

# BB/BI 314, Cell and Molecular Biology

## Fall 2015- 4 credits

### Lectures

TR 1400-1520, LINC 210

### Recitations- Attendance is required.

Recitation schedule (Honors Recitation is indicated by **H**)

Day	Time/Location		
Tuesday	1600-1650/ ALS 2018		
Wednesday	1100-1150/ Cordley 3121	1600-1650/LINC 303	
Thursday	1000-1050/STAG 112( <b>H</b> )	1300-1350/ Cordley 3121	1600-1650/ALS 2018
Friday	900-950/LINC 268		

### Instructor

Dr. Indira Rajagopal

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**Office Hours:** Wednesdays and Thursdays 1100-1200, other times by appointment.

### Teaching Assistants

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### Textbook/ Learning Resources

There is no *required* textbook for this course. However if you like using a textbook, you may find *Essential Cell Biology*, by Alberts, B. et al (4<sup>th</sup> ed, 2012 or 3<sup>rd</sup> ed. 2009, Garland Science) to be an accessible and helpful resource. Study modules, study guides and other material relevant to the class will be posted on Canvas. To access class materials, please be sure to choose BB 314 X001\_F2015 from your list of courses. The class schedule and exam dates for the quarter are also posted at this site. *It is the student's responsibility to check Canvas regularly for announcements and information pertaining to the course.*

You are welcome to e-mail me with your questions or meet with me in my office if you need help. If my posted office hours conflict with your other classes, feel free to request an appointment at another time. I also encourage you to e-mail the TAs with your questions or requests for review of anything that you don't understand fully. Having your requests ahead of time gives them a chance to schedule some time during recitation to answer these questions. We're here to help you- so don't be shy.

## Course Goals

This course will

- build on the knowledge of cell structure and function gained in the BI 21X series and extend students' knowledge of how eukaryotic cells work at the molecular level.
- provide an overview of cell structure and function at the molecular level, including the flow of information from genes to proteins, and regulation of cellular processes, signaling and proliferation in eukaryotic cells.
- introduce some of the major ideas and experimental approaches in cell and molecular biology.

These course goals are linked to specific student learning outcomes.

## Student Learning Outcomes

Learning outcomes indicate what students should be able to do as a result of instructional activity in BI 314. Outcomes are organized to match the course goals, as well as the exam and recitation assessments.

Students will:

- Understand and correctly utilize the scientific vocabulary used in communicating information in cell and molecular biology
- Describe and discuss the properties and biological significance of the major classes of molecules found in living organisms and the relationship between molecular structure and biological function
- Explain the general principles of gene organization and expression in prokaryotes and eukaryotes
- Describe the structure and functions of membranes and intracellular compartments and summarize the processes by which proteins and other molecules are delivered to these compartments.
- Explain the basic pathways and mechanisms in biological energy transduction and compare and contrast the processes of photosynthesis and respiration.
- Describe the components of the cytoskeleton in eukaryotic cells and their functions and biological significance.
- Explain the processes responsible for cell-cell communication and outline the mechanisms of signal transduction in cells.
- Outline the mechanisms controlling the eukaryotic cell cycle and programmed cell death
- Explain the molecular basis of diseases, including cancer, and illustrate how this knowledge can be applied in devising better therapies.
- Integrate and apply general concepts of cell and molecular biology to assess specific situations/problems and propose explanations/solutions.

### Student Learning Objectives/Study Guides:

Learning objectives are specific indicators of what students will be doing and learning in BI 314. These objectives are directly derived from the student learning outcomes, and assessments match these specific objectives. Objectives are made available to students in the form of periodic study guides that students can use to guide their learning. Study guides are posted from time to time at the class website.

## Evaluation (Exams and grading)

The course grade is based upon the following for BI 314 and BI 314H:

Component	BI 314	BI 314H
Midterms (2)	100 points <b>each</b>	80 points <b>each</b>
Comprehensive Final Exam	140 points	125 points
Recitations and related assignments	45 points	100 points
Clickers and in-class work	30 points	30 points
Review Quizzes (6)	60 points	60 points
<b>Total points</b>	<b>475 points</b>	<b>475 points</b>
Bonus Homework (optional)	20 points	20 points

These components are explained below in greater detail.

### Exams

All exams must be taken. Makeup exams will be given only for absences excused by the instructor. For absences that can be anticipated ahead of exam time, advance permission from the instructor to miss the exam is required. Requests for excused absences/make-up exams will be considered on a case-by-case basis and *permission is not guaranteed*. If you are presenting at a scientific meeting, or on an athletic team/marching band that is on the road on the day of the exam, it is your responsibility to provide documentation (such as a letter from a research mentor, coach, or band director indicating that your absence is unavoidable and is part of your OSU education). Excused absences will **not** be allowed for routine illness (colds, etc.), or other mild ailments. Please make sure to acquaint yourself with the exam schedule right away and make any travel plans accordingly. ***It is your responsibility to inform your parents, or anyone else who might buy your tickets, when your exams are. You will not be excused if they buy your tickets for those dates and you will receive a zero for any exam missed for such a reason.*** Excused absences will **not be permitted after the absence has occurred**, except under very unusual circumstances, such as serious medical emergencies documented by a doctor's letter. ***There are no exceptions to this rule.***

### Recitations

The recitation grade is based on attendance and points obtained on the in-class exercises and activities. If you miss recitation, you lose the points for that day. You may miss **one** recitation in the term without penalty. Honors students will make presentations based on research papers and write a term paper as part of their recitation work. Because of the additional work done by Honors students in recitation, more points are assigned for Honors recitations, with a corresponding adjustment in the points for exams.

### Class participation

You will be expected to actively participate during class periods. This may include working with other students on short exercises to improve your understanding. We will also use audience response systems (aka Turning Point clickers) in the lecture sessions. Students are required to bring their clickers to class and use them to participate in learning. The clicker questions in class are only for the purpose of providing both students and the instructor with immediate feedback on student comprehension of the topic under discussion. You will not be penalized for wrong answers. Likewise, the exercises are intended to promote deeper learning, not to test you. It is your responsibility to make sure that your clicker has working batteries. ***Please do not ask about your clicker points if you miss a class or forget your clicker or if your clicker dies in class.*** If you are present and participating in at least 12 class periods you get full points (this builds in a generous allowance for occasions when you may be absent or forget your clicker).

### **Review Quizzes**

There will be quizzes from time to time during recitation periods. These quizzes are not on new material but on topics taught in the introductory biology series. Although some students may not have taken introductory biology at OSU or may have AP credit, the topics are such that any basic biology course should have addressed them. The purpose of the quizzes is to help students brush up on topics they have learned prior to BI 314, that are relevant to the following week's material. The idea is to encourage students to refresh their memories on these topics so that the new material will be easier to place in the context of what they already know. Reviewing topics learned in introductory classes is one of the most powerful ways for students to enhance their learning in BI 314. Students will be informed the week before of an upcoming recitation quiz and a study guide will be posted. The topics can be reviewed in any basic biology text (there are some on reserve for BI 314 in the library). Online resources that can be used for such review may also be provided with the study guide. These review quizzes provide students with a chance to improve their grade in BI 314 in two ways- they can get full points on something they have already learned in a previous class, and reviewing the material will make new concepts easier to grasp.

### **Bonus Homework**

Every week there will be an optional homework assignment posted on Canvas. Students who complete the homework can earn up to a maximum of 20 additional points to be added on to their total score. The homework is entirely optional.

### **Grades**

No fixed numerical grading scale will be used to determine letter grades. Letter grades will be determined at the end of the term based on the distribution of the point totals for the class. Letter grades will **not** be assigned for each exam, but the median and average scores for the class, as well as the range will be posted, so that you may assess where you stand in the class.

### **Grading errors/requests for regrading**

If you think that your answer on an exam has been wrongly graded (or that the points have not been totaled correctly) you may bring it to the instructor's attention and request regrading *within two class periods* after the day that exams are returned to the class. *After this time, no requests for regrading will be considered.*

## **General course policies/ Study suggestions**

This course packs a large amount of new information in a relatively short time period. In spite of this, students who do their studying on a regular basis can master the topics without too much difficulty. If you wish to do well in this course:

Keep in mind that this is a 300-level class, and as such, will require more effort on your part than lower division classes. Also, the subject matter is varied and complex and cannot be learned by rote or in one quick burst of cramming. Budget your study time accordingly.

Understand expectations - the classes you have had so far may have required mostly memorization and recall on a multiple choice exam, where you merely had to be able to recognize the correct choice. In this class, *the exams are not "multiple guess" scantron tests.* I will expect you to learn the facts, but also to be able to think using those facts and apply your knowledge. This is a higher level of mastery than simple factual knowledge and requires more effort to achieve.

Use all the resources provided to you - download and study the topic outlines using the study guides to check on your learning, use the online resources provided, attend lectures and recitations, and ask questions of your

teaching assistant and instructor. *If you do not understand something, it will not miraculously become clear to you or go away if you ignore it.* Take responsibility for your learning and ask for help (it may reassure you to know that this instructor is vegetarian, so you can be sure that you will not be eaten alive for asking questions). A collection of study tips is provided at the class website. If you need more suggestions on how to study for this course, please talk to the TAs or the instructor.

**Important - a word about prerequisites:** We will assume that you have the basic background knowledge that you should have acquired in the listed prerequisites. For this reason, it is helpful to regularly review material from introductory biology, so that you can be prepared for the topic we will be discussing next. The review quizzes are also intended to help you with this process. Any biology text like the one used for the BI 21X series will suffice and there are several on reserve for this course in the library if you do not have one. There will also be links at the class webpage to online resources that will be helpful in reviewing some of the topics. Students often underestimate the value of this sort of review, but *it can make a whole letter grade difference in your performance.* Even if you are skeptical, try this method and see if it doesn't make understanding the new information easier.

Regular class attendance is encouraged. Please be considerate of your fellow students and your instructor and silence your cell phone or any other electronic device you possess that might disrupt the class.

**Warning:** *The instructor has been programmed by space aliens to respond to the ringing of cell phones or other disruptions of the class by handing out a pop quiz to the whole class unless the person causing the disruption fesses up and apologizes to the class. The disrupter will lose 5 points on the spot, the first time this happens. A second offense will result in loss of 10 further points and so on. Be wise and considerate and silence your phone before class ((you may set it on Vibrate instead of turning it off, but any ringtone that is audible to your neighbors and disturbs other people who are trying to concentrate on the class is a no-no).*

*You also risk losing points if you disturb others around you in any other way. Students pay a lot to take classes and they have the right to an atmosphere in which they can concentrate and learn. If you wish to post Facebook updates or watch cat videos rather than pay attention in class, you, and everyone else, will be much more comfortable if you do so on your own couch at home, with a bag of Cheetos for company.*

## General OSU and Departmental Policies

### Disabilities/ Special Accommodations

"Students with documented disabilities who may need accommodations, who have any emergency medical information the instructor should know, or who need special arrangements in the event of evacuation, should be registered with Disabilities Access Services. Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at (541) 737-4098"

### Student Conduct

The Department of Biochemistry/Biophysics follows the university policies on student conduct. These can be found at <http://oregonstate.edu/admin/stucon/regs.htm>.

Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- \* cheating- use or attempted use of unauthorized materials, information or study aids
- \* fabrication- falsification or invention of any information
- \* assisting- helping another commit an act of academic dishonesty
- \* tampering- altering or interfering with evaluation instruments and documents
- \* plagiarism- representing the words or ideas of another person as one's own

Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

*“The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.”*

## Course schedule

Below is the tentative course schedule for the term. This is somewhat flexible, as I may take more time on a specific topic if it is necessary for student understanding. **Exams, however, will be on the days indicated.** Naturally, you will only be tested on the topics discussed before the exams.

<b>Week</b>	<b>Topics</b>	<b>Recitation/quiz</b>
Week 1	Introduction to Cell and Molecular Biology; How Genes and Genomes change	Yes; No quiz
Week 2	DNA and Chromosomes; Replication of DNA	Yes; Quiz 1
Week 3	DNA Repair mechanisms; Transcription, Regulation of Gene Expression <b>Midterm 1 (Thursday)</b>	Yes; Quiz 2
Week 4	Protein Structure and Regulation	Yes; Quiz 3
Week 5	Cell compartments and Protein Sorting	Yes; Quiz 4
Week 6	Energy Transduction	Yes; Quiz 5
Week 7	The Cytoskeleton <b>Midterm 2 (Thursday)</b>	Yes; No quiz this week
Week 8	Cell Signaling	Yes; Quiz 6
Week 9	Cell Cycle Control	Thanksgiving; No recitations this week
Week 10	Cell Renewal and Apoptosis Cancer and cancer therapies	Yes
Week 11	<b>Final Exam: TBA</b>	