

BISC 679 section 1, SPRING 2018
ADVANCED MOLECULAR AND CELLULAR BIOLOGY

Lecture: Tu & Th 9:30–10:45 AM Carrier RM 220

Instructor: Dr. Brad Jones, 122 Shoemaker;

Phone: 915-1700; **E-mail:** jonesbw@olemiss.edu

Office Hours: Monday 10:00AM-12:00PM or by appointment

Course Description: This is a graduate level course that uses the lecture portion of Bisc 440, Cell and Molecular Biology, with additional requirements for graduate students. 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 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 think critically about how one studies cellular processes and functions.

Credit Hours: 3

Prerequisite: Instructor approval

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)

Date	Topic	Chapter
Tu 1/23	Introduction/ Cells and Genomes	1 pp. 1-10; 14-22
Th 1/25	Cells and Genomes/ Proteins	3 pp. 109-127, 134
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Tu 1/30	Proteins	3 pp. 109-127, 134
	• Structure of proteins	
Th 2/1	Proteins	3 pp. 134-146; 151-155; 169
	• Protein function	
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Tu 2/6	DNA and chromosomes	4 pp. 173-179
	• Structure and function of DNA	
Th 2/8	DNA and chromosomes	4 pp. 180-197; 214-216
	• Chromosomes - packaging of DNA	
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Tu 2/13	How Cells Read the Genome (Quiz 1)	6 pp. 299-309
	• RNA structure and function, Genetic Code	

Th 2/15	How Cells Read the Genome • Transcription in Prokaryotes	6 pp. 309-321
Tu 2/20 Th 2/22	Exam #1 How Cells Read the Genome • Transcription in Eukaryotes	6 pp. 323-327
Tu 2/27	How Cells Read the Genome • Transcription continued, RNA processing	
Th 3/1	How Cells Read the Genome • Translation, Post-translation	6 pp. 333-362
Tu 3/6	Control of Gene Expression • An overview of gene control • DNA-binding motifs in gene regulatory proteins	7 pp. 369-380
Th 3/8	Control of Gene Expression • How genetic switches work: Prokaryotes	7 pp. 380-392
Mar. 13, 15	Spring Break	
Tu 3/20 Th 3/22	Control of Gene Expression (Quiz 2) Control of Gene Expression	7 pp. 380-392
Tu 3/27 Th 3/29	Exam # 2 Membrane Structure	10 pp. 565-585
Tu 4/3	Membrane Transport	11 pp. 597-615 ; 617-619
Tu 4/5	Cytoskeleton • Structure of cytoskeletal filaments	16 pp. 889-896; 898-904; 925-929
Tu 4/10	Cytoskeleton • Molecular motors	16 pp. 915-923; 936-938; 941-942
Th 4/12	(Quiz 3) Half class	
Tu 4/17	Intracellular Compartments and Protein Sorting • Compartments • Endoplasmic reticulum	12 pp. 641-649; 669-684; 688-691
Th 4/19	Exam #3	
Tu 4/24	Intracellular Vesicular Traffic • Transport through the endomembrane system	13 pp. 695-700; 701-702; 705-710
Th 4/26	Cell Communication • General principles	15 pp. 813-820; 824-826; 846-847; 874-877
Tu 5/1	G Protein coupled receptors • Calcium signaling	15 pp. 832-843

- Enzyme-linked cell-surface receptors

Attendance and participation: According to the attendance policy at the University, you must attend class during the first two weeks of the semester or you will be dropped from the rosters for both lecture and lab. To comply with attendance verification requirements, a report of your attendance will be made on February 5th.

Grades: There will be three lecture exams and a final cumulative exam. The final exam will count for twice as much as each lecture exam. There will also be 3 quizzes. The average grade of these quizzes will be counted as an additional lecture exam grade. In addition to lecture quizzes and exams, graduate students will write a review article in the style presented in scientific journals based on readings from the primary literature on a topic focused on molecular mechanisms of cell biology. Graduate students should consult with me early in the semester to discuss format and procedure. The review article grade will be counted as equivalent to a lecture exam grade.

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.

Grading Scale: 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

Final exam schedule: Thursday, May 10 8:00 AM

University rules allow a student to change the time of a final exam if that student has three tests on one day. The regulations read: "Any student having three or more examinations scheduled for the same day will arrange with the instructor to take the 12:00 noon examination or the 7:30 p.m. examination on some other mutually satisfactory date."

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

Other Notes and Policies

Special Needs. Students with special needs (e.g. physical handicaps or learning disabilities) who need to make special arrangements should consult me within the first two weeks of the semester. It is the responsibility of any student with a disability who requests a reasonable accommodation to contact the Office of Student Disability Services (915-7128). SDS will then contact the instructor through the student by means of an Instructor Notification of Classroom Accommodations form.

Challenges to Assigned Grades. Challenges to assigned grades will be welcomed in writing. Challenges must be submitted within one week of a graded assignment.

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. Incompletes will not be given except in extreme circumstances beyond a student's control.

Withdrawals. The last date for withdrawal is Friday March 4.

