	Lectures 14 & 15	Mar 6 Wed
8	Mar 9, Sat	11:59pm, Mar 16, Sat	Lectures 16 & 17	Mar 13 Wed

**** No discussion section on the week of Feb 12th due to midterm.***

INSTRUCTIONAL ASSISTANTS:

Name	Email Address	OH time	Zoom ID	In person location
Taian Chen	t3chen@ucsd.edu	1-3pm Tue	99352397317	Coffee shop in front of the Leichtag building
Saloni Dangre	sdangre@ucsd.edu	5-6pm Mon	92599742370	HSS 1145L
Riya Kalra	rkalra@ucsd.edu	11am-noon Wed	97378730769	HSS 1145L
Tejasvi Patil	tnpatil@ucsd.edu	4:30-5:30pm Thu	98643652845	HSS 1145L

Course Citizenship

This course component aims to encourage students to consider the impact of their actions on their own and others' learning. Professional interactions bring meaningful benefits to students, fellow classmates, and the teaching team. Similar to the workplace, professionalism can open new opportunities and benefits. Demonstrating maturity and professionalism, as well as contributing meaningfully to the course community, showcase professionalism. Every student is initially assumed to be professionally mature, and full credit is awarded at the start of the quarter. However, based on observations throughout the quarter, including one-on-one interactions and electronic communication, professionalism credits may be deducted. Examples of excellent course citizenship include:

- **Ethical conduct**: adhere to academic integrity policies.
- **Accountability & responsibility**: submit assignments on time.
- **Feedback receptivity**: being open to constructive feedbacks from the instruction team.
- **Preparedness**: study the pre-recorded materials before attending the class, complete the problem sets before attending discussion sections.
- **Inclusion**: respect diversity, contribute to an inclusive learning environment.
- **Conflict resolution**: address conflicts in a respectful and constructive manner.
- **Communication**: communicate clearly and respectfully in writing and speaking

- **Initiative**: proactively study and discuss class materials, seek clarification when needed.
- **Tech etiquette**: use electronic devices responsibly in class, avoid distractions and stay focused on the lesson.

Example of poor course citizenship:

- Ignoring the directions or requests from the instructional team
- Harassing and/or bullying the instructional team or other students, either in person or online
- Excessive texting during lectures

CLASS POLICIES:

EXAMS:

One midterm exam will be administered in class during one regularly scheduled lecture time: 8am-9:20am PST. The date is tentatively set on **February 13, Tuesday**.

The final exam will be in person at **8am- 11am on March 21 Thursday**.

To promote academic integrity and effectively address questions you may have during the exam, both exams will be proctored.

Exceptions will be made for those with personal situations/extenuating circumstances that you can provide documentation of. You must email Dr. Hui (enfuhui@ucsd.edu) within the first 2 weeks of the winter quarter if you wish to take the exams at an alternate time. All students with an exception will take the exam at one agreed upon alternate time. Accommodations will not be made for students that choose to schedule courses with overlapping class or final exam times.

Any student who is found cheating on a midterm and/or final will be reported to the Academic Integrity Office according to university policy for an investigation into academic dishonesty (see section on Academic Integrity below).

REGRADES: If you discover an error in the grading of your exam, you may request a regrade by emailing Dr. Hui or the instructional assistant for your section within one week of when the graded exams are made available. No requests will be considered after one week, except for correction of point addition errors.

ACCOMODATIONS: Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. Please note that instructors are unable to provide accommodations unless they are first authorized by OSD. For more information, contact the OSD at (858) 534-4382 (voice), **osd@ucsd.edu**, or visit **osd.ucsd.edu**."

ACADEMIC INTEGRITY

Students are expected to do their own work, as outlined in the UCSD Policy on Academic Integrity. **Academic misconduct** is broadly defined as any prohibited and dishonest means to receive course credit, a higher grade, or avoid a lower grade. Academic misconduct misrepresents your knowledge and abilities, which undermines the instructor's ability to determine how well you're doing in the course. Please do not risk your future by cheating.

As defined by UCSD policy, academic dishonesty includes:
• Taking an exam for another student or allowing another student to take an exam for you.
• Copying another student's work on an exam or allowing another student to copy your work.
• Altering graded exams or assignments and submitting them for a regrade.
• Using a calculator, phone or other electronic device.

Any student caught or suspected of cheating by doing one of the things on the list above will be reported to the UCSD Academic Integrity Coordinator and the Dean of the student's college. Confirmed cases of cheating on exams or altering an exam and submitting it for a regrade will result in the student receiving an automatic F as their final grade as well as other disciplinary actions determined appropriate by the Academic Integrity Coordinator.

LETTER OF RECOMMENDATION POLICY:

I will be happy to support students for their future endeavors, through letters of recommendation. However, he will only write letters for students who meet either of the two following conditions:

1. You obtain an A+ from this class. This will automatically guarantee you a letter if needed.
2. You obtain a B+ or above from this class **and** has made a strong impression in me by the time you finish the course, such that I could comment positively on your potential or personality besides your performance in this class. Evidence includes strong class attendance (i.e., high iClicker points), being proactive/inquisitive in the lectures/office hours, or a large improvement from the midterm to the final exam.

Plain letters restating the grades usually do not help your application, but you are responsible for providing me with the material to write a meaningful letter.