

BISC372 Introduction to CELL BIOLOGY

Lecture Times: MWF 2:00 to 2:50
Lecture Location: Lamar 129

Instructor: R. Brian Doctor, PhD
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Office Hours: Monday 12:00 pm to 1:00 pm
Tuesday 11:00 am to 12:00 pm
Wednesday 12:00 pm to 1:00 pm
other times by appointment

Credit Hours: 3 hours
Prerequisites: BISC 160 series (160, 161, 162, 163) General Biology

Communication:

E-Mail Is the most reliable means of getting me a message.

Social Media Nope

Phone Feel free to call but do NOT leave me a message. If I am free in my office I will gladly pick up but I do NOT replay my messages.

Office Hours NO appointment needed; just come on by during these times.

Monday 12:00 pm to 1:00 pm

Tuesday 11:00 am to 12:00 pm

Wednesday 12:00 pm to 1:00 pm

Drop-in Feel free to drop by my office after 3:00 on MWF or after 11:00 on TuThu. If I am there and free I would be delighted to talk with you. If I am in the middle of something I will set up a time for you to come back.

Appointment Send me an e-mail with the dates/times you can come by and I will reserve you that time.

Mail Box Do NOT leave materials or assignments for me in the departmental mailboxes; I will not get them in a timely fashion. To drop off assignments when I am not in, slide the pages under my office door.

Blackboard I use Blackboard to communicate with the class as a whole. This includes messages, powerpoint lecture slides, homework assignments and test scores.

Course Description: The discipline of cell biology occupies a pivotal position in the biologic sciences. Cell biology bridges the basic sciences such as chemistry, biochemistry and molecular biology with the more integrative sciences such as physiology and medicine. This course provides students with a broad exposure to the fundamental principles, structures and functions of cells. Cells are the fundamental unit of life and are, therefore, essential entities in all taxonomic domains. While prokaryotic cells (i.e. anucleated cells; e.g. bacteria, archaea) will be touched on, the emphasis of the course will be placed on the eukaryotic (i.e. nucleated cells with distinct organelles; e.g. protozoa, plants, animals). Further, amongst the variety of eukaryotic cells, the primary emphasis will be on the structures and functions of mammalian cells.

Course Organization: The course will be presented in roughly four quarters.

Quarter 1: includes the history of cell evolution, chemistry of the cell, chemistry of the cellular macromolecules, membranes, membrane proteins and transmembrane transport

Quarter 2. includes the central dogma of cell biology (DNA-RNA-protein), protein synthesis and mechanisms of polarized protein distribution in eukaryotic cells

Quarter 3. begins by learning about the cell cycle in cell replication, stem cells in cell proliferation and apoptosis in planned cell death. The focus then shifts to loss of control of proliferation and death and the development of cancer cells. Finally, the three cytoskeletal elements (microtubules, intermediate filaments, actin filaments) and their respective roles in the structure and functions in cells is covered.

Quarter 4. the course shifts from a 'bottom up' to a 'top down' approach and covers the specialized cell organization and functions in cells of the four tissue types (epithelial, neural, connective, muscle)

Learning Objectives: After successfully completing this course, each student will have a strong understanding of the fundamental structures and functions of the components within eukaryotic cells. In addition, the students will have an appreciation for how the disparate expression and organization of the components within cells leads to distinct cell types capable of performing specific tasks within tissues.

Lecture Materials: Most lectures will follow powerpoint slides. Prior to each lecture, the powerpoint slides for that day's lectures will be posted on Blackboard. This is meant to facilitate note taking during lecture and direct you to points of significance while studying after lecture. Importantly, most of the exam questions are generated from the points made on the powerpoint slides.

Texts:

- (1) *Karp's Cell & Molecular Biology*, 8th edition, Iwasa and Wallace.
 - serves as the primary text for the course
 - having a copy of this text is important
- (2) *Junquiera's Basic Histology*, 12th OR 13th OR 14th edition
 - is a supplementary text for the course
 - will be essential in the 4th quarter of the course
 - the 13th and 14th editions have recently been released and is stocked in the book store
 - in the past, students have gotten used 12th editions for under \$20 via the internet
 - in the past, some students have shared this text

NOTE: To familiarize themselves with the topics and enhance their depth of learning from the lectures, students are highly encouraged to read the assigned material prior to lecture.

NOTE: The depth and breadth of the material is greater in the book than will be covered in the lectures. Students are encouraged to take the opportunity to self-teach themselves the additional material (great practice and preparation for being in grad school).

Attendance Policy: Attendance will be tracked by scanning IDs in the classroom scanners prior to each lecture. In accordance with the University's new Attendance Verification Policy, each student MUST attend at least one lecture during the first two weeks AND scan in prior to the lecture. Subsequently, attendance is NOT mandatory but should facilitate student's mastering of the course material is HIGHLY recommended. There is no direct penalty for the number of absences but students with poor attendance will get NO consideration for borderline grades when final grades are tallied (i.e. if you are 1 or 2 pts from the next higher grade you will not be given those points). Students with excellent attendance WILL get some consideration when their final scores are just below a grade cut-off. Students with medical or school-associated absences should provide notification and will not be counted as 'ABSENT'. Also, students away for graduate school interviews will not be counted 'ABSENT' with appropriate notification. Students should contact the instructor for other forms of excused absences.

Grades: There will be a total of 500 points possible by the end of the course. This includes FOUR quarterly exams worth 100 points each. There is NOT a separate cumulative final. There will also be a number of homework assignments (6-12) during the semester. The cumulative homework scores will each be normalized to a 100 point scale and will be included on the final point total.

	<u>Max possible</u>
Exam 1	100 pts

Exam 2	100 pts
Exam 3	100 pts
Exam 4	100 pts
<u>Homework</u>	<u>100 pts</u>
TOTAL	500 pts

Exams Exam format is 50 multiple choice questions answered in a 50 minute class session. Exams will REQUIRE students to bring a blank scantron (882-E; half-page green scantron sheet) and #2 pencils. If there is not a class before ours, exams will begin 15 minutes early. If there is not a class scheduled in our room after our class, exam times will be extended 15 minutes.

Make Up Exams: Students that miss exams for legitimate, documented reasons can make up exams by contacting the instructor and working out a mutually agreeable and timely time.

Homework: Homework assignments will be given during the semester. The assignments may serve (i) to independently cover important areas that are not addressed specifically in lecture, (ii) to cover again areas of central importance, (iii) to revisit areas where the group struggled with difficult concepts or (iv) to assess if students are reading the assigned material prior to class. Students are welcome to work with other students in the class to discuss the questions and formulate answers but the final responses/answers must be completed independently. Students are encouraged to explore different resources beyond the lecture materials and textbooks when formulating their answers. Unless stated otherwise, homework assignments MUST be generated on and printed from a computer. Homework turned in late may be subject to a 10%/day penalty for up to 50%. Despite the steep penalty, late homework is always graded and some points are better than taking a 0 for that assignment.

Grading Scale: Grades will be curved to reflect the exam difficulty/class performance. In the past, the A and B levels had very little curve required but the C level received a fair bit of curve. Final grades will include the (+/-) scale.

Academic Integrity Any form of academic misconduct (e.g. cheating, plagiarism, fabrication) will not be tolerated and may subject violators to a failing grade in the course. If you suspect someone around you of cheating, have the intestinal fortitude to let me know. They will hurt the grades of many in the class and will erode the integrity and respect of our institution.

Electronics Students are welcome to use laptops/tablets during lectures to take notes on. ALL electronic devices should be muted. Use of electronic devices for non-class related tasks is counterproductive for the user, distracts and disrupts other students around the user and is strongly discouraged. If you are going to have non-class related items open, be considerate and sit in the back rows.

Students with Disabilities For students with acknowledged disabilities, efforts will be made to minimize the impact of the disability and maximize the student's ability to learn the course material and complete any testing or examination of the student's learning.

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](tel: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.

This syllabus is subject to change at the discretion of the instructor to accommodate instructional needs.

Lecture Topics and Related Reading:

#	Date	Chapter	Topic
00	JAN	20 th	MLK Day
01		22 nd	Introduction to CELL BIOLOGY
02		24 th	1 History, Evolution and Properties of the CELL
03		27 th	2.1-2.8, 2.18 Composition and Macromolecules of the CELL
04		29 th	2.9-2.12; 3.1-3.4 Proteins
05		31 st	4.1-4.7 Membranes <i>comparative sizes and masses of cell compartments</i> <i>homework</i>
06	FEB	3 rd	4.9-4.14 Membrane Proteins: Ion Channels/Transporters
07		5 th	4.16 Ions and Electrochemical Gradients
08		7 th	18.1-18.3 Microscopy: Light Microscopy
09		10 th	18.4-18.7 Microscopy: Electron Microscopy
EX		12 th	EXAM I (1-9)
10		14 th	1.3, J2, J3 Eukaryotic Organelles <i>DNA Packing, Unpacking & Transcription</i> <i>homework</i>
11		17 th	XX Mitochondria
12		19 th	8.21 Protein Distribution to Organelles
13		21 st	8.1; 8.3-8.11 Endomembrane System <i>laws of thermodynamics and mitochondrial structure</i> <i>homework</i>
14		24 th	8.13-8.15; 8.17-8.20 Membrane Trafficking and Recovery
15		26 th	9.10; 9.13 Cytoskeleton: Actin
16		28 ^{th st}	9.9 Cell Motility <i>actin-associated proteins</i> <i>homework</i>
17	MAR	2 nd	9.2; 9.4-9.7 Cytoskeleton: Microtubule
18		4 th	9.10; 9.13 Cytoskeletal Motor Proteins
19		6 th	Actin- and Microtubule-based cell-surface structures <i>intermediate filaments</i> <i>homework</i>
		9 th , 11 th , 13 th	SPRING BREAK
20		16 th	15.1-15.2 Cell Signaling: Signal Schemes & Delivery
EX		18 th	EXAM II (10-19)
21		20 th	15.1-15.2 Cell Signaling: Signal Receptors
22		23 th	15.3-15.7; 15.12 Cell Signaling: Signal Transduction
23		25 th	14.1-14.5 Cell Cycle: Cyclins and CDKs
24		27 th	14.6-14.11 Cell Cycle: Stages of Mitosis <i>cell cycle regulation</i> <i>homework</i>
25		30 th	1.6 Stem Cells and iPS Cells
26	APR	1 st	15.17 Tissue Repair
27		3 rd	Cell Death and Apoptosis <i>current status of cancer in the US</i> <i>homework</i>
28		6 ^{th th}	16.9-16.18 Cell Biology of Cancer
EX		8 th	EXAM III (20-28)
29		10 th	J-4 Epithelial Tissues: Characteristics

30		13 th	J4; 7.5-7.12	Epithelial Tissues: Cell-Cell Junctions
31		15 th 17 th	J-4	Epithelial Tissues: Transepithelial Transport GOOD FRIDAY
32		20 th d	J-16 335-345	Epithelial Tissues: Hepatocytes
33		22 nd	J9; 4.16-17	Neural Tissues: Neurons
34		24 th	J9; 4.16 <i>homework</i>	Neural Tissues: Neurons & Glial Cells <i>muscle tissues</i>
35		27 th th	J-9	Neural Tissues: Sight & Sound
36		29 th th	J5, J7, J8; 7.2-4	Connective Tissues: ECM, Cartilage, Bone
37	MAY	1 st	J6, J12	Connective Tissues: Adipocytes & RBCs
EX		6 th -10 th		EXAM 4 (29-37)