

CELL AND MOLECULAR BIOLOGY – BISC 440 – FALL 2020

LECTURE: Tuesday & Thursday at 9:30 AM–10:45 AM via Zoom (recurring meeting)

INSTRUCTOR:

Dr. Brad Jones, Shoemaker 122, 915-1700, jonesbw@olemiss.edu

Office hours: via Zoom TBA

COURSE DESCRIPTION:

This course will give students a rigorous and yet basic understanding and appreciation of the fundamental principles of molecular cell biology. Specifically, this course is directed towards an understanding of how the living cell works, with particular attention to the molecules of the cell – especially the protein, DNA, and RNA molecules – and how they cooperate to create a remarkable system that is capable of responding to stimuli, move, grow, divide and duplicate itself. The laboratory segment of the course will expose students to common molecular biology techniques and methods for observing cells and gene activity. The emerging field of molecular cell biology, a union of several subfields of biology including genetics, cell biology, biochemistry, and microscopy, seeks a more comprehensive understanding of the cell, and ultimately the organism.

LEARNING OBJECTIVES:

After completing this course a student should be able to understand and remember the molecular basis of many aspects of cellular structure and function, including the structure and function of biological macromolecules, especially proteins, DNA, and RNA, and how these molecules cooperate to form the cell. The student should be able to understand and apply several modern laboratory methods of molecular biology. The student should be able to think critically about how one studies cellular processes and functions.

REQUIRED TEXTS:

Molecular Biology of the Cell, 6th edition, Alberts et al. (ISBN 9780815344322)

Molecular Biology of the Cell, 6th edition: The Problems Book, Wilson and Hunt (ISBN 9780815344537)

EXAMS and GRADES:

Exams: Exams will be based on material covered in lectures, textbook, and other readings. Lectures will be the primary guide for what will be covered in exams. Exams will generally be a combination of multiple choice, fill-in-the-blank, and short answer questions.

Make-up exams will only be given to those students who miss a test because of an official University activity or because of illness, or other excused activities. *Arrangements for a makeup test should be made prior to the absence.* It is your responsibility to contact me in person to schedule a makeup exam. Make-ups are given solely at the instructor's discretion – do not assume that you will be automatically allowed to take a make-up exam. Make-up exams must be taken at a date and time decided by the instructor, generally within 2-3 days of the original exam date.

Grades: There will be two lecture exams (100 points each) and a final exam (200 points). The final exam will have a portion that covers material from the last third of the class and a portion that is cumulative. There will also be 3 quizzes. The average grade of the 2 best quiz grades will be counted as an additional lecture exam grade (100 points), i.e., the lowest quiz grade will be dropped. Lecture exams will account for 75% of the course grade. Laboratory participation and lab quizzes and exams 25% of the grade. (See Lab Syllabus for details)

Letter Grade assignments: Grades are calculated on the percentage of the total points earned:

A: 93-100; A-: 90-92; B+: 87-89; B: 83-86; B-: 80-82; C+: 77-79; C: 70-76; D: 60-69; F: 59 or below

BLACKBOARD:

To join Lecture/Zoom meetings go to Zoom Meeting tab in the Blackboard menu to access invitations to join. Zoom lecture meetings will be recorded and posted on Blackboard. Slides used in lecture will be posted on Blackboard prior to/or after the lecture.

CLASS SCHEDULE:

Date	Topic	Chapter
Tu 8/25	Introduction, Cells and Genomes	1 pp. 1-10; 14-22
Th 8/27	Cells and Genomes / Proteins	3 109-127
Tu 9/1	Proteins <ul style="list-style-type: none"> • Structure of proteins • Protein function 	3 109-127, 134. 134-146, 151-155,169
Th 9/3	DNA and chromosomes <ul style="list-style-type: none"> • Structure and function of DNA 	4 173-179
Tu 9/8	Chromosomes & Chromatin	4 180-197; 214-216.
Th 9/10	How Cells Read the Genome (Quiz1) <ul style="list-style-type: none"> • Transcription in Prokaryotes 	6 299-309
Tu 9/15	How Cells Read the Genome <ul style="list-style-type: none"> • Transcription in Eukaryotes 	6 309-321
Th 9/17	Exam #1	
Tu 9/22	How Cells Read the Genome <ul style="list-style-type: none"> • Transcription in Eukaryotes 	6 323-327
Th 9/24	How Cells Read the Genome <ul style="list-style-type: none"> • Transcription continued, RNA processing 	
Tu 9/29	How Cells Read the Genome <ul style="list-style-type: none"> • Translation, Post-translation 	6 333-362
Th 10/1	Control of Gene Expression <ul style="list-style-type: none"> • An overview of gene control • DNA-binding motifs in gene regulatory proteins 	7 369-380
Tu 10/6	Control of Gene Expression	7 380-392
Th 10/8	Control of Gene Expression (Quiz 2)	7 380-392

Tu 10/13	Membrane Structure	10 565-585
Th 10/15	Exam # 2	
Tu 10/20	Membrane Transport	11 597-615 ; 617-619
Th 10/22	Cytoskeleton <ul style="list-style-type: none"> • Structure of cytoskeletal filaments • Molecular motors 	16 889-896; 898-904; 925-92Ω 16 915-923;936-938; 941-942
Tu 10/27	Intracellular Compartments and Protein Sorting <ul style="list-style-type: none"> • Compartments • Endoplasmic reticulum 	12 641-649; 669-684; 688-691
Tu 10/29	Intracellular Vesicular Traffic <ul style="list-style-type: none"> • Transport through the endomembrane system 	13 695-700; 701-702; 705-710
Tu 11/3	Intracellular Vesicular Traffic (Quiz 3)	
Th 11/5	Cell Communication (Quiz 3) <ul style="list-style-type: none"> • General principles 	15 813-820; 824-826; 846-847; 874-877
Tu 11/10	G Protein coupled receptors <ul style="list-style-type: none"> • Calcium signaling 	15 832-843
Th 11/12	Cell communication	
Tu 11/17	Cell Communication <ul style="list-style-type: none"> • Enzyme-linked cell-surface receptors 	15 850-867
T 11/24	FINAL EXAM 8:00 AM	

OTHER NOTES AND POLICIES:

Studying:

1) Read the book before coming to lecture. This will allow you to familiarize yourself with the material before it is covered in class and will prepare your mind for learning when you come to class. Also, if you have questions about what you read, you can ask during the lecture. Please, never be afraid to ask a question. Undoubtedly there is someone else in the room wondering the same thing, and it will help everyone if something needs to be explained in a slightly different way, or clarify a point.

2) Take notes during class. This is an excellent way to reinforce your learning of the material, even though slides and videos of lectures will be posted on Blackboard.

3) Review your notes shortly after lecture, and ask me again if something is unclear, or fill in missing pieces with information from the text.

4) Do the assigned problems in the Problems Book. Problems on the material covered in class are

listed on Blackboard -- many questions on quizzes and exams are based on these problems.

5) Read the figure legends. In addition to the assigned text outlined on the syllabus, it is essential that you read the figure legends of all figures discussed in class.

6) Quiz yourself. Use questions at the end of each chapter to test your understanding of the material. These questions are a great way to study.

7) Most of all, do not procrastinate. You cannot do well on an exam in this course by waiting until the night before the exam to study.

Disability Access and Inclusion: The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at <https://sds.olemiss.edu> to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at **662-915-7128** so the office can: 1. determine your eligibility for accommodations, 2. disseminate to your instructors a Faculty Notification Letter, 3. facilitate the removal of barriers, and 4. ensure you have equal access to the same opportunities for success that are available to all students.

Student Support related to COVID-19: Students are encouraged to visit the University's Keep Learning site (<https://olemiss.edu/keeplearning/>) to access information and resources related to COVID-19 support. The site provides links to University student services to facilitate and support learning.

Academic Integrity: Any form of misconduct -- cheating, plagiarism, fabrication -- will not be tolerated and may subject violators to a failing grade in the course. Incompletes will not be given except in extreme circumstances beyond a student's control.

This syllabus is subject to change at the discretion of the instructor to accommodate instructional, and/or student needs.