BIMM 100 – Molecular Biology
Fall 2010, 4 units

Professor: Jens Lykke-Andersen, 3218 Bonner Hall.
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Phone: 858-822-3659 (please identify yourself as a student in BIMM 100).
Office hours: Thursday 3:30-4:30 PM, 3218 Bonner Hall, starting Sept 30.

Teaching Assistants:
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Course website: On WebCT: http://webct.ucsd.edu

Class hours: Tuesdays & Thursdays, 2:00 – 3:20 PM, in 107 SOLIS.
The lectures are your most specific guide to what is important. Never hesitate to ask questions to clarify what is said during the lectures.

Important dates:
Friday, October 22: Deadline to drop the class without penalty.
Tuesday, October 26: MIDTERM (2-3:20 PM)
Thursday, December 9: FINAL EXAM (3:00-5:59 PM)
For other important dates, see the Schedule.

Course Prerequisites: BICD100 (Genetics), BIBC100 or BIBC 102 (structural or metabolic biochemistry), and their prerequisites, including BILD1 and organic chemistry.
If a prerequisite has been waived to allow you to take this class or if you feel rusty on the prerequisites, it is strongly recommended to carefully read Chapters 1-3 and Chapter 5, pp165-176, of the *Lodish* textbook (6th ed), which cover 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. Doing well in this class requires solid prior understanding of genetics, biochemistry and organic chemistry.

COURSE STRUCTURE:

Textbook: Lodish et al. 'Molecular Cell Biology' 6th edition, Freeman, 2008 is optional, but strongly recommended. 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 often 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 question 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/lodish6e/

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. This is done purposefully to allow the lectures to follow the general order of the central dogma of biology (DNA->RNA->Protein). We will therefore first discuss the composition and structure of DNA, the composition of genomes, DNA replication and repair, the use of recombinant DNA in research, transcription, RNA processing, mRNA translation and turnover. 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, a copy of the lecture slides (in pdf format) will be uploaded on the course website. You can 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.

Clickers: To achieve extra credit, you will need an i-clicker. These clickers are available at the Price Center book- store and cost $37.50 (new) or $28.15 (used). Make sure to get an i-clicker and not a different system (such as H-ITT or PRS). For more information, visit http://mediaservices.ucsd.edu/student-response-system

Clickers will be used for rapid feedback to foster interactive learning in a large classroom setting. Clicker questions (3-6 per class) 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.

To obtain as much credit for clicker use as possible, please register your i-clicker ASAP at WebCT.

Assignments: Class assignments will be posted on the class website on most Thursdays during the quarter (see the schedule for the specific dates). 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.

Discussion sections: Discussion sections will be held by TAs once a week, most weeks of the quarter (see schedule). The discussions will be based on the Assignments posted the previous week. The TAs will lead a discussion based on the Assignments to make participating students arrive at the correct answers. The TAs 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.

You will need to sign up for a specific Discussion section on WebCT (there are 10 sections with a limit of 35 students each) during the week of Sept 27 – Oct1. Discussion sections will begin during the week of Oct 4 at the time and locations indicated on the sign-up sheets. TAs will announce their personal office hours at the first meeting of the sections. The time and location of Discussion sections and office hours will also be posted on the WebCT class website.

EXAMS & GRADING:

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

Midterm (40% of final score): The midterm exam is closed book and given during class time. It covers only the material discussed up until the exam. The time of the midterm can be found in the schedule.

Final Exam (60% of final score): The final exam is given in finals week (see schedule). It is closed book and will cover the concepts of the entire course with focus on the specific material covered after the midterm.

- Questions on the Midterm and Final will focus on short answers and must be answered in ink.
- Pens and ID card (student 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 TAs' and professor's discretion.
- 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. 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 (Dr. Lykke-Andersen). If an exception is made for these extraordinary circumstances, a make-up will be an ORAL exam given by Dr. Lykke-Andersen.
- Requests to reconsider any grading must be submitted in writing along with your original exam to the instructor (Dr. Lykke-Andersen) during class or office hours. The full request must be received within one week of the exam return date. 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.

Clicker use (up to 5% of extra credit). This is based entirely on clicker use, not on whether you get the answers right. To get credit for the whole semester, make sure that your clicker is registered with the class at the beginning of the quarter!
- Cheating with clickers by having someone other than yourself using your clicker during class is considered a breach in academic honesty and will result in the loss of all clicker points for the quarter for both yourself and the person bringing your clicker, as well as any additional disciplinary actions as indicated by the policy to maintain academic honesty. Correct clicker use will be monitored by the instructor and TAs during class.

Letter grades are assigned as follows:
90-100: A
80-89: B
70-79: C
60-69: D
Below 60: F

Class participation and input from TA section leaders may be used to determine +/- additions and the final letter grade.

Since your 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.

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 will give you the best idea of how exam questions are formulated.
6. Actively participate in discussions of the assignments during Discussion sections.

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 during peer discussion of clicker questions is therefore highly recommended.

A note of caution: Memorizing slides and texts is not an efficient method of learning. 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 how to interpret simple experimental observations. 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, reading newspapers, surfing the web, texting and engaging in conversations (except when prompted during clicker questions), or anything else that might distract yourself and others 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.

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: http://www-senate.ucsd.edu/manual/appendices/app2.htm

It should be needless to say that it is much easier to pass this course and any future courses that depend on this course, 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 done very well in the class and you must have been an active participant. Lecturer's of smaller classes or labs 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 a letter from the Office for Students with Disabilities (OSD) in a timely manner so that your needs may be addressed. The OSD determines accommodations based on documented disabilities. Please see guidelines at: http://disabilities.ucsd.edu/

Responsibilities:
In a class of 300 or more students it is impossible to teach directly to everyone's needs.
It is my (and the TAs) 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, reading the textbook, 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!

GOOD LUCK!

BIMM 100 - Molecular Biology, Fall 2010 – Schedule

Date(**)	Lecture#	Planned Topic	Lodish(***) (*Chapter*: pages)
Sept 23	1	Overview, Central Dogma	*1*: 1-4; 9-14
Sept 28	2	DNA, Sequencing	*2*: 44; 4: 111-119 *5*: 184-187
Sept 30(*)	3	Genes & genomes, PCR	*6*: 215-226 *5*: 188
Oct 5	4	Mobile DNA Chromosomes/chromatin	*6*: 226-236 *6*: 247-250, 254-257
Oct 7(*)	5	DNA Replication, Telomeres	*4*: 139-145 *6*: 257-266
Oct 12	6	DNA repair Viruses	*4*: 145-153 *4*: 154-159
Oct 14(*)	7	Cloning, Gene inactivation	*5*: 176-192, 196-197 *5*: 204-209
Oct 19	8	Transcription in bacteria Northern blotting	*4*: 120-122; *7*: 269-276 *5*: 192
Oct 21	9	Eukaryotic transcription elements	*7*: 276-286, 316-318
Oct 26		**Midterm (in class; covers lectures 1-8)**	
Oct 28(*)	10	Eukaryotic Pol II transcription factors	*7*: 286-298
Nov 2	11	Chromatin remodeling Eukaryotic transcription regulation	*6*: 250-254; *7*: 299-310 *7*: 311-316
Nov 4(*)	12	Pol-I and Pol-III transcription rRNA, tRNA processing	*7*: 316-318 *8*: 358-367
Nov 9	13	pre-mRNA processing	*8*: 323-341
Nov 11(*)		VETERANS DAY – NO CLASS	
Nov 16	14	Nuclear export Translation	*8*: 341-347 *4*: 127-139

Nov 18	15	Post-trancriptional gene regulation	*5*: 210-211; *8*: 347-358
Nov 23(*)	16	How viruses manipulate cellular gene expression	No text
Nov 25		THANKSGIVING – NO CLASS	
Nov 30	17	Molecular Biology of Cancer	*25*: 1107-1143
Dec 2	18	Review	

Thursday Dec 9 FINAL EXAM 3:00-5:59 PM

(*): At the end of the day on dates marked by an asterisk, assignments will be posted for discussion during discussion sections on MWF the following week.
There will be no discussion sections during the weeks of 9/27-10/1, 10/25-10/29 and 11/22-11/26.

(**): Classes are on Tuesdays and Thursdays from 2:00 to 3:20 PM in SOLIS 107.

(***): Text book: “Molecular Cell Biology”, 6th edition, Lodish et al., 2008.