

BIMM 100 – Molecular Biology

Summer Session II (4 Units)

Instructor: Anusorn (Sorn) Mudla

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Office: Bonner 2317 or H&SS 1145B (Desk B)

Office Hours: Monday and Wednesday 1-3 pm (Bonner Hall 3146). I will also do office hour by appointment for Tuesday and Thursday.

Lectures: MTuWTh 11:00 am – 12:20 pm, Pepper Canyon Hall Room 122

Final Exam: Friday September 7th 2018 11:30 am – 2:29 pm. Location: TBA

Discussion Sections: starts the first week of class

Section	Day	Time	Location	TA/Tutor	Email:
A01	Thursday	1-2:50 pm	HSS 2150	Alice Yaldiko	awablaha@ucsd.edu
A02	Thursday	3-4:50 pm	HSS 2150	Yutian Li	yul355@ucsd.edu
A03	Tuesday	9-10:50 am	CENTR 217B	Yutian Li	yul355@ucsd.edu

TAs Office hours and locations:

TA/Tutor	Day	Time	Location
Yutian Li	Thursday	9:00 am – 11:00 am	Bonner 2150
Alice Yaldiko	Monday	8:45 am – 10:45 am	Geisel Library-East Common

Course Prerequisites: BILD1 and BIBC100 or BIBC102 (structural or metabolic biochemistry). If you feel rusty on the material of the prerequisites, it is strongly recommended that you carefully read Chapters 1-3 and Chapter 5, pp171-182, of the *Lodish* textbook (7th ed), which cover material that is considered prerequisite and will only be mentioned in passing during class. Prerequisite classes for BIMM100 cannot be waived. Doing well in this class requires solid prior understanding of genetics, biochemistry and organic chemistry.

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 structure 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 covered include the composition of genomes and the basic mechanisms of replication, transcription, RNA processing, translation, and how the complexes that perform these activities identify their targets, carry out their function and can be regulated to meet cellular needs.



GRADING:

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

Grading components	Percentage
Midterm 1	20%
Midterm 2	20%
Final (accumulative)	40%
Discussion section activity	10%
Quizzes	10%
Total	100%
Extra credits	
• Attendance (iClicker)	5%
• CAPES/professionalism	2%

The following grading scheme will be used. The course is not graded on a curve (i.e. 20% of students getting A, B, C, and such). Thus, the ability to do well in this course is not dependent on others doing poorly. Because course assessments are not perfectly precise, grade cutoffs may be shifted slightly (e.g. by ~1%) from those listed below, based on large gaps in between individual scores. I will not round-up the final grade.

A+	97-100	B+	87-90	C+	77-80	D+	67-70	F	<60
A	93-97	B	83-87	C	73-77	D	63-67		
A-	90-93	B-	80-83	C-	70-73	D-	60-63		

COURSE STRUCTURE:

In an attempt to teach to all students, the course is structured in a way that offers multiple learning tools. These include:

Textbook: Lodish et al. 'Molecular Cell Biology' 7th edition, Freeman, 2013 is **optional** (earlier editions are okay as well). There are copies on reserve in Geisel and the Biomedical Library (<https://roger.ucsd.edu/record=b9440233~S9>). 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, though the particular questions may be formulated using material from the book. Reading the same topics in the book explains the selection of topics a second time, sometimes in greater depth. Some nice animations and other helpful material related to the book can be found at the textbook web site: <http://bcs.whfreeman.com/lodish7e/>

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. Other topics that may be covered are CRISPR, cancer, immunotherapy and synthetic biology.

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 or 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 in the 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.

VIDEOCASTING: Class lectures are videocast and are available for download soon after lecture. Download videocasts at <http://podcast.ucsd.edu/>

CLICKERS: You will need an i-clicker. New and used i-clickers are available at the Price Center bookstore. Make sure to get an i-clicker and not a different system (such as H-ITT or PRS).

Clickers will be used for rapid feedback to foster interactive learning in a large classroom setting. Clicker questions 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 **Tuesday August 7**, on the class website (<http://ted.ucsd.edu>). There will 5% extra credit if you answer more than 75% of the quicker questions. These are number of questions which vary between lectures. You do not need to answer them correctly to receive credit but do your best because it will be helpful on the exams.

QUIZZES: There will be four online quizzes. These quizzes are design to check you understanding from previous week material. They will be in multiple choice and short answer format (no more than just a few words). The quiz should not take longer than 1 hour. The lowest quiz grade will be dropped. These quizzes are very similar to the problem set given in earlier week. It is VERY IMPORTANT that you do the problem set prior to taking the quiz.

PROBLEM SETS: Problem sets will be posted on the class website on Sunday. Problem sets are used as a tool to promote understanding of the discussed topics through problem solving. It is very strongly recommended to work through the problem sets either alone or in study groups.

To best prepare yourself for exams, I highly recommend you to sit down with each problem set and take them as if they were exams – i.e. write down your answers. Do this before hearing answers from other students, discussion sections and/or keys.

Answer keys for each problem set will be posted after the lecture on Thursday. Please keep in mind that study from the key is not an effective way to do well on the exams. Doing the problem set by yourself and check your answers with the key will enhance your problem-solving skills. This is essential not only taking the exams for this class but other classes when you are under pressured situation.

DISCUSSION SECTION: You must attend the section you registered for and there is no official switching of sections, since registration for each individual section is completely independent (i.e. you would need to drop the course and then register for the waitlist of another section.)

The section meetings provide for:

1. Academic review. Each week the IA will provide an opportunity to review the previous week's lectures and readings. This review may take the form of answering your specific and general questions, clarifying something important presented quickly in lectures, expanding on something important described in the textbook, or working through a numerical problem of the type found on the exams. You may also discuss questions you have from the weekly quiz but you IAs will not just simply give away the answers.



2. Each week you will work on a problem set in a group of 3-4 students. This will be graded as part of your “discussion section activity” score. These questions will focus on interpreting experimental results from primary literatures or solving problems similar to exam questions. This will enhance your collaborative skills and how to think as scientists. Reading primary literature is very an essential skill and I am encouraging you to try reading papers in the field of molecular biology. The activity will take approximately 1 hour.

MIDTERM AND FINAL EXAMS: The tests in this course will focus on application of knowledge so it will not be heavily relied on memorization. I will not ask you to memorize unimportant detailed information. I will be very clear during lectures of what are important. Midterms are cumulative but will focus on the most recent material, the final exam will include material from throughout the course.

Exam format: Questions on the Midterms and Final will be in multiple choice and short answer format. Pen and pencils 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 professor’s discretion. You are allowed to use restroom during the exam but need to leave without your belonging and ask for permission from the exam proctors.

To facilitate reflection and learning from tests, our midterms will be a two-phase collaborative exam. The first phase will be done individually, and the second phase will be collaborative (in a group). The group score will be compared to the average of the group’s individual quiz scores. If the group score is higher than that average, the difference between the group score and the average will be added to each person’s individual score (to a max of 100%).

Example: Group consists of student A, B, C, and D.

Student A: 90% on individual Student B: 80% on individual

Student C: 70% on individual Student D: 60% on individual

Average of individual scores: 75%.

That same group gets 80% on the group quiz. Difference between average individuals and group = 5%. Therefore, each individual gets an additional 5% on their scores, so the final exam scores will be:

Student A: 95% Student B: 85%

Student C: 75% Student D: 65%

I strongly recommend you study in a group. Studies have shown that people tend to learn more from collaborative work compared to doing work alone (*Barkely 2005, Davis 2009*). These collaborative testing opportunities allow us to deepen our understanding because we are receiving feedback on our thinking in a very timely fashion (and feedback is critical for learning). Also, it is an opportunity to practice communicating effectively and collaboratively to solve problems.

MISSED EXAMS: There are no make-up exams, so unexcused absences from scheduled exams will be recorded as zeroes. Significant issues that affect your ability to take a scheduled exam (e.g., death or serious illness in the family or personal tragedy/health issue) must be communicated to me directly via email. You will be required to provide documentation of an unavoidable emergency (e.g., serious illness, etc.). If you know in advance that you will miss the exam please inform me as soon as possible at least one week before the exam date with the valid proof. Failure to take the exam at the assigned time and place will result in a grade of zero for that exam.

RE-GRADES: I will use an online grading system called Gradescope. This system will allow TAs to grade your exams electronically after the exams have been scanned. In this way, you may use pen or pencil on the exam and it will be eligible for re-grading. After the exam is



graded you will be notified and be able to submit the request for regrading electronically. It is still your responsibility to check your exam for errors in grading. You **MUST** request the regrade within 1 week after your exam has been graded and released.

CHEATING: I will not tolerate any form of cheating during the exams. Any student who is observed to look at and/or copy off another student's paper during 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). Cheating will result in failing the course with no exception.

PROFESSIONALISM: This portion of the course grade is intended to motivate students to consider the impact of their actions on their own learning and the learning of others in the course. Unprofessional interactions consume time yet have no meaningful benefits to you, your fellow students, and/or the teaching team. Analogously in the workplace, being unprofessional to your colleagues or supervisors will only discount you. When you are discounted, you will not be invited for new opportunities that you may or may not be aware of. Professionalism can be demonstrated through individual (2% described here) and community efforts (0.5% extra credit described below). The individual component is to account for demonstrating maturity and professionalism. By default, every student is assumed to be professionally mature. Hence, this component is awarded to every student at the beginning of the quarter. During the quarter, based on observations by the teaching team, which includes but is not limited to one-on-one interactions, electronic communication, and follow-up conversations on grades, your professionalism credit may be deducted in steps of 0.5%.

Example interactions with meaningful benefits:

- Developing deeper insight into course material, concepts, biology, and/or society in general
- Working collaboratively to improve in skill building and future opportunities
- Learning conceptually and meaningfully why full credit was not awarded for an assignment
- Clarifying course material that facilitates deeper learning
- Reporting errors or problems in class, on assignments, or for other course materials

Example interactions that have no meaningful benefits and thus should be avoided:

- Contributing inequitably to team work in class, in discussion section, or on exams
- Harassing and/or bullying the instructional team or other students, either in person or online
- Asking questions when the information is already available or will eventually be known
- Ignoring the directions or requests from the instructional team
- Being disruptive to fellow students in class, in discussion section, or on exams

E-MAIL POLICY: The best way to contact me is by email: amudla@ucsd.edu. On all emails PLEASE put BIMM 100 in the subject line to indicate that the email pertains to this course. If you email about anything regarding your status in the course, please include your UCSD username, and PID. If you have questions about course content, it is often faster to email your IA directly but also cc me.

TECHNOLOGY POLICY: Bring your phones/tablets/laptops to class! We will use the internet for in-class activities and it is a great resource for taking notes. None of these may be used during quizzes or exams in class. **Respect other students!** Keep in mind technology can be extremely distracting. Please silence all devices and do not play videos or pictures or cute cat memes that are not directly tied to what we are doing in class.

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 of \$75). Students can also face suspension and dismissal from the University; those sanctions are not at my discretion. Academic sanctions can range from 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/index.html>

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.

OTHER RESOURCES:

Writing and Critical Expression Hub: <http://commons.ucsd.edu/students/writing/index.html>

The Writing and Critical Expression Hub provides support for undergraduates working on course papers, i.e. laboratory reports and the research proposal, as well as other independent writing projects. Writing mentors can help at any stage of the writing process, from brainstorming to final polishing. The Writing and Critical Expression Hub offers: one-on-one writing tutoring by appointment; supportive and in-depth conversations about writing, the writing process, and writing skills; help with every stage in the writing process, walk-in tutoring; and workshops on writing.

Accessibility and inclusion:

<http://disabilities.ucsd.edu> | osd@ucsd.edu | 858-534-4382

Any student with a disability is welcome to contact us early in the quarter to work out reasonable accommodations to support their success in this course. Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD). Students are required to present their AFA letters to faculty and to the OSD Liaison in the Division of Biological Sciences in advance so that accommodations may be arranged.

Whenever possible, we will use universal designs that are inclusive. For example, colors used in this syllabus are distinguishable by most colorblind and non-colorblind people, and this font is designed to be dyslexic friendly. If you have feedback on how to make the class more accessible and inclusive, please get in touch!

Discrimination and harassment: The Office for the Prevention of Harassment & Discrimination (OPHD) provides assistance to students, faculty, and staff regarding reports of bias, harassment, and discrimination. OPHD is the UC San Diego Title IX office. Title IX of the Education Amendments of 1972 is the federal law that prohibits sex discrimination in educational institutions that are recipients of federal funds. Students have the right to an educational environment that is free from harassment and discrimination.

Students have options for reporting incidents of sexual violence and sexual harassment. Sexual violence includes sexual assault, dating violence, domestic violence, and stalking. Information about reporting options may be obtained at OPHD at 858-534-8298, ophd@ucsd.edu, or <http://ophd.ucsd.edu>. Students may receive confidential assistance at CARE at the Sexual Assault Resource Center at 858-534-5793, sarc@ucsd.edu, or <http://care.ucsd.edu>, or Counseling and Psychological Services (CAPS) at 858-534-3755 or <http://caps.ucsd.edu>. Students may feel more comfortable discussing their particular concern with a trusted employee. This may be a student affairs staff member, a faculty member, a department chair, or other university official. These individuals have an obligation to report incidents of sexual violence and sexual harassment to OPHD. This does not necessarily mean that a formal complaint will be filed. If you find yourself in an uncomfortable situation, ask for



help. The university is committed to upholding policies regarding nondiscrimination, sexual violence, and sexual harassment.

GENERAL AGREEMENT:

In a large class it is impossible to teach directly to everyone's needs. It is my (and the TAs) responsibility 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, assignments, practice exams, discussion sections, and office hours. It is your responsibility 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, reviewing materials, working through assignments and actively participating in the discussion of assignments during TA 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 contribute to this rapidly growing field in biology and medicine!

TIPS ON HOW TO DO WELL:

1. Print out or download lecture slides before each lecture. **DON'T DO THIS MORE THAN 24 HOURS BEFORE CLASS!** I often make last minute changes to the PowerPoint to incorporate recent research.
2. Be present and take good notes during lectures (I will often use the board for explanation, which slows down the pace and allows you to take notes on the lecture slides).
3. Use the textbook and internet resources (see the Links Section of the course TritonEd page) as reference material to help you better understand lecture material. It's rarely beneficial to read a textbook like a novel from front to back. Use the index and table of contents to find material covered in class.
4. Attend discussion section and prepare well for them. Go through the previous week's material and come up with specific topics or questions for the IA to clarify.
5. Take all the material from lecture, the videocast, the textbook, and the PowerPoints and consolidate it in a fashion that makes sense. The key to understanding and remembering so much complex concepts and terminology is to ORGANIZE, ORGANIZE, ORGANIZE!
6. Assess yourself frequently and accurately! Just looking at flashcards is rarely enough. Try and teach a topic to a friend or draw out an important figure from memory.
7. When you study, keep a running list of questions and issues you are having with the material. Bring those questions to office hours or a study group.
8. It's better to study for short bursts often than in massive cramming sessions.
- 9. GO TO OFFICE HOURS!!!!!! IT'S FUN!!!!!!**

Watch these videos linked below for even more effective study tips:

<https://www.youtube.com/watch?v=FyBdA61GmJ0>

<https://www.youtube.com/watch?v=p60rN9JEapq>

There is a course on Coursera that I personally found very helpful for learning anything. It is free and I want you to check it out: <https://www.coursera.org/learn/learning-how-to-learn>. There are many other fun online courses on Coursera on learning as well.

Since your grade will be decided entirely from your final score and not 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 of clicker questions is therefore, highly recommended.

HAVE FUN LEARNING & GOOD LUCK



Class Schedule

Week	Day	Date	Planned Topics	Assignment/ Review
1	M	6-Aug	Introduction, Syllabus, Genome	Sun (8/12): Quiz 1
	Tu	7-Aug	Discovery of DNA and DNA replication	
	W	8-Aug	Gel electrophoresis and PCR	
	Th	9-Aug	DNA sequencing and DNA repair	
2	M	13-Aug	Telomere; non-coding and mobile DNA	Sat (8/18): Review session 1-3 pm (CENTR 109) Sun (8/19): Quiz 2
	Tu	14-Aug	Recombinant DNA	
	W	15-Aug	Molecular biology techniques	
	Th	16-Aug	Transcription	
3	M	20-Aug	Midterm 1	Sun (8/26): Quiz 3
	Tu	21-Aug	RNA processing	
	W	22-Aug	Processing of rRNA and tRNA	
	Th	23-Aug	Translation	
4	M	27-Aug	Post Transcriptional and translational regulation	Wed (8/29): Review Session 1-3 pm (CSB 001) Sun (8/29): Quiz 4
	Tu	28-Aug	Gene regulation in prokaryote	
	W	29-Aug	Gene regulation in Eukaryote	
	Th	30-Aug	Midterm 2	
5	M	3-Sep	Labor-Day (No Lecture)	
	Tu	4-Sep	Genome Engineering (CRISPR)	
	W	5-Sep	Cancer/Review for Final	
	Th	6-Sep	Review for Final: CAPE	
	F	7-Sep	Final	