BIMM 100 – Molecular Biology Fall 2023, 4 units

Instructor: Jens Lykke-Andersen, 4138 Bonner Hall.

E-mail: jlykkeandersen@ucsd.edu (Important: please use the subject line: 'BIMM 100'). E-mails sent before 8 AM Mon-Fri will generally be answered on the same day. E-mails sent later than 8 AM will generally be answered the following weekday.

Phone: 858-822-3659 (please identify yourself as a student in BIMM 100).

Office hours: Mondays 2-3 PM in 4146 Bonner Hall, starting Oct 9.

Instructional Assistants:

Student Last Names	Instructional Assistant (e-mail)	Office Hours
A-F:	Nathan Barney (nbarney@ucsd.edu)	Thur 1-2 PM, 4146 Bonner
G-L:	Vita Chou (wchou@ucsd.edu)	Fri 3-4 PM, zoom
M-R:	Sean Kai Hsu (sehsu@ucsd.edu)	TBD
S-Z:	Ploy Techawatanasuk	Mon 1-2 PM, zoom
	(ptechawatanasuk@ucsd.edu)	

Class website: On Canvas: https://canvas.ucsd.edu/

Class hours:

Lectures: Tuesdays & Thursdays, 11:00 AM - 12:20 PM, in Galbraith Hall. Discussion Section: Mondays 9:00-9:50 AM via zoom

Important dates (http://blink.ucsd.edu/instructors/resources/enrollment-calendars.html):

Tuesday, October 24:	EXAM 1 (11:00 AM-12:20 PM; in class).			
Friday, October 27:	Deadline to drop the class without "W" on transcript.			
Tuesday, November 14:	EXAM 2 (11:00 AM-12:20 PM; in class).			
Friday, December 1:	Deadline to drop with "W" grade.			
Wednesday, December 13:	EXAM 3 (11:30 AM-2:29 PM)			
- For other important dates, see the Class Schedule.				

Course Prerequisites:

 BILD1 (The Cell),
Lab class, BILD 4 or BIMM 101 or BIBC 103 or BILD 70, and
Organic chemistry: [BENG 120 or CHEM 40A or CHEM 40AH or CHEM 41A] and [BENG 120 or CHEM 40B or CHEM 40BH or CHEM 41B]
Prerequisite classes for BIMM100 cannot be waived. **Purpose of the course:** Molecular Biology is the study of gene structure, function and regulation at the molecular level. It describes fundamental mechanisms, shaped by evolution, that underlie all known life on our planet - mechanisms that when impaired, for example by mutation or by parasitic interference, lead to human disease. You will be introduced to our current understanding of genome structures and gene expression and the key experimental observations and deductions made by scientists, which have shaped, and continues to shape, our knowledge in this rapidly developing field of biology. As you will learn, this is a field of intense research with new exciting discoveries reported daily.

Learning objectives: After taking this class, you should know the key concepts of the central dogma of molecular biology and how insights into these concepts have been gained through experimental observations. You should also be able to interpret, and predict the outcome of, basic experiments to study factors and pathways in molecular biology processes.

The specific topics you will learn include the composition of genomes and the basic mechanisms of replication, transcription, RNA processing, translation and RNA turnover, and how the complexes that perform these activities identify their targets, carry out their function and can be regulated to meet cellular needs.

Doing well in this class requires solid prior understanding of biochemistry and organic chemistry.

COURSE STRUCTURE:

BIMM100 is a large class with ≈200-400 students. In an attempt to teach to all students, the course is structured in a way that offers multiple learning tools. These include:

Textbook (optional): Lodish et al. 'Molecular Cell Biology' 9th edition, Freeman, 2021 is <u>optional</u>, but highly recommended (earlier editions are okay as well, but require a little more work identifying the proper pages). There are copies on reserve in the Biomedical Library. It is a reasonable and clear reference to own if you will continue in the biomedical sciences and is also used in BICD 110 - Cell Biology. It will give you another view of the material treated in lecture. The subjects treated in lecture are the materials you will be tested on; however reading the same topics in the book explains the selection of topics a second time, sometimes in greater depth.

Clickers: To achieve extra credit, you will need an i-clicker, either a physical i-clicker remote or an i-clicker mobile app. New and used i-clicker remotes are available at the Price Center bookstore.

Clickers will be used for rapid feedback to foster interactive learning in a large classroom setting. Clicker questions (usually 5-10 per class) will be used during class time to make students think about, and discuss with each other, how the newly discussed material fits within the bigger picture of molecular biology, and how experimental observation and experimental design can address questions in molecular biology.

To obtain as much credit for clicker use as possible, please register your i-clicker ASAP, and no later than **Friday Oct 6**, on the **class website**.

Problem Sets: There will be a total of six Problem Sets due during the quarter. They will be posted on the class website on Monday mornings immediately prior to the Discussion Section (see the schedule for the specific dates). Problem Sets will be subjects of peer-discussions

during Discussion Sections and of class discussions during a subset of In-person Classes (see schedule and below). <u>Completed Problem Sets are handed in and graded</u>. They are due on Canvas Sundays before midnight each week and will count towards your overall grade (<u>no late submissions accepted</u>). I recommend that you complete the Problem Sets on paper before uploading answers on Canvas.

Problem Sets are closely aligned with exams and are used as a tool to promote understanding of the discussed topics through problem solving. To best prepare yourself for exams, I highly recommend that you actively participate in Discussion Sections and Class Discussions. Answer keys for Problem Sets will be posted after the submission deadline each week.

Practice exams: A Practice Exam will be posted about one week before each exam. To best prepare yourself for the real exam, I <u>highly</u> recommend you to sit down with the practice exam and take it as if it was a real exam – i.e. write down your answers. Do this before the Practice Exam Discussion Section (i.e. the Discussion Section immediately prior to each exam) as the Practice Exam will form the foundation of this Discussion Section. A key will be posted immediately before the Discussion Section so you can focus on discussion of those questions you found the most difficult.

In-person Classes - Lectures: Lectures will cover the central topics of molecular biology in the order indicated in the schedule, although the specific order can deviate a bit from that indicated depending on time. The order of the topics discussed during lectures is different from the order in the textbook. The lectures are divided into three sections covering: 1) Genes & Genomes, 2) Basic mechanisms of gene expression, and 3) Regulation of gene expression. Along the way, we will discuss key experiments and deductions that underlie the understanding of the different processes. The pages in the textbook corresponding to the material discussed during lectures are indicated in the schedule.

On the day before each lecture, at the latest, a copy of the lecture slides (in pdf format) will be uploaded on the course website. It is highly recommended that you download and print out the lecture slides so that you can follow the lecture by taking notes on it. They comprise a skeletal record of what happens during lecture. However, you may find the lecture slides unintelligible without your own written notes. Therefore, don't think of them as a second, independent "book" you can read but instead as a collaborative record of the lecture that you will create.

In-person Classes - Problem Set Discussion: Six classes during the quarter will be dedicated to problem set discussions. We will discuss the last two pages of the week's Problem Set using clickers. Your use of clickers in these discussions will be part of your clicker extra credit for the course.

Asynchronous Lectures: A subset of the lecture material, primarily material focusing on molecular biology methods, will be posted on Canvas as videos. Each will have a short quiz that will form part of your grade. Material discussed in the asynchronous lectures will appear in the exams.

Discussion Sections: Discussion sections will be held via zoom, overseen by IAs, once per week, most weeks of the quarter (see class schedule). Most (six) discussion sections will focus on peer-discussion of Problem Sets, which will be posted immediately before the Discussion section. A subset of Discussion Sections will focus on Practice Exams. Discussion Sections are not mandatory, but highly recommended (think of them as a set time to work on your weekly problem sets with peer- and IA-support).

For these discussions - as an experiment this year - we will divide students into peer-groups based primarily on student preference. A link will be provided in Canvas for you to indicate which other students (4-6 or so in total) you would like to form a peer group with. Students that do not indicate a peer-group will be assigned to one by the instructor. You will subsequently be given a zoom breakout room number to go to for each Discussion Section, where you will discuss the week's Problem Set (or Practice Exam) with other students of your peer-group.

For Problem Set Discussion Sections, please start from the first question and discuss among yourselves the answers. You could use a zoom white board for drawing and/or share the Problem Set questions on the zoom screen if you like. If you get stuck on a question as a group or want to verify an answer, you can call an IA into your breakout room using the chat function.

For Practice Exam Discussion Sections, these will work best if all group participants have taken the Practice Exams before the meetings. You can then, during the meeting, focus the discussion on questions that you had difficulty with and call IA's in for questions when needed.

Office Hours: Each student will be assigned to an IA, who will hold office hour once per week (see alphabetical IA assignments by student last names on Page 1 of the syllabus). The Course Instructor will also have a weekly office hour. If you cannot make it to your own IA's office hour you are welcome to attend office hours of any other IA and/or the Course Instructor. The time and location of office hours is listed above and will be posted on the class website.

EXAMS & GRADING:

Your grade in BIMM 100 is based entirely on your final class score. Your final score will be calculated the following way:

Exams (75% total; 25% each exam): All exams are closed book and covers the material discussed in the corresponding Section (i.e. they are not cumulative, although each section builds conceptually on the previous sections). The time of the exams can be found in the schedule (the first two are in-class exams and the third is in finals week).

- Questions will be multiple choice format and must be answered on a scantron using pencil no. 2.

- Pencils (No.2) and ID card (student ID or driver's license) are the only personal items you may have with you during the exam; any other items you bring (backpacks, phones turned OFF, etc) must be placed entirely under your seat and are subject to being moved at the IAs' and instructor's discretion.

- There will be <u>no scheduled make-up exams</u>. Failure to take the exam at the assigned time and place will result in a grade of zero for that exam. Extraordinary circumstances preventing you from taking an exam at the scheduled time must be submitted in writing and include official documentation of the cause as far in advance as possible to the instructor. If an exception is made for these extraordinary circumstances, a make-up will generally be a 1-hour oral exam. Requests are not accepted after start of the exam.

- Since exams are completed on scantron with a pencil, exams are not handed back per school policy and regrading requests are not possible. If you suspect something went wrong

with the grading of your exam, please contact the instructor.

- Any student who is observed to look at and/or copy off another student's paper during an exam will be reported to the Academic Integrity Office according to university policy for an investigation into academic dishonesty (see section on Academic Integrity below). We have tools to monitor cheating during exams, so please do not be tempted.

Problem Sets (20% total; 4% each for best 5 of 6): Full credit (4%) will be given for Problem Sets with 80% or more correct answers. Less than 80% correct answers will give proportionally less credit (e.g. 70% correct = 3.5% credit, etc). Your best 5 of 6 Problem Sets will count. No late Problem Sets will be accepted and there will be no make-up Problem Sets. You are welcome, and indeed encouraged, to discuss Problem Set questions with other students, but please submit your own answers.

<u>Video Quizzes (5% total)</u>: Your timely completion of quizzes for asynchronous videos. Full credit for each quiz requires correct answers for all but one question (for example 4 of 5). Fewer correct answers will give proportionally less credit (e.g. 3/5 correct => 3/4 = 75% credit, etc). No late quizzes will be accepted and there will be no make-up quizzes.

<u>Clicker use (up to 5% of extra credit)</u>: This is based entirely on clicker <u>use</u>, not on whether you get the answers right. For each lecture, usage of the clicker for \geq 75% of questions during the lecture will result in full credit for that lecture. *Note: It is your responsibility to remember to bring your clicker (or phone with i-clicker app) to every lecture and to make sure that batteries are charged; i.e. no clicker credit will be awarded retroactively if the clicker is not used or doesn't work during lecture.* However, with the expectation that all students forget their clicker once during the quarter, missing clicker use for up to 2 lectures will still result in full extra credit for the quarter. To get credit for the whole quarter, make sure that your clicker is registered with the class no later than **Fri Oct 6**.

- Make sure to not cheat with clickers by having someone other than yourself using your clicker, or bringing someone else's clicker, during class. This is considered a breach in academic honesty and will be reported to the Academic Integrity Office according to university policy for an investigation into academic dishonesty (see section on Academic Integrity below). Appropriate clicker use will be monitored by the instructor and IAs during class.

Letter grades are assigned as follows:

Overall Class Score: 75% Exams 1-3 (25% each) 20% Problem Sets 1-6 (4%, best 5) 5% Video Quizzes + Up to 5% extra credit for Clickers

Class ScoreLetter grade93-100+:A90-92:A-

88-89:	B+
83-87:	В
80-82:	B-
78-79:	C+
73-77:	С
70-72:	C-
60-69:	D
Below 60:	F

Note: Since your own grade is not influenced in any way by how your classmates perform, working together with your classmates will only help everyone involved. Studying in groups is highly recommended!

TIPS ON HOW TO DO WELL:

BIMM 100 (like many other university courses) is complex enough to reward the student who gives some thought to how to take it. The most important trick is to keep up. The pace is unrelenting because BIMM 100 must sometimes move rapidly using less than 20 in-person and video lectures to cover the field of molecular biology, which is a rapidly expanding field due to intense research.

The following practices will help you best prepare for the exams:

- 1. Print out lecture slides before each lecture.
- 2. Be present and take good notes during lectures (the lecturer will often use the board for explanation, which slows down the pace and allows you to take notes on the lecture slides).
- 3. Actively participate in thinking about, and in peer discussions of, clicker questions.
- 4. If you have it, read the textbook preferably before class (planned topics and corresponding textbook pages are indicated in the schedule).
- 5. Watch the Video lectures and submit the associated quizzes on time each week.
- 6. Actively participate in discussions of Problem Sets and Practice Exams during **Discussion sections**. Submit Problem Sets on time!
- 7. Sit down and work through Practice Exams writing down all answers to the best of your ability **before** getting answers from Discussion Sections, posted keys, or other students.
- 8. Work in Study groups!
- 9. Do NOT "cram" last minute for the exams! Instead stay on top of the material throughout the quarter.

In addition, the "Solved Problems" at the end of each *Lodish* Chapter can give useful practice in problem solving.

Since your grade will be decided entirely from your final score and <u>not</u> based on how you do compared to other students in the class, it will never hurt you to help fellow students. In fact, research on learning has shown that whether you are on top of the material or are having a hard time understanding the concepts, you will improve your learning by discussing the material with other students. Participation in study groups and in peer discussion during discussion sections and clicker questions is therefore <u>highly</u> recommended.

<u>A note of caution</u>: Memorizing slides and texts is <u>not</u> an efficient method of learning for this class. While some memorization is required to become literate in molecular biology, the primary goal of the course, and what you will be primarily tested on, is understanding the key broader

concepts of molecular biology and using this to formulate predictions and to interpret observations from simple molecular biology experiments as tested primarily through problem solving questions on the exams. These skills are best achieved by following the practices listed above.

CLASS POLICIES:

Attendance: Attendance in class and during Discussion sections is optional, but very strongly encouraged. You simply will not do well in the class if you do not put in significant effort.

Classroom etiquette: Please refrain from eating, surfing the web, texting and engaging in conversations (except when prompted during clicker questions), or anything else that might distract others and yourself from paying attention during lectures. Please make sure to shut off cell phones. If you must leave class early, please sit in the back in an aisle seat so you can exit with the least amount of disruption to others.

Academic integrity: All suspicions of academic misconduct will be reported to the Academic Integrity Office according to university policy.

Those students found to have committed academic misconduct will face administrative sanctions imposed by their college Dean of Student Affairs and academic sanctions imposed by me. The standard administrative sanctions include: the creation of a disciplinary record (which will be checked by graduate and professional schools); disciplinary probation; and attendance at an Academic Integrity Seminar (at a cost). Students can also face suspension and dismissal from the University; those sanctions are not at my discretion. Academic sanctions can range from loss of clicker credit, a score of zero on an exam, to an F in the class. The appropriate sanctions are determined by the egregiousness of the Policy violation. Students who assist in or are complicit with cheating could also be in violation of the Policy. Thus, students who become aware of their peers either facilitating academic misconduct or committing it should report their suspicions to me for investigation.

Please review UCSD's Policy on Academic Integrity, which can be found on this website: https://students.ucsd.edu/academics/academic-integrity/

It should be needless to say that it is much easier to pass this course, and any future courses that use this course as a prerequisite, by putting the energy into understanding the material of the course rather than into an attempt to pass the course by cheating.

Note that we have devised methods for monitoring for cheating with clickers and exams in this class; please do not be tempted to cheat.

Letters of recommendation requirements: Acceptance into programs to further your education can be very competitive and thus you should carefully choose letter writers who know you well and who can honestly state that you achieved one of the top scores in their class and that your demonstrated enthusiasm, diligence and hard work makes the writer confident that you will be an excellent candidate for the school of application. Therefore, for me to write an effective letter of recommendation, you should have received an 'A' in the class and you should have been an active participant that I have had a chance of interacting with during the quarter. Given the size of the BIMM 100 class, lecturers of smaller classes or labs, or research supervisors, will often know you much better and their letters of recommendation will therefore usually carry much more weight; that said, I am happy to assist with letters if you feel that a letter from me will carry the most weight of any you can obtain.

Disabilities: If you qualify for accommodations because of a disability, please submit to me an AFA letter from the Office for Students with Disabilities (OSD) as soon as possible, and <u>no later</u> than the second week of class, so that your needs may be addressed. The OSD determines accommodations based on documented disabilities. Please see guidelines at: <u>http://disabilities.ucsd.edu/</u>

Responsibilities:

In a class of 200-400 students it is impossible to teach directly to everyone's needs.

It is <u>my (and the IAs) responsibility</u> to keep the class organized, to come to class well prepared and to provide students with multiple pathways to learning the topics, including lecture slides, explanations on the board, clicker questions, problem sets, practice exams, discussion sections, and office hours.

It is <u>your responsibility</u> to put a significant effort into the class, by coming to class with printed lecture slides, taking notes, actively participating in clicker questions/peer discussions, reading the textbook, working through problem sets and actively participating in the discussion of problem sets during discussion sections.

This way, BIMM 100 should be an enjoyable and exciting learning experience. Embrace this opportunity to understand the basics of molecular biology and, perhaps, one day you will make the next breakthrough in this rapidly growing field in biology and medicine!

GOOD LUCK!