

# **BIMM 100 – Molecular Biology, Distance-Learning Edition**

## **Summer Session I 2020, 4 Units**

*This syllabus is subject to change, particularly because of campus efforts to contain COVID-19. Any schedule changes will be posted on the course website. Make sure to frequently check the website to keep updated.*

**Instructor:** Steven W. Miller, Ph.D, Bonner Hall Rm 4121

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**Office Hours:** 3:00 pm – 4:00 pm Mondays & Wednesdays via Zoom

**Class Lecture:** Content Delivered through Canvas Videos for Asynchronous Viewing  
Live Session via Zoom: 2:00pm – 3:20pm, Monday through Thursday

**Course Website:** <https://coursefinder.ucsd.edu>

**Discussion Sections:**

12089	MW	4-4:50	Quoc Tran	<a href="mailto:qbt001@ucsd.edu">qbt001@ucsd.edu</a>
12090	MW	5-5:50	Alex Zhang	<a href="mailto:azz001@ucsd.edu">azz001@ucsd.edu</a>
12091	TTH	4-4:50	Li Wang	<a href="mailto:liw120@ucsd.edu">liw120@ucsd.edu</a>
12092	TTH	5-5:50	Quoc Tran	<a href="mailto:qbt001@ucsd.edu">qbt001@ucsd.edu</a>

***NOTE: All educational sessions, including lecture and discussion sections, will be recorded and made available asynchronously.***

Please make sure that you check out this website for resources on how to learn remotely:  
<https://digitallearning.ucsd.edu/learners/learning-remote.html>

**Recommended text:** Molecular Cell Biology, Lodish et al. W. H. Freeman.  
Either 7th (2013) or 8th (2016) Editions.

**Important Dates:**

Exams: Exam 1, Thursday, July 9<sup>th</sup> (2:00 pm – 3:20 pm)  
Exam 2, Thursday, July 23<sup>rd</sup> (2:00 pm – 3:20 pm)  
Final Exam, Friday, July 31<sup>st</sup> (3:00 pm – 6:00 pm)

See <http://summersession.ucsd.edu/calendar/> for important academic dates (subject to change as conditions change)

**Course Prerequisites:** BILD 1 or equivalent; organic chemistry (CHEM 40A and B or equivalent); and a lab class involving molecular biology (BILD 4 or BILD 70 or BIMM 101 or BIBC 103). It is strongly recommended that you read Chapters 1-3 and Chapter 6, pp224-234, of the Lodish textbook (8<sup>th</sup> ed; 172-182 if 7<sup>th</sup> ed), which review material that is considered prerequisite and will only be mentioned in passing during class.

**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, including 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. In addition, you should have a basic understanding of the experimental approaches and deductions that have shaped, and continues to shape, our understanding of these concepts.

## **COURSE STRUCTURE:**

BIMM100 typically has a large number of students, which all have different ways of learning. In an attempt to teach to all students in this distance-learning setting, the course will be taught in a hybrid “flipped” model that offers multiple learning tools. These include:

**Textbook:** Lodish et al. ‘Molecular Cell Biology’ is optional, but highly recommended. There are copies of the text 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, 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:** Lecture videos will be available on Canvas for each of the daily topics. 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. This is done purposefully to allow the lectures to follow the general order of the central dogma of biology (DNA->RNA->Protein), and 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.

Each video lecture will be accompanied by lecture slides (in PDF format) for students to download from the Canvas site. It is highly recommended that you download and print out the lecture slides so that you can follow the lecture by taking notes on them.

**Live Zoom Sessions:** *After watching and taking notes on the Canvas lecture topics of the day*, these sessions are designed to practice, discuss, and expand on the content in the asynchronous lectures. They will include clicker-type questions and breakout groups. Questions will be used during class time to make students think about, and discuss with each other, how the newly discussed material fit within the bigger picture of molecular biology, and how experimental observation and experimental design can address questions in molecular biology. For more information about why we use iClickers visit:  
<http://clickers.ucsd.edu>

**Practice Problem Assignments:** Class assignments will be posted on the class website throughout the quarter, with each assignment corresponding to a set of 2-3 lecture topics as indicated on the class schedule. Assignments are used as a tool to promote understanding of the discussed topics through problem solving. It is optional to work through the assignments and they are not handed in. However, it is very strongly recommended to work through the assignments either alone or in study groups. Assignments will be reviewed during discussion sections.

**Discussion Sections:** Discussion sections will be held by IAs twice a week during the condensed summer session. The discussions will be based primarily on the posted Assignments. The IAs will lead a discussion based on the Assignments to make participating students arrive at the correct answers. The IAs will not provide the answers themselves. To get the most out of Discussion sections, it is therefore critical to have first worked through the Assignments alone or in study groups and then to participate in the discussion during the Discussion sections. Discussion sections are optional, but very strongly recommended.

**Discussion Board:** (On the course website) The purpose of the Discussion Board is to organize discussions and provide an area for students to ask questions, discuss specific class topics, and reply to each other's posts. This forum aims at providing an additional tool to address specific questions and will be supervised by the professor and IAs. Keep in mind that the discussion board does not replace lectures.

**Office hours** (Instructor and IAs)

Weekly office hours provide an additional option to discuss the material being presented in class or other related interests you may have. Course-related discussions include asking for extra help, seeking clarification of material presented in class and following up on aspects of the class you find compelling. The instructor will not have lessons planned for office hours. It is expected for students to drive these meetings with their questions and thoughts. A good way to prepare for office hours is to review the material and your notes from class and identify as clearly as you can what you do not understand.

## EXAMS & GRADING:

GRADING -- BIMM100 has three grading components: participation & professionalism (2%), assignments (14%), quizzes (15%), exams (68%). The following grading scheme will be used.

A+	97-100%	B+	87-90%	C+	77-80%	D+	67-70%	F	0-60%
A	93-97%	B	83-87%	C	73-77%	D	63-67%		
A-	90-93%	B-	80-83%	C-	70-73%	D-	60-63%		

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.

There are no opportunities for extra credit beyond what is assigned as part of the course by the instructor.

**PARTICIPATION AND PROFESSIONALISM (7 pts; 2%)** – Success in this course depends upon the willingness of student to engage in both individual and team-oriented activities that foster the mindset of scientific research environments. The classroom environment is a collegial, collaborative, professional community and student behavior toward their peers and instructors is expected to reflect as much. This portion of the grade reflects upon both the actions of the student as an individual and the class as a whole. As such 1% accounts for the initial assumption of each student as dedicated, collaborative professionals, and chronic deviations of individual students will result in points being deducted. The remaining 1% reflects upon the class community and refers to surveys and evaluations. If 90% of the class responds to such material designed to provide feedback for the improvement of the course and the instructors and assistants, all students will earn these points.

**HOMEWORK** (14%; 15 pts each) – Will consist of write-to-learn peer-review assignments to be submitted on Canvas. See Calendar.

**QUIZZES** (15%; 10 points each) – These will consist of short quizzes on Canvas to be completed each week.

**IN-CLASS EXAMS** (38% of final score; Exam 1 – 50 pts; Exam 2 – 75 pts): The midterm exam is closed book and given during class time. Material covered in each exam is noted in the course schedule.

**FINAL EXAM** (30% of final score; 100 pts): The final exam is given during the finals session (see schedule). It is closed book and will cover the concepts of the entire course.

**BONUS:** • (up to 2% bonus) Attendance and participation in at least 75% of your Discussion Section meetings. Monitored and recorded by your IA. Can be substituted by extensive Discussion Board activity.

• (up to 3% bonus) Attendance and participation in at least 75% of the Live Zoom Sessions. Monitored by participation (not correctness) in polling questions (~clickers) during these sessions. Below 75%, bonus points are prorated.

## About Exams....

- Questions on the Midterms and Final will be in short answer format on Canvas during the scheduled lecture session.
- You may be asked to join a Zoom session for proctoring; be prepared to show your UCSD ID to verify your identity upon completion and submission of the exam.
- Because of the shortened Summer Session, there will be no scheduled make-up exams for the midterm or finals. Failure to take the exam at the assigned time and place will result in a grade of zero for that exam.
- Requests to reconsider any grading must be submitted in writing along with your original exam to the instructor during class or office hours. The full request must be received within one week of the exam return date. A regrade request will cause the entire exam to be regraded. If anything on the exam submitted for regrade 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 University policy to maintain academic honesty.

Note: regrade requests on the final exam will only be taken in person by the instructor during business hours on the Monday following the exam, prior to the submission of grades to the registrar.

## 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 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. Read the textbook – preferably before class (planned topics and corresponding textbook pages are indicated in the schedule).
5. Work through assignments alone or in groups - always before Discussion Sections. These (along with clicker questions and practice exams) will give you the best idea of how exam questions are formulated.
6. Actively participate in discussions of the assignments during Discussion sections.
7. Constantly reflect and evaluate yourself and how well you really understand each topic.

In addition, the “Solved Problems” at the end of each Lodish Chapter are often useful.

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.

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

A note of caution: Memorizing slides and texts is not an efficient method of learning concepts. 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 concepts of molecular biology and using this to formulate predictions and to interpret observations from simple molecular biology experiments. 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. Your attendance effort will be rewarded with the points earned from lecture activities. You simply will not do well in the class if you do not put in significant effort.

**Classroom etiquette:** Please mute your computer microphone unless asked to participate by the instructor. Inappropriate content or disrespect toward fellow students or instructors can result in removal from the live class sessions.

**Academic integrity:** Cheating will not be tolerated and will be subjected to disciplinary actions as discussed above under exams and clickers and as indicated by the policy to maintain academic honesty. All cheating will be reported to the University. Please review UCSD's Policy on Academic Integrity, which can be found on this website: <http://academicintegrity.ucsd.edu/process/policy.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. If you are struggling or overwhelmed, that is OK! Seek help from your IAs, instructor, and your classmates; working through your difficulties will help you prepare for and be able to manage the next challenge you will face, whereas cheating will only put you further behind.

***Students suspected of Academic Integrity violations on exams will be invited to Zoom follow-up meetings where they will be asked to (in real time, on video) justify their answers (before the graded exams or solutions are released). If the instructor isn't convinced during the meeting, or the student refuses to participate, they're submitted for Academic Integrity violations.***

**Accommodations:** Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students

with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. Please note that instructors are unable to provide accommodations unless they are first authorized by OSD. For more information, contact the OSD at (858) 534-4382 (voice), or visit [osd.ucsd.edu](http://osd.ucsd.edu).

**TECHNOLOGY POLICY:** This remote course requires daily computer use for viewing videos and participating in lectures and examinations. Even though lectures are viewed on a computer it is strongly advised to take written notes rather than notes on the computer. Please see this research study that shows “multi-tasking” on computers is likely to decrease your grade<sup>1</sup>! The use of cell phones, additional tabs, or any other electronic devices is not permitted during exams. Use of a cell phone or other similar electronic devices during an exam or quiz is grounds for receiving a failing grade.

<sup>1</sup>Sana et al. 2013. <http://www.sciencedirect.com/science/article/pii/S0360131512002254>

**Responsibilities:** In a class with a large number students it is impossible to teach directly to everyone’s needs. It is my (and the IAs) responsibility 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, and discussion sections. 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, reading the textbook, working through assignments and actively participating in the discussion of assignments during IA 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!

GOOD LUCK!

BIMM 100 Summer Session I Tentative Schedule

Date	Topic	Lecture	7th ed* (Chapter: pages)	8th ed* (Chapter: pages)	Related Homework	Exam content		
6/29	Introduction							
6/30	DNA structure	1	1: 1 - 10 2: 36 - 37 4: 115 - 121 4: 123	1: 1 - 15 2: 45 - 46 5: 167 - 176 5: 177	HW1	Exam 1; 9 July		
7/1	DNA replication; telomeres	2	4: 145 - 151 6: 273 - 275	5: 197 - 203 8: 347 - 349				
7/2	DNA repair; PCR	3	4: 151 - 159 5: 192 - 193	5: 203 - 212 6: 239 - 241				
7/6	Genes; mobile DNA	4	6: 223 - 245	8: 301 - 323				
7/7	Chromosomes	5	6: 256 - 271	8: 327 - 345	HW2			
7/8	Transcription and Gene Expression in Prokaryotic Organisms	6	4: 124 - 127 7: 279 - 288	5: 176 - 180 9: 353 - 363	HW3		Exam 2; 23 July	
7/9	Exam 1; Lectures 1-5							
7/13	Gene Expression in Eukaryotic Organisms	7	7: 288 - 297 7: 302 - 305	5: 180 - 182 9: 363 - 381				
7/14	Activation and Repression of Transcriptional Initiation	8	7: 297 - 302 7: 305 - 314 7: 315 - 322	9: 381 - 390 9: 390 - 398	HW4			
7/15	Regulation of Transcription Factor Activity	9	7: 323 - 327	9: 398 - 404				
7/16	mRNA Processing and Export	10	8: 345 - 370	10: 417 - 445				
7/20	RNA Polymerase I and Polymerase III and Maturation	11	8: 336 - 338 8: 384 - 392	9: 412 - 414 10: 461 - 470	HW5			
7/21	Translation	12	4: 131 - 145	5: 183 - 197				
7/22	Post-Transcriptional Regulation	13	8: 364 - 365 8: 384 - 392	10: 435 - 440 10: 451 - 461	HW6			
7/23	Exam 2; Lectures 6-11							
7/27	Non-coding RNAs	14	5: 216 - 218 8: 370 - 374	6: 264 - 268 10: 445 - 451				
7/28	Recombinant DNA Methods	15	5: 182 - 192 5: 195 - 198 5: 201 - 202	6: 234 - 239 6: 241 - 246 6: 249 - 253	HW7			
7/29	Genomics	16	6: 252 - 256 5: 200 - 201	6: 243 - 249 8: 323 - 327				
7/30	Cancer	17	24: 1113 - 1150	24: 1135 - 1168				
7/31	Cumulative Final Exam							

**\*Recommended Text: Molecular Cell Biology, Lodish et al. MacMillan Learning. 7th or 8th edition.**