

## COURSE SCHEDULE

Lectures: TuTh Center Hall 119: 8:00- 10:50 am

| Date                                       | Lecture# | Planned Topic  | Lodish ( <i>Chapter: Pages</i> )                               |
|--|----------|--|--|
| <i>Genes &amp; Genomes</i>                 |          |  |  |
| July 1                                     | 1        | DNA,<br>DNA Replication  | Overview, Central Dogma<br>2: 36-37; 4: 115-120<br>4: 145-151  |
| July 3                                     | 2        | Telomeres<br>DNA repair<br>Genes & genomes<br><i>Sequencing</i>  | 6: 273-275<br>4: 151-159<br>6: 223-231<br>5: 195-197           |
| Monday TED Quiz #1 Due at 11:59pm          |          |  |  |
| July 8                                     | 3        | Noncoding & Mobile DNA<br><i>PCR</i><br>Recombinant DNA<br><i>Gene inactivation</i>  | 6: 231-245<br>5: 192-193<br>5: 182-198, 201-206.<br>5: 212-216 |
| <i>Basic Mechanisms of Gene Expression</i> |          |  |  |
| July 10                                    | 4        | Transcription<br><i>Northern blotting</i>  | 4: 124-127; 7: 290-297<br>5: 198                               |
| Monday TED Quiz #2 Due at 11:59pm          |          |  |  |
| July 15                                    | 5        | <b>Midterm 1 (in class; covers Lectures 1-4</b><br>Eukaryotic Pol-I, -II, -III transcription<br>rRNA, tRNA processing<br>mRNA capping, polyadenylation | 7: 297-305, 336-339<br>8: 384-391<br>8: 345-349, 358-360       |
| July 17                                    | 6        | pre-mRNA splicing<br>Nuclear export<br>Translation<br>mRNA turnover  | 8: 351-356<br>8: 365-368<br>4: 131-144<br>8: 375-376           |
| Monday TED Quiz #3 Due at 11:59pm          |          |  |  |

*Regulation of Gene Expression*

|                                       |            |   |  |
|---------------------------------------|------------|---|--|
| July 22                               | 7          | Transcriptional Regulation: Prokaryotes<br>TR in Eukaryotes<br><i>Microarrays</i>                     | 7: 282-285<br>7: 288-290, 302-305<br>5: 199-201                    |
| July 24                               | 8          | Transcription Activators<br>Chromatin<br>Chromatin remodeling<br><i>Chromatin immunoprecipitation</i> | 7: 305-314, 320-322<br>6: 256-266<br>7: 315-320, 323-333<br>7: 297 |
| Monday TED Quiz #4 Due at 11:59pm     |            |   |  |
| July 29                               | 9          | Post-transcriptional gene regulation<br>Gene regulation by non-coding RNAs<br>RNA quality control     | 8: 360-365, 374, 376-384<br>7: 331-335 8: 370-374<br>8: 380        |
| July 31                               | 10         | Molecular Biology of Cancer   |  |
| Friday 5pm TED Quiz #5 Due at 11:59pm |            |   |  |
| Final Exam                            | 08/02/2014 | Saturday  | 08:00a - 10:59a  |

#### INSTRUCTOR

Dr. Keefe Reuther,

Division of Biological Sciences

Office: HSS (Humanities and Social Sciences Building) 1145D

Office hours: Tuesday and Thursday (3:00pm-4:00pm) or by appointment

Email address: [kdreuther@mail.ucsd.edu](mailto:kdreuther@mail.ucsd.edu) (please put BIMM100 in the subject line)

Office phone: 858.246.0753

#### VENUES

Lectures: TuTh Center Hall 119: 8:00- 10:50 am

#### COURSE PREREQUISITES

BICD100 (Genetics), BIBC100 or BIBC 102 (structural or metabolic biochemistry), and their prerequisites, including BILD1 and organic chemistry. 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.

#### 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 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. Doing well in this class requires solid prior understanding of genetics, biochemistry and organic chemistry.

#### CONTACT:

Your TA's and fellow students are your best resource for information and you should first attempt to answer your questions through them. Try emailing your TA's through TED. Contact Dr. Reuther first only for specific issues unrelated to course content. The best way to contact him is by email. On all emails PLEASE put BIMM 100 in the subject line to indicate that the email pertains to this course. Also, if you email a question the evening before an exam please send it before 5 PM. If you email about anything regarding your status in the course, please include your UCSD username, and PID.

**TEXTBOOK:**

Lodish et al. 'Molecular Cell Biology' 7th edition, Freeman, 2012. 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/>

**LECTURE:**

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. The pages in the textbook 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.

**CLICKERS:** not used in this course.

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

**TECHNOLOGY POLICY:**

The use of cell phones or any other electronic devices (e.g. pagers, text messaging, PDAs, etc.) is not permitted during exams. Cell phones or other communication devices must be turned off and stored before entering the lecture hall at all times. Use of a cell phone or other similar electronic devices during an exam, quiz or assignment is grounds for receiving a failing grade.

Laptop computer policy: Students are welcome to bring laptops to lecture for note-taking purposes. Laptops must be put away (closed and powered off or on sleep mode) during any lecture quizzes, assignments or exams. Unless specifically given permission by Dr. Reuther, you may NOT access the web during the lectures. This is extremely distracting to neighboring students and will not be tolerated. Any student found using the web during class time will be required to turn off their computer for the remainder of the lecture and may be denied permission to use a computer in class thereafter.

**WEB SITE:**

Everything related to the class is kept on the TED site (<https://ted.ucsd.edu/webapps/login/>). Announcements of exam room changes and many other important matters will be posted on the TED site. Check the site often! Grades will all be posted on the website.

**GRADING:**

|  |                   |
|--|-------------------|
| TED Quizzes (20 points each; lowest score dropped) | 80 points         |
| Molecular Biology Essay                            | 40 points         |
| Midterm Exam                                       | 100 points        |
| <u>Final Exam</u>                                  | <u>250 points</u> |
| Total  | 470 points        |
| End of course questionnaire (EXTRA CREDIT)         | 5 points          |
| Beginning of course questionnaire (EXTRA CREDIT)   | 5 points          |

These guidelines will be used to assign grades:

- > (85%) A (A-, A or A+)
- > (75%) B (B-, B or B+)
- > (65%) C (C-, C or C+)
- > (55%) D

If necessary, these cutoffs will be adjusted downward so that at least 50% of students in the class receive an A or a B, but they will not be adjusted upward for any reason.

**MIDTERM EXAM: MAKE-UP EXAMS ARE NOT AVAILABLE. EXAMS ARE OFFERED AT THE SCHEDULED TIME ONLY.** Advise your coaches, teammates, traveling companions, significant others, and families accordingly. The exam will consist of multiple choice, short essay, short answer, and quantitative or graphical material designed to test your ability to synthesize information presented in the lectures and readings. The midterm exam will be based on material up to the lecture preceding the exam unless announced otherwise in class.

**FINAL EXAM: EARLY EXAMS ARE NOT AVAILABLE.** Watch for the announcement in class and on the web site about the location. The final will be cumulative. Approximately 1/3 of the final will be on the material from after the second midterm, and 2/3 of the final will be cumulative from material covered the entire session.

**MISSED EXAMS:** There are no make-up exams, so unexcused absences from scheduled exams will be recorded as zeroes. Unusual and serious problems that affect your ability to take a scheduled exam (e.g., death or serious illness in the family or personal tragedy) must be communicated to Dr. Reuther directly. You will be required to provide official documentation of an unavoidable emergency (e.g., serious illness, etc.). Without such documentation, you will receive a zero for that exam. For a missed midterm exam with valid documentation, the remaining midterm and final exam will count for the entire test portion of your grade. For a missed final with valid documentation, you will be issued an incomplete grade, which can then be made up with the instructor after the end of the quarter.

**RE-GRADES:** It is your responsibility to check your exam for clerical errors in grading. If a grading error has been made, you should submit a re-grade request to Dr. Reuther at the end of a lecture within one week of return of the exam. The time and date of closing down the appeal

process will be announced in class. Simply write “please re-grade Q #” or “arithmetic error on p. #” on the cover of your paper. Write a concise description of the alleged error on a separate, attached piece of paper. No re-grades are possible for exams written in pencil or non-permanent ink. Students who submit exams for re-grading understand that we may (1) re-grade the entire exam, and (2) compare the submitted paper to a scanned copy of the original exam. Since course grades are due with the Division of Biology 72 hours after the final exam is given, re-grades of the final will be handled as follows: Graded final exams will be available for pickup a few days after the final is given. Re-grade requests are to be placed under Dr. Reuther’s office door within one week after graded exams are made available. If the re-grade request is valid and it affects the letter grade of the student in the course, then Dr. Reuther will change your course grade accordingly.

**LETTERS OF RECOMMENDATION.** I am more than happy to potentially write you a letter of recommendation for graduate school, medical school, UCSD program, etc. **HOWEVER**, keep in mind that you likely want me to write a good one. I typically teach 400-800 students per quarter; therefore, if I don’t know you outside the lecture hall, I won’t write you a letter of recommendation. All I can realistically do is list the grades you received on exams and assignments. If you would like me to write a letter of recommendation that goes beyond exam performance, you must give me the opportunity to meet you. Come to office hours (repeatedly) or utilize the Dine with a Prof program available through most campus colleges. If I feel that I have an accurate picture of you as a person, student, or scientist then you can count on that letter. Keep in mind this must all be done during the quarter in which you are my student.

**OSD students:** 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. For more information, contact the OSD at (858) 534.4382 (V); (858) 534-9709 (TTY); [osd@ucsd.edu](mailto:osd@ucsd.edu), or <http://osd.ucsd.edu>.

**CHEATING: DON’T.** Students are expected to do their own work, as outlined in the UCSD Policy on Integrity of Scholarship (go to TritonLink: Academics: Academic success: Academic integrity). Cheating will not be tolerated, and we will fail any student caught engaging in academic dishonesty. Their identity and the evidence of cheating will be passed to the relevant campus staff for further action. All exams will be closed book and closed-notes; all personal materials including cell phones must be stowed under your seat while exams are in progress. All assignments are to be completed individually, unless otherwise noted.

**COURSE IMPROVEMENT:** Your constructive criticisms are welcome. Dr. Reuther is available immediately after lectures, at his scheduled office hours, and by email anytime.

**SECTIONS AND SECTION MEETINGS:** Students have the opportunity to meet with a Teaching Assistant in relatively small groups on a weekly basis. There will be no sections during the first week of classes.

You must sign up for a Section after the first class meeting using <https://sections.ucsd.edu>. Instructions will be announced in class that day. There is a limit of 33

students for each section. Wait listed students should also sign up for sections now but there is no guarantee that they will eventually become enrolled in the class.

The section meetings provide for:

1. Academic review. Each week the TA 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. To benefit from these meetings you must prepare by completing both your lecture notes and the assigned reading. There is no need to bring the textbook to the Section meeting.
2. Advice on studying. In particular, the TA's may be able to steer you through the enormous amount of descriptive material in the textbook. They will not know what will be on the exams but they are experienced enough to know how to set learning priorities. They meet with the professor before each class and can give you his advice on what's important and what is less likely to be a focus on exams.
3. General course announcements. We will make numerous announcements about the course and course-related opportunities.
4. General advice. The TA's are a lot easier to find than the professor so please direct your questions about other courses, majors, careers, summer opportunities, study abroad opportunities to them, in the first instance

#### **Schedule of Section Meetings:**

| Section # | Day | Time            | Building | Room | TA       |
|-----------|-----|-----------------|----------|------|----------|
| A02       | Th  | 11:00a - 12:50p | CENTR    | 217A | Yunichel |
| A03       | Tu  | 1:00p - 2:50p   | CENTR    | 217A | David    |
| A04       | Tu  | 11:00a - 12:50p | CENTR    | 217A | Sarah    |
| A05       | Tu  | 3:00p - 4:50p   | CENTR    | 217A | Shounak  |
| A06       | W   | 09:00a - 10:50a | CENTR    | 217A | Angelo   |

#### **Teaching Assistants:**

| Name            | email             |
|-----------------|-------------------|
| Ghosh, Shounak  | s2ghosh@ucsd.edu  |
| Jimenez, Angelo | a9jimene@ucsd.edu |
| Joo, Yunichel   | ycjoo@ucsd.edu    |
| Lam, David      | d4lam@ucsd.edu    |
| Urata, Sarah    | surata@ucsd.edu   |

#### **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.

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. Read the textbook – preferably before class (planned topics and corresponding textbook pages are indicated in the schedule).

4. Attend discussion section and prepare well for it. Go through the previous week's material and come up with specific topics or questions for the TA to clarify. Identify the material that is giving you trouble early.

5. Take all the material from lecture, the podcast, 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!

In addition, the “Solved Problems” at the end of each *Lodish* Chapter can give useful practice in problem solving.

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.

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 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.