

# **BIMM 100 – Molecular Biology Spring 2021, 4 units**

## **BIMM 100 – Molecular Biology**

Spring 2023, 4 units

**Professor:** Emma Farley, E-mail: [efarley@ucsd.edu](mailto:efarley@ucsd.edu) put “BIMM 100” in subject line

Lecture: Tu, Th, 11:00 – 12.20 PETER 110

Office hour: Monday 3 – 4 PM Leichtag Biomedical Research Building Room  
Tuesday 3 – 4 PM Leichtag Biomedical Research Building Room

My office hour start Tuesday April 11<sup>th</sup>.

Discussion Sections and Office Hours start from the week of April 10th!

See IA Discussion section and OH document for details on these.

### **Important info regarding remote learning –**

- **Lectures:** I will give the lectures at the planned lecture times on Tuesday and Thursday. Classes will be interactive, with chance to ask questions, participate in polling questions and peer discussion so I highly recommend you attend the class in person. However, attendance is not required, and lectures will be recorded for those who cannot attend and for review purposes.
- **Discussion sections:** Discussion sections will be synchronous, and I highly recommend you attend discussion section to work through the problem sets. You must attend your assigned discussion section. You need to attend 6/9 Discussion sections in order to get 3 extra credit points, and participate for 2 further extra credit points.
- **Problem sets:** Each Thursday I will post the problem set, work through the problems on your own and submit your answered problem set to your IA 2hrs before the discussion section. You will get up to 6 points if you hand in 6/8 problem sets; you don't need to get the right answer, but you must work through the problem set and attempt to answer all the questions. The problem sets mirror the exams and so doing the problem sets will help you prepare for the exams. Answer keys will be posted the following Friday after the last discussion section.
- **Exams:** There will be two midterms in class (April 25<sup>th</sup> and May 18<sup>th</sup>) and a final Friday June 13<sup>th</sup> 11.30-2.30.
- **Office hours:** Office hours will be synchronous. However, the IA OHs are at a variety of times to provide an opportunity to meet with them if you need.

### **Important dates:**

<https://blink.ucsd.edu/instructors/courses/enrollment/calendars/2020.html>

Friday, April 28: Deadline to drop without W on your transcript.

June 11<sup>th</sup>: FINAL EXAM 11.30-2.30

For other important dates, see the Class Schedule.

## **COURSE OVERVIEW:**

**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. Errors in these mechanisms are the source of evolutionary adaptation and disease. You will be introduced to our current understanding of genome structure and gene expression. You will also be introduced to the key experiments, observations and deductions made by scientists, which have shaped, and continue to shape, our knowledge of how molecules (DNA, RNA and proteins) can encode the information for life. 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, the basic mechanisms of replication, transcription, RNA processing, translation. You will also learn how gene expression is regulated to enable the same genomes to give rise to different cells types and how mis-regulation of these mechanisms leads to disease.

## **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' 8<sup>th</sup> edition, Freeman, 2016 is optional (earlier editions are okay as well but pages will not correspond exactly). 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 covered in lectures. I will post the electronic copies of the relevant pages onto canvas each week for those who don't have access to the book.

**The subjects presented in lectures 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 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:

### 1) DNA, Genes & Genomes

DNA as the molecule of inheritance, Genes and the types of DNA found in the genome.

### 2) Basic Mechanisms of Gene Expression

How DNA makes mRNA makes protein, and how DNA makes tRNA and rRNA

### 3) Regulation and Mis-Regulation of Gene Expression in Life, Evolution and Disease

How gene expression is controlled so the right genes are expressed at the right time and place. We will also discuss how mis-regulation of gene expression leads to evolutionary adaptations and disease.

Along the way, we will discuss key experiments and deductions that underlie understanding of the different processes. The pages in the textbook (8<sup>th</sup> ed) 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 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.

**Polling Questions:** Polling questions in class will be used for rapid feedback to foster interactive learning in a large classroom setting. Polling 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.

**Problem Sets:** Problem sets will be posted on the class website on most Thursdays during the quarter (see the schedule for the specific dates). Problem sets are used as a tool to promote understanding of the discussed topics through problem solving. It is optional to work through the problem sets. However, **it is very strongly recommended to work through the problem sets either alone or in study groups before looking at answer keys or going to discussion section.**

To best prepare yourself for exams, I highly recommend you 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, attending discussion sections and/or looking at keys. Submitting completed problem sets to your IA 2hrs before the class starts will gain you extra credit. If you complete and submit 6/8 problems sets you will get 3 extra credit points.

Answer keys for each problem sets will be posted on the next Friday (see the schedule for the specific dates).

**Discussion Sections:** Discussion sections will be held by IAs once a week most weeks of the quarter (see Discussion section schedule). The discussions will be based primarily on the problem sets posted in the previous week. The IAs will lead a discussion to make sure participating students arrive at the correct answers and to work through any of the questions that you struggled with.

**To get the most out of Discussion Sections, it is critical to have first worked through the problem sets alone or in study groups and then to participate in the discussion during the Discussion Sections.**

Discussion Sections are optional, but highly recommended. **The attendance of discussion sections will be recorded by IAs and will be used to calculate extra credits.** IAs will have their personal office hours. The time and location of Discussion Sections and office hours will also be posted on the class website. IA's OHs will be posted on Canvas in the first week of the class.

### **EXAMS & GRADING:**

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

**Problem sets (6% of final score):** Submitting your completed problem set to your IA 2hrs before class will give you 1 point to a total of 6 points. There are 8 problem sets and so you need to complete and submit 6 of these to get the max points.

**Midterms 1 and 2 (25% each for a total of 50%)** The midterm exams are closed book and given in class. It covers the material discussed up until the exam (see Schedule). There will be two midterms. The times of these midterms can be found in the schedule.

**Final Exam (44% of final score):** The final exam is given in finals week (see schedule). It is closed book and will cover the broader concepts of the entire course (cumulative). 25% of the final will focus on material from section three. 19% of the exam will cover broad concepts of the entire course.

### **Extra credits:**

#### **Discussion section attendance 3 extra credit points**

IAs will record your attendance of discussion sections starting in week 2, April 4th. You will need to attend 6/9 of the discussion sections to get the extra credit.

#### **Discussion section participation two extra points:**

IAs will note students who actively participate by explaining answers or otherwise engaging in the class.

### **Notes on regrades:**

Requests to reconsider any grading must be submitted in writing along to Prof. Emma Farley during office hours. **Regrading is limited to grading mistakes and is not granted to requests for more partial credit for incorrect answers.** The full request

must be received within one week of the exam return date. **If regrading is granted, the entire exam will be regraded by Dr Farley.** If anything on the exam submitted for regrading is found to be altered, it will be considered a breach in academic honesty and will be grounds for failure of the course as well as any additional disciplinary actions as indicated by the policy to maintain academic honesty (see section on Academic Integrity below).

## **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 30 lectures to cover the field of molecular biology, which is an exciting and rapidly expanding field.

### **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 a white board for explanation, which slows down the pace and allows you to take notes on the lecture slides). The slides will not have much text this is to allow you to take your own notes.
- 3) Actively participate in the lectures, peer discussion and polling questions.
- 4) Sit down and work through problem sets by writing down all answers to the best of your ability before getting answers from Discussion Sections, Review Class, posted keys or other students. These (along with polling questions) will give you the best idea of how exam questions are formulated.
- 5) Actively participate in discussions of the problem sets during Discussion Sections.
- 6) After having ensured you understand the material from the previous week, by attending lectures, going over the problem set and attending the discussion section. Review any material that is still unclear to you and attend office hours for further clarification if needed.

**A note of caution:** Memorizing slides and texts is not 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 in the exams. These skills are best achieved by following the practices listed above.

## CLASS POLICIES:

**Attendance:** Attendance in Class and Discussion sections is optional, but very strongly encouraged. Attendance in discussion sections will gain you extra credit.

**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: <http://students.ucsd.edu/academics/academic-integrity/defining.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.

**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 a letter of recommendation, you must have received an 'A+' in the class and you must have been an active participant that I had a chance of interacting with during the quarter. Given the size of the BIMM 100 class, your smaller classes or labs, or research supervisors, will usually know you much better and their letters of recommendation will therefore usually carry much more weight.

**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 no later 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: <http://disabilities.ucsd.edu/>

**RESPONSIBILITIES:**

There are many ways of learning, and everyone has a preferred style. I will aim to use a variety of styles in an attempt to meet everyone's needs.

It is my (and the IAs) 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, polling questions, assignments, 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 polling questions/peer discussions, reading the textbook, working through assignments, and actively participating in the discussion of assignments during IA discussion sections. Office hours provide yet another opportunity for you to seek the help you need if you are still unclear about something after the lecture and discussions.

BIMM 100 opens the door to the world of molecular biology which is exploding in novel and exciting ways, for example genome editing. It is the basis for understanding development, disease, how life evolves, novel treatments for disease and to identify criminals. If you follow the recommendations and actively participate it 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!

I look forward to spending the next quarter with you and hope you enjoy the class.

# Good luck!!!