Cell Biology

MCELLBI X116

3 semester units in Molecular and Cell Biology

Course Description

This course introduces you to cell biology from a molecular perspective. You will learn the basic techniques of cell biology and gain an understanding of the major components of cells and how they function. You will also explore the mechanisms of cellular growth, energetic, and communication. At the end of this course, you will be prepared for further advanced study in cell and/or molecular biology.

Prerequisite

One year of college-level general biology for majors

Learning Outcomes

After successfully completing this course, you will be able to

- explain the structures and function of the basic components of both prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles;
- describe how DNA technologies have revolutionized Cell Biology;
- explain and analyze the process of energy flow in cells;
- describe the basic process of DNA replication and how it differs in prokaryotic and eukaryotic cells;
- explain how proteins are produced and sent to their target destinations within cells;
- describe the basic signal transduction pathways and mechanisms of cellular communication;
- apply the knowledge of cell biology to selected examples of altered cell function. These can include responses to environmental or physiological changes, or alterations of cell function as brought about by a mutation.

Course Materials, Technical Requirements & DSP Accommodations

Required Textbook

- Lodish, Harvey et al. Molecular Cell Biology, 8th ed. (New York: W.H. Freeman and Co., 2016). ISBN: 978-1-4641-8339-3

Technical Requirements

This course is built on a Learning Management system (LMS) called Canvas. In order to use Canvas, your computer will need to meet these technical specifications.

Canvas allows you to record audio or video files of yourself and upload them in the course. Although doing so is not required for any of the activities, using these features will enhance your engagement in the course. If you would like to use these features, you will need to have a webcam and a microphone installed on your computer.

You must take quizzes and exams on a wired Internet connection to ensure complete and timely submission

DSP Accommodations

If you are a student with special needs and haven't already contacted the Disabled Student Services (DSS), please contact the office right away. Here are detailed instructions for DSP accommodations.

Learning Activities

This course consists of ten modules. Each module includes a combination of multimedia lectures, animations, self-check questions, discussions, worksheets, and checkpoint quizzes. The course also includes a comprehensive, proctored final exam. To ensure that you are following University policies, please carefully review the academic integrity section of the syllabus as it relates to the following activities.

Reading Assignments

Each module corresponds to one or more textbook chapters. I recommend that you read the assigned chapter/s once for the 'big picture' *before* watching the lectures, so you have a basic understanding of the lecture topics. Then, after you have watched the lectures, go back and read the chapter/s carefully as there may be questions on the worksheets, quizzes, and exams about material that was not covered in the lectures but is covered in depth in the textbook.

Instructor's Lectures

My lectures highlight concepts that are either particularly important or challenging. Please note that *the lectures are not meant to be comprehensive.* Questions on assignments and exams will include material that was not covered in lectures. It is therefore necessary for you to carefully read the assigned chapters as well. You may also watch my presentations as many times as you need, as a whole and/or returning to specific slides via the table of contents, as well as download the presentation as an MP3 file and print out a transcript.

Self-Check Assignments

Use the end-of-chapter questions in your textbook to help you practice working with the concepts and check your level of understanding and retention. These questions are not graded. You can find solutions to those questions in the recommended text listed in the Materials section: Lodish, Harvey, *Solutions Manual for Molecular Cell Biology*. You can email me with any questions that come up from the assignments.

Discussion Forum Assignments

Introductions Forum: in Module 1 you'll introduce yourself to your instructor and coursemates. For your introduction, please use Canvas features to record your voice and/or a video or yourself, and/or upload a photo, so that your course mates and I can get a better sense of you.

Each module includes a graded discussion forum assignment for which you will post brief answers. You will find specific instruction in each discussion assignment. You will also be expected to respond to one of your classmates' posts in a manner that reflects critical thinking. For your discussion forum submissions, you are encouraged to use your textbook, internet resources, and other reliable sources as you research these topics. However, it is important that your answer submissions be written in your own words, or if it is necessary to quote from another source, please do so sparingly and provide the citation.

Your posts and replies will be graded according to this discussion assignment rubric.

Worksheet Assignments

Worksheets consist of questions that relate to the material covered in the module in which they are assigned, and may include multiple choice, fill-in-the-blank, matching, true/false, short answer and critical thinking essay questions. The worksheets are open-book assignments designed to help you master the material necessary to perform well on the quizzes and the final exam. While completing your worksheets, it is acceptable to use your textbook, Web resources, and other reliable sources to help you understand the concepts necessary to answer the questions. However, it is important that your answer submissions be written in your own words, or if it is necessary to quote from another source, please do so sparingly and provide the citation.

Each module includes a two-part, graded worksheet: one part is in quiz form, and you have unlimited time to complete it but can only submit it once; the second part consists of short-answer/essay questions and is a dropbox submission.

Your short-answer/essay questions will be graded according to this essay questions rubric.

Checkpoint Quizzes

There are three graded checkpoint quizzes in the course (Modules 3, 6 and 10), covering the material included in the modules up to each quiz. They help you check your progress in the course and acquaint you with the kinds of questions you will encounter in the final exam. *Please, also note that the modules following each checkpoint quiz are locked until you receive a grade for the quiz. However, you will be able to access the lectures, readings and self-review questions in Modules 4 and 7 even before the quizzes have been graded so that you can move forward with your study.*

- To check your comprehension and recall of the readings and prior assignments, you must take each quiz as **closed book**, without using any print or electronic resources. Failure to do so constitutes academic dishonesty and will put you at a disadvantage when taking the final exam.

- You will have 80-90 minutes to complete each quiz. Once you click on the "Take this Quiz" button, the quiz will be automatically submitted after the allotted time, regardless of whether you have finished or not, or logged out and are no longer taking the quiz.
- Please take all quizzes on a **wired connection** as a loss of connection will not be accepted as a valid excuse for incomplete submissions. Do NOT open and close your browser window while taking a quiz.

Final Exam

The final exam is a 3-hour proctored, pencil & paper, comprehensive exam, which you must complete before your course end date.The final exam is a combination of multiple choice, T/F, fill-in-the-blank and short-answer questions. You are not permitted to bring notes, your book, or electronic devices to the final. It is very helpful for you to review all the assignments and written work, paying particular attention to my comments.

Requirements for taking the final exam:

- You must complete all assignments and have received a grade for each.
- Your instructor must have approved your request to take the final exam
- You must have been enrolled in the course for a minimum of 90 days.
- You must complete your final exam before your course end date, which is 180 days from your enrollment date. Check your Welcome letter and mark this date on your calendar.

In order to pass this course, you must pass the final exam with a grade of 70% or higher.

For an overview of final exam procedures, please read the Final Exam Procedures section of this syllabus. Then review the Final Exam Procedures section of our website for detailed information.

Academic Integrity, Research, and Proper Citation

Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for you or any other members of the academic community. This misconduct includes a wide variety of behaviors such as cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are intended to be available, and helping another student to gain an unfair academic advantage.

As a student of UC Berkeley Extension, you are encouraged to reach out to your fellow students in your class to avoid isolation, to discuss materials, and to ask each other questions, but there are limits to this collaboration. Please review the following document on academic integrity, which clearly defines what constitutes cheating, as well as plagiarism and other forms of academic misconduct. Their definitions might surprise you. As a UC Berkeley Extension student, you are also bound by the UC Berkeley Extension Code of Student Conduct.

Please review this material, and contact your instructor for clarification, if necessary. You will be asked to take your Pledge to Academic Integrity before you can access this course content.

UC Berkeley Extension takes academic misconduct very seriously. Depending upon the nature of the incident, the academic disciplinary sanction may vary but can result in consequences such as a failing grade for the course or even suspension and dismissal.

This class will be using Turnitin. Turnitin is an online plagiarism detection service that matches submitted papers/answers to a text-matching database consisting of traditional publications, internet publications, and other UC Berkeley and UC Berkeley Extension student papers. It is a useful tool for learning proper summary, paraphrase, and quotation skills in addition to identifying overt instances of plagiarism. Further information and instructions can be found at Turnitin.com

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Grading & Course Policies

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Grade Breakdown

Your course final grade will be assigned according to the following percentages:

- Checkpoint Quizzes – 30%
- Discussion Assignments – 15%
- Worksheets – 25%
- Final exam – 30%*

***In order to pass this course, you must pass the final exam with a grade of 70% or higher. Final exam scores below 70% result in a grade of F.**

Final grades follow UC Berkeley grading system, as follows:

UC Berkeley grading system												
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Percentage	100-93	92-90	89-87	86-83	82-80	79-77	76-73	72-70	69-67	66-63	62-60	< 60

Visit the UC Berkeley grading policies and procedures page for grading information, including letter grades and other letter designations (W, I, NC, P/NP).

To view your final grade and request official transcripts, log in to your student account at extension.berkeley.edu and go to "My Enrollment History."

Course Policies

- You must submit assignments for one module at a time and wait for your instructor's grades/feedback before submitting assignments for the next module. Your instructor has up to *7 days to return assignments* with a grade and provide feedback that will help you complete subsequent assignments. Instructors are expected to respond to *email inquiries within 48 business hours*.
- All modules must be completed in sequential order unless otherwise noted by the instructor.

- You must be enrolled a minimum of 90 days and have all your assignments completed and graded before you may take the final exam.
- You must complete your final exam on or before your course end date (180 days) and you must pass the final with a 70% score (or higher) to pass the course. Instructors have *14 days* to grade final exams and submit a final course grade.

Communication & Office Hours

My office hours will be as needed. Rather than setting aside a specific time for office hours, which may not be convenient for all of you, send me an email if you have a personal question/concern related to the course, and we'll set up a time to chat in the course. Find the link to chat in the left navigation sidebar. *Please, note: all course communication between students/instructor **must** be conducted within the course site.*

To contact your instructor, you can access course email by clicking on the Inbox link on the top-right Corner Help toolbar (see also Canvas tutorial). Instructors have 2 business days to respond to student communications and 7 days to return graded submissions unless students have been notified otherwise (e.g., because of vacation or other reasons).

Course mail may also be used to contact other students. Please ensure that you are following guidelines of the Student Code of Conduct and Academic Integrity in these interactions.

Managing Your Time in the Course

While taking an online course offers flexibility, it also requires self-discipline. In a Continuous Enrollment course such as this one, it is your responsibility to pace yourself through the course so that you have adequate time to successfully complete the course.

Tips for Success

- Start right away.
- You have 180 days (including holidays, vacations, and the unplanned events that life may throw at you) to complete 10 modules and take the final exam. Remember that instructors have 7 days to return student assignments and you may only submit one assignment at a time.
- Put aside time for self-study. Take time to complete self-check questions and use your closed-book quizzes to gauge your knowledge and recall of the course material. Remember that you will need to pass the final exam in order to pass the course.
- Reach out for support. If you feel you are not on track, contact your instructor for advice.
- Be sure to provide yourself extra time to handle unforeseen events, review material, request exam approval, find a proctor, take your final exam, and have your final graded by your instructor. Remember that final exams must be completed on or before your course end date and you must have all assignments completed (returned and graded) before your request to take the exam can be approved.
- Review the final exam procedures and timelines, and ask any questions well before your course end date.

Course End Date and Course Evaluation

Course End Date

Your access to the online classroom will expire on the course End Date, which is indicated in the initial email you received when you enrolled. You have 180 days to complete this course from your course ***enrollment*** *date*.

Course Evaluation

UC Berkeley Extension is committed to improving our online courses and instruction. Please take some time to fill out the course evaluation. This evaluation is completely confidential. The instructor will be given the evaluation responses after final grades have been submitted and posted.

You will be emailed an invitation to complete an online course evaluation once your proposed proctor has been approved, and your final exam has been scheduled. Evaluation surveys will remain open for 5 days, and students who have not completed a survey will receive email reminders.

Final Exam Procedures

You must complete your final exam by your course end date, which is 180 days from your course enrollment date. The Welcome email you received lists your official course end date. Please mark this date on your calendar. The earliest date you may take your final exam is 90 days from your course enrollment date. You may only request release of your final exam after all your coursework has been submitted, graded and returned by your instructor. You may submit only one module assignment at a time, and your instructor has 7 days to return graded assignments. Please plan accordingly.

Overview of the Process:

1. First, you should decide who will proctor your final exam. Review the list of approved proctors, and if you do not find one that suits your needs, follow the steps outlined to have a new proctor approved by UC Berkeley Extension. You should nominate your proctor for approval a few months before you plan to take your final exam.
2. Complete your coursework. Refer to your syllabus for details, as many courses require you to submit only one module assignment at a time, and wait for your instructor's feedback before submitting the next assignment. Keep in mind that instructors have 7 days to grade your work. You should plan to submit your final assignment 2-3 weeks before your course end date at the latest.
3. Once all your coursework has been graded and returned, request the release of your final exam.
4. Once your exam is approved for release, you can log in at extension.berkeley.edu to select your approved proctor. Once saved, the exam will be sent to your proctor within 3 business days.
5. After you receive notice that your exam has been sent to your proctor, you may schedule your exam appointment. Plan to take your exam within 2 weeks of being notified that the exam has

been sent to your proctor, but before your course end date. You will not be allowed to sit for your exam after your course end date.

Please, carefully review the Online Final Exam Procedures portion of our website for important information about this process, and send an email to extension-exams@berkeley.edu if you have any questions.

Canvas Tech Support

The learning management system (LMS) used in this course is Canvas, which has convenient mobile apps for phones and tablets. In order to use Canvas, your computer will need to meet these technical specifications. Read the Orientation page to make sure that your computer is at par with Canvas specifications.

Anytime you are in Canvas you can access the help menu where you can report problems, get support, and search Canvas user guides from the Help link on the top menu bar.

Other options

- Canvas Support 24/7 Hotline: 855-308-2758
- Chat with Canvas Support
- Email: support@instructure.com

Course Outline

Orientation Required, including Academic Integrity Pledge and Course Policies Quizzes

Module 1: Cells

- Lecture 1: Cells
- Lecture 2: Microscopy
- Animations
- Reading: Ch. 1; Ch. 4, sections 4.1-4.4
- Self-Check Questions
- Introduce Yourself; M1 Discussion: An Ancient Eukaryote
- M1 Worksheet (2 parts)

Module 2: The Chemistry of Life

- Lecture 1: The Chemistry of Life
- Lecture 2: Cell's Building Blocks
- Animations
- Reading: Ch. 2
- Self-Check Questions
- M2 Discussion: Hyperthermophiles "Like It Hot"

- M2 Worksheet (2 parts)

Module 3: Proteins

- Lecture 1: Proteins
- Lecture 2: Relationship between Protein Structure and Function
- Lecture 3: Regulation of the Activity and Life of a Protein
- Lecture 4: Purifying, Detecting and Characterizing Proteins
- Animations
- Reading: Ch. 3
- Self-Check Questions
- M3 Discussion:The Toxic Amino Acid
- M3 Worksheet (2 parts)
- Checkpoint Quiz 1

Module 4: DNA - The Genetic Basis Of Life

- Lecture 1: DNA -The Genetic Basis Of Life
- Lecture 2: Structure of DNA
- Lecture 3: DNA Replication
- Animations
- Reading: Ch. 5, sec. 5.1, 5.5; Ch. 8, sec. 8.6, pp. 347-49
- Self-Check Questions
- M4 Discussion: Creating Viruses
- M4 Worksheet (2 parts)

Module 5: From Genes to Proteins

- Lecture 1: From Genes to Proteins
- Lecture 2: Translation of the Genetic Message
- Animations
- Reading: Ch. 5, sec. 5.2- 5.4; Ch. 9, sec. 9.1-9.2
- Self-Check Questions
- M5 Discussion: Riboswitches
- M5 Worksheet (2 parts)

Module 6: DNA Technologies and Genetic Engineering

- Lecture 1: DNA Technologies and Genetic Engineering
- Lecture 2: Studying Gene Expression and Function
- Animations
- Reading: Ch. 6, sec. 6.2-6.3
- Self-Check Questions
- M6 Discussion: Cloning Dinosaurs?
- M6 Worksheet (2 parts)
- Checkpoint Quiz 2

Module 7: Biological Membranes

- Lecture 1: Biological Membranes
- Lecture 2: Membrane Proteins & Biosynthesis

- Lecture 3: Transport of Molecules across Membranes, Part I
- Lecture 4: Transport of Molecules across Membranes, Part II
- Animations
- Reading: Ch. 7; Ch. 11
- Self-Check Questions
- M7 Discussion: Proteins and Genetic Diseases
- M7 Worksheet (2 parts)

Module 8: Cellular Energetics

- Lecture 1: Cellular Energetics
- Lecture 2: Aerobic Respiration
- Animations
- Reading: Ch. 12, sec. 12.1-12.4
- Self-Check Questions
- M8 Discussion: Toxins and Poisons
- M8 Worksheet (2 parts)

Module 9: Protein Targeting

- Lecture 1: Protein Targeting - Secretory Pathways
- Lecture 2: Protein Targeting - Nonsecretory Pathways
- Animations
- Reading: Ch. 13
- Self-Check Questions
- M9 Discussion: Post-Translational Modification of Proteins
- M9 Worksheet (2 parts)

Module 10: Cell Signaling

- Lecture 1: Cell Signaling
- Lecture 2: GPCR Signaling Pathways
- Reading: Ch. 15
- Self-Check Questions
- M10 Discussion: How to Fight Antibiotic-Resistant Bugs
- M10 Worksheet (2 parts)
- Checkpoint Quiz 3

FINAL EXAM