BIMM 100 – Molecular Biology Summer Session II 2020 (4 Units)

Instructor: Anusorn (Sorn) Mudla Email: amudla@ucsd.edu Office: Remotely working Lectures: MTuWTh 9:30 am – 10:50 am (via Zoom)

Final Exam: Friday September 4th 2020 8:00 am - 10:59 am. (Online)

| Section | Day | Time | TA/Tutor | Email: |
|---------|-----|-------------|----------------|-------------------|
| A01 | MW | 11-11:50 am | Connor Lennan | clennan@ucsd.edu |
| A02 | MW | 12-12:50 pm | Crystal Hsu | crhsu@ucsd.edu |
| A03 | MW | 1-1:50 pm | Koorosh Askari | koaskari@ucsd.edu |
| A04 | MW | 2-2:50 pm | Koorosh Askari | koaskari@ucsd.edu |

Discussion Sections: starts the first week of class

Office hours:

| TA/Tutor | Day | Time Zoom ID | | Password | Links |
|----------------|-----------|----------------|---------------|----------|---------|
| Crystal Hsu | Tuesday | 12 – 1 pm | 642 818 1080 | BIMM100 | Crystal |
| Crystal Hsu | Wednesday | 9 -10 pm | 642 818 1080 | BIMM100 | Crystal |
| Connor Lennan | Thursday | 8:30 – 9:30 am | 952 7226 8907 | BIMM100 | Connor |
| Sorn Mudla | Friday | 10 am – 12 pm | 937 9507 8167 | BIMM100 | Sorn |
| Koorosh Askari | Friday | 4 pm – 5 pm | 943 561 2833 | BIMM100 | Koorosh |

Course Prerequisites

BILD 1 + organic chemistry (CHEM 40A and B or equivalent) + a lab class involving molecular biology (BILD 4 or BIMM 101 or BIBC 103). 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 (8_{th} 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.

Canvas

All of the class material is accessible via Canvas. I highly recommend you using Google Chrome as your web browser. Safari has issues with displaying images sometimes. You can find the course at

- 1. coursefinder.ucsd.edu or
- 2. canvas.ucsd.edu

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) | 30% |
| Discussion section activity | 10% |
| Weekly Quizzes | 10% |
| Daily Quizzes | 10% |
| Total | 100% |
| Extra credits CAPES/professionalism Feedback survey Pre-test Post-test | 0.5 % 0.5 % 0.5 % 0.5 % |

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 |
|----|--------|----|-------|----|-------|----|-------|---|------|
| Α | 93-97 | В | 83-87 | С | 73-77 | D | 63-67 | Р | > C- |
| A- | 90-93 | B- | 80-83 | C- | 70-73 | D- | 60-63 | | |

Pass/No pass: D is a passing grade from the university perspective (student receives credit for class). However, to count the class toward Biology major requirement, you need a C- or better. If Biology students receive D's, they must re-take the class. If they receive a higher grade when repeating the class after earning a D or F, the higher grade will be factor into their GPA but the first grade still appears on their transcript.

COURSE STRUCTURE:

Due to COVID-19 pandemic, the course will be fully ONLINE. The lectures will be delivered both asynchronous and synchronous. Quizzes will be on Canvas while Midterms and final will be on Gradescope. Discussion section will be via Zoom. I welcome any feedback about the lectures so I can adjust and accommodate your need.

TEXTBOOK: Lodish et al. 'Molecular Cell Biology' 8th edition, Freeman, 2016 is **OPTIONAL** (earlier editions are okay as well). You can do well in this class **WITHOUT** the book. The previous version is also compatible. 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.

ASYNCHRONOUS LECTURES: These lectures are recorded podcasts from BIMM 100 Summer Session 2 2019. 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.

Each week, a set of recorded lectures will be posted on Canvas. I will provide lecture slides and lecture notes for each lecture so you can follow the lecture better. The lecture notes provide a summary of what I think are key concepts for each lecture. I recommend you taking your own note while listening to the recorded lecture.

SYNCHRONOUS LECTURES: I will hold lectures during the regular class time (9:30 – 10:50 am). This will be a chance for you to ask questions and learn from other students' questions. I will also go over main concepts from the asynchronous lectures in more detail but try not to be repetitive. I hope this will resemble the in-person class in term of interaction as much as possible. You should watch the asynchronous lectures before attending synchronous lecture. In this way, you have more time to generate questions. The synchronous lectures will be RECORDED. If you are not comfortable being recorded, you can turn off your video on Zoom. During the lecture, you can also ask question by typing in the chat. This would allow those of you who are less comfortable asking questions verbally to get your questions answered. You may leave the synchronous lecture at any time. I encourage you to attend both asynchronous and synchronous lectures. You can join the Zoom meeting via link below.

Join Zoom Meeting:

https://ucsd.zoom.us/j/96624166469?pwd=bUIMa2xiWWJSOE92TTA1MINZSFVDZz09 Meeting ID: 966 2416 6469 Password: BIMM100

DAILY QUIZZES: To keep you on track and up-to-date with the lectures, I will assess your understanding with daily quizzes. The questions on the quizzes will be similar to the iClicker questions presented in the lectures. The number of questions will vary each day. You will have 48 hours to work on each quiz. If you get over 85% of the entire quiz, you will receive the full 10% credit

on the final grade. I will not round-up your score. For example, if you receive 84.9% you will not be round-up to 85%. If you receive less than 85%, your final daily quiz grade will be calculated as percentage of your score. For example, if you receive the total of 70%, you final grade would be 0.7 x 10% = 7 %. This will allow you to miss some questions or some quizzes without being too panic.

WEEKLY 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. These quizzes are very similar to the problem set given for that 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 sitting 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 last discussion section on Wednesday. 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 should attend the section you registered. However, to compensate for students in different time zone, I permit you to attend any discussion sections. To keep the date and time consistent with the class registration, discussion section will be on Monday and Wednesday.

| Time | IAs | Zoom ID | Zoom Password | Links |
|-------------|---------|---------------|---------------|----------|
| 11-11:50 am | Connor | 980 7033 4125 | BIMM100 | A01 Link |
| 12-12:50 pm | Crystal | 642 818 1080 | BIMM100 | A02 Link |
| 1-1:50 pm | Koorosh | 926 9581 7810 | BIMM100 | A03 Link |
| 2-2:50 pm | Koorosh | 910 2030 7382 | BIMM100 | A04 Link |

The section meetings provide for:

1. Academic review (MONDAY-OPTIONAL). 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. Discussion section activity (WEDNESDAY-REQUIRED). Each week you will work on a problem set in a group of 3 students in the breakout room on Zoom. Only one answer sheet will be submitted to your IA. In each group, you will write down answers and turn in via email. This will be graded as part of your "discussion section activity" score. It is essential to answer the question correctly. 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. If you miss a discussion section, you need to contact your IAs with acceptable reason and set up a make-up WITHIN that week. You will not receive any credit if you submitted your work later than Friday of that week.

MIDTERM AND FINAL EXAMS: Questions on the Midterms and Final will be in multiple choice and short answer format. 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 to memorize. Midterms are cumulative but will focus on the most recent material, the final exam will include material from throughout the course. Midterms will be held during the regular class time, but you will be taking them <u>ONLINE</u>. The final will be held online on Friday September 4th 2020, 8 – 11 am.

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 an 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.

CHEATING: I will not tolerate any form of cheating. It is difficult to detect any forms of online cheating and I will not spend time inventing tools to catch you. Honesty is a valuable characteristic you should have. You are encouraged to study with other but cannot collaborate during exams.

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 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 (email, Zoom and discussion board), 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. Please also cc your IA in the email because this will facilitate the responding time. 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 <u>my (and the IAs)</u> 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 <u>your</u> 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 and skim through it before watching each asynchronous lecture. This will facilitate your notetaking process and shift your focus onto trying to understand the concept rather than writing note.

2. 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.

3. 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.

4. 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!

5. 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.

6. 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.

7. It's better to study for short bursts often than in massive cramming sessions.

8. Come to office hour and reach out if you have questions.

Watch these videos linked below for even more effective study tips: https://www.youtube.com/watch?v=FyBdA61GmJ0 https://www.youtube.com/watch?v=p60rN9JEapg

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: <u>https://www.coursera.org/learn/learning-how-to-learn</u>. 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. You can form a Zoom study group.

HAVE FUN LEARNING & GOOD LUCK

Class Schedule

| Week | Day | Date | Planned Topics | | |
|------|-----|--------|---|--|--|
| 1 | М | 3-Aug | Syn: Introduction, Syllabus, Genome | | |
| | Tu | 4-Aug | Gene and Discovery of DNA | | |
| | W | 5-Aug | DNA replication | | |
| | Th | 6-Aug | Gel electrophoresis and PCR | | |
| | М | 10-Aug | DNA sequencing and DNA repair | | |
| 2 | Tu | 11-Aug | Telomere; non-coding and mobile DNA | | |
| 2 | W | 12-Aug | Recombinant DNA | | |
| | Th | 13-Aug | Transcription (1) | | |
| 3 | М | 17-Aug | Midterm 1 | | |
| | Tu | 18-Aug | Molecular biology techniques | | |
| | W | 19-Aug | Transcription and RNA processing | | |
| | Th | 20-Aug | Noncoding RNA, Translation | | |
| | М | 24-Aug | Post Transcriptional and translational regulation | | |
| | Tu | 25-Aug | Gene regulation in prokaryote | | |
| 4 | W | 26-Aug | Gene regulation in Eukaryote | | |
| | Th | 27-Aug | Genome Engineering (CRISPR) and applications | | |
| 5 | М | 31-Aug | Midterm 2 | | |
| | Tu | 1-Sep | Gene therapy and bioinformatics | | |
| | W | 2-Sep | Cancer/Review for Final | | |
| | Th | 3-Sep | Review for Final: CAPE | | |
| | F | 4-Sep | Final | | |