

LIFE210 - Introductory Eukaryotic Cell Biology

Lecture:	Sections 1 and 231: Clark A104, 12:00-12:50 PM MWF
Honors Recitation (Life 211):	Section RH0: MRB 123, 11:00-11:50 AM R* <i>*Taking this recitation is <u>required</u> to receive honors credit</i>
Instructor:	Steven Markus, PhD
Office Hours:	By appointment (email or meet after class to schedule)
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Instructor:	Chaoping Chen, PhD
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Teaching Assistants & Office Hours:	Liam Elkins (Liam.Elkins@rams.colostate.edu): R 12-2 pm, Yates 210 Gretchen Fixen (Gretchen.Fixen@colostate.edu): T 9-11 am, Yates 212 Astrid Quintero (Astrid.Quintero@colostate.edu): R 9-11 am, Yates 316 Raymond Quinones (Raymond.Quinones@colostate.edu): W 11-1 pm, Yates 212 Samuel Snyder (Samuel.Snyder@colostate.edu): W 1-2 pm, Yates 308

Textbook: Molecular Biology of the Cell, 6th edition by Alberts et al. 2015 or 7th edition 2022,
Or Essential Cell Biology, 5th edition by Alberts et al. 2019

Course Objectives

- Understand essential concepts and fundamental definitions in cell biology that are necessary to further grasp biochemistry, and broader biomedical issues.
- Learn major components and (bio)chemical reactions involved in the basic cellular processes. Cell biology is the molecular and chemical underpinnings of how and why life (cells and organisms) works. This course only explores the “tip of the iceberg” but will provide a springboard for anyone who wants to delve into cell biology in greater depth.
- Learn to apply the acquired knowledge to problems and questions through critical thinking and problem solving exercises.

How to Do Well

To help you best understand the course content, we will provide you with the following: (1) 8 unit outlines; (2) lecture slides to be posted to Canvas; (3) clicker questions that were presented in class; and (4) example exams (pending availability, and up to the instructor’s discretion). You are expected to come to class prepared (*i.e.*, know something about what we will talk about). Typical preparation involves reading the assigned textbook pages (see below), and looking over the lecture notes for each lecture. If you do not have a good understanding of the material raised by the clicker questions, ask about them at the beginning of the next class, and/or make an appointment to go over them individually with the TA. Use the quizzes, lecture notes, outlines, and clicker questions to guide your studying for the exams. Study your notes including key terms and concepts, and then take the quiz the first time without your notes. If you do not do as well as you would like, review your notes again and take the quiz a second time with your notes and book open (you get two attempts at each quiz!). Finally, we strongly suggest that you practice diagramming some of the key biochemical/cell biological processes on a white board or note paper multiple times rather than just looking them over to study. You will find that the information is retained much more readily, and you will recognize gaps in your understanding more readily. Using this approach in a study group is even more effective. Free tutoring is available in the Arts and Sciences Tutorial Hall from 5 - 10 pm, Sunday through Thursday. For more details see:

<https://tilt.colostate.edu/learning/tutoring/>

Syllabus

<u>Date</u>	<u>Period</u>	<u>Topic</u>	<u>Text Reading (page #s)</u>	
			<u>6th edition</u>	<u>7th edition</u>
Unit 1: Chemistry of Cells – An Overview				
Aug 21	SM1	Introduction and course overview & Unity and diversity of cells; definition of cancer	8-12; 31-39 1091-98; 1127-29	7-13; 31-45 1163-68; 1198-1201
Aug 23	SM2	Chemical composition of cells	43-44	49-51
Aug 25	SM3	Chemical bonds, Part I	44-45	51-52
Quiz 1 due @ 12:00 pm, Monday, August 28 th (noon, not midnight!!)				
Aug 28	SM4	Chemical Bonds, Part II		
Aug 30	SM5	Molecules found in cells, Part I	45-46 90-91 (panel 2-1)	52-53 94-95 (panel 2-1)
Sep 1	SM6	Molecules found in cells, Part II	47-50	53-56
Quiz 2 due @ 12:00 pm, Tuesday, September 5th **Labor Day - NO Class**				
Sep 4				
Unit 2: Macromolecular Structure and Function: Proteins				
Sep 6	SM7	Amino acids, Peptide Bonds & Intermolecular interactions	109-10 112-13 (panel 3-1) 138-40	115-17 118-19 (panel 3-1) 145-46
Sep 8	SM8	Protein structure and folding	114-18; 123-29	121-27; 130-36
Quiz 3 due @ 12:00 pm, Monday, September 11 th				
Sep 11	SM9	Proteins as catalysts I	57-61; 140-46	63-67; 146-52
Sep 13	SM10	Proteins as catalysts II	(same as SM9)	
Sep 14	**Review for Exam 1** (Thursday evening from 4-4:50 pm in Chemistry A103)			
Sep 15	E1	EXAM 1 (covering lectures SM1-10)		
Unit 3: Macromolecular Structure and Function: Cell Membranes				
Sep 18	CC11	Biomembrane compositions	565-82	603-21
Sep 20	CC12	Biomembrane characteristics I	565-82	603-21
Sep 22	CC13	Biomembrane characteristics II	565-82	603-21
Quiz 4 due @ 12:00 pm, Monday September 25 th				
Sep 25	CC14	Solute diffusion and transport across membranes	597-600; 611-14	637-40; 651-54
Sep 27	CC15	Solute diffusion and transport across membranes	600-04; 606-08	640-44; 646-4
Sep 29	CC16	Transmembrane transport in disease	609-11	649-51
Quiz 5 due @ 12:00 pm, Monday October 2 nd				
Unit 4: Metabolism – Flow of Matter and Energy in Cells				
Oct 2	CC17	Overview of cellular metabolism I	51-6; 63-8	57-62; 69-75
Oct 4	CC18	Overview of cellular metabolism II	73-8; 81-5	81-4; 87-90
Oct 5	**Review for Exam 2** (Thursday evening from 4-5 pm in Chemistry A103)			
Oct 6	E2	EXAM 2 (covering lectures CC11-16)		
Oct 9	CC19	Regulation of cellular metabolism	87-8	92-93

Oct 11	CC20	Metabolic changes in cancer cells	1098-99	1175
Unit 5: Intracellular Compartments, Protein and Lipid Sorting				
Oct 13	CC21	Compartmentalization of cells	24-28; 641-49	22-31; 83-93
Quiz 6 due @ 12:00 pm, Monday October 16th				
Oct 16	CC22	Protein sorting to cellular compartments I	649-66	694-745
Oct 18	CC23	Protein sorting to cellular compartments II	669-91	694-745
Oct 20	CC24	Protein sorting to cellular compartments III	695-722	694-745
Quiz 7 due @ 12:00 pm, Monday October 23th				
Oct 23	CC25	Lipid and protein sorting IV	722-50	748-807
Unit 6: Cellular Communication				
Oct 25	CC26	Principles of cell signaling	813-831; 874-76	873-892
Oct 26	**Review for Exam 3** (Thursday evening from 4-4:50 pm in Chemistry A103)			
Oct 27	E3	EXAM 3 (covering lectures CC17-25)		
Oct 30	CC27	Membrane receptors	832-67	892-928
Nov 1	CC28	Intracellular signaling molecules	834-49	895-910
Nov 3	CC29	Signaling through enzyme-linked receptors	850-67	911-928
Quiz 8 due @ 12:00 pm, Monday November 6th				
Nov 6	CC30	Other signaling examples	867-75	928-934
Unit 7: Cell Shape and Movement				
Nov 8	SM31	Laboratory biochemistry & cell biology		
Nov 10	SM32	Light microscopy to understand cell biology		
Quiz 9 due @ 12:00 pm, Monday November 13th				
Nov 13	SM33	Molecular dynamics of the cytoskeleton	889-960	949-1017
Nov 15	SM34	Regulation of cytoskeletal dynamics		(same as SM33)
Nov 16	**Review for Exam 4** (Thursday evening from 4-5 pm in Chemistry A103)			
Nov 17	E4	EXAM 4 (covering lectures 26-33)		
Nov 20-24	**Fall Recess/Thanksgiving Break – NO Classes**			
Nov 27	SM35	Motor proteins		(same as SM33)
Nov 29	SM36	Cytoskeleton and cellular behavior	889-960	1017-1026
Unit 8: Cellular Growth Control				
Dec 1	SM37	Cell cycle I: An overview	963-967	1027-1071
Quiz 10 due @ 12:00 pm, Monday December 4th				
Dec 4	SM38	Cell cycle II: Regulation	967-1018	1027-1071
Dec 6	SM39	Programmed cell death	1021-32	1089-1102
Dec 8	SM40	Cell biology of cancer	1091-1141	1163-1212
Dec 13	E5	4:10-6:10 pm, EXAM 5 (covering lectures SM34-40; in Clark A104)		

Last add/drop and W-drop days

Wednesday, September 6th – last add/drop day; you will have taken 2 quizzes by then.

Friday, November 10th – last course withdrawal day (with W grade); you will have taken 8 quizzes & 3 exams by then.

iClickers

You will require either an iClicker remote, or a mobile device with the iClicker application installed to participate in, and receive credit for in-class participation. iClicker is a response system that allows you to respond to questions we pose during class; you will receive extra credit points for that feedback and/or participation. In order to receive this credit, you will need to register your iClicker remote (or the mobile device application) by the first Friday of the semester (**August 25th, 2021**).

For information on iClicker software/hardware, please go to the following website for instructions:

<https://canvas.colostate.edu/iclicker/student-information/>

****iClicker will be used every day in class, and you are responsible for bringing your device daily.****

Quizzes and Exams

1. 10 Quizzes – 50 points total

There will be 10 quizzes each worth 5 points. They will all be administered on Canvas. They will be posted every Friday (see course schedule above), except the Fridays of the four exams and will be due on the following Monday before class time (noon; except for Quiz 2, which is due on Tuesday September 7th due to Labor Day). There will be 10 quizzes and you will be given two attempts on each.

2. Exams – 500 points total

There will be five exams each worth 100 points. With the exception of the final exam, the exams will be administered during the regular class time, and in the regular classroom. They will consist of a combination of multiple choice and essay questions. The exams will cover what is discussed in class and what is emphasized in the outlines (see canvas), clicker questions and quizzes.

Grading

There are a total of 500 points from Exams, and 50 points from Quizzes. Each of the 5 exams in LIFE 210 will be worth 100 points (500 total), and the 10 weekly quizzes on Canvas are worth 5 points each (50 total), for a cumulative total of 550 points possible. This does not include any bonus points acquired from answering in-class iClicker questions (see below). If you achieve the following point totals for LIFE 210 you will be assured the **minimum** letter grade shown:

1. 495-550 ($\geq 90\%$)	A
2. 440-494 (80-90%)	B
3. 385-439 (70-80%)	C
4. 330-384 (60-70%)	D
5. <330 (<60%)	F

Each exam or quiz will not be curved individually, but the final total points required for a course grade might be curved depending on the averages and distribution of points. In addition, your grade for LIFE 210 will be determined based on the total 550 points (combined). Students in LIFE 210 have averaged around 80% of the total points possible over the past several years. As a result, there is usually no grading curve.

In-class iClicker questions will be worth 1 point for answering irrespective of correctness. These points will be weighted to be worth a maximum total of 20 extra credit points (in addition to the 550 total possible points) at the end of the semester.

Make-up Exams and Exam Regrading

There will be no make-up exams offered. Unexcused absences from an exam or quiz will be given a zero. If you have an excused absence (based on written or other verifiable evidence) from an exam or quiz, your final grade will be based on a percentage of the total possible points for the exams and quizzes you did take. **Alternatively, students can schedule to take the exam early with the instructor if they know they cannot take the exam at the regularly scheduled date and time.** If you have questions concerning the grading of any

of your exams or quizzes, the questions you want re-graded should be circled and the exam or quiz should be turned in to the instructor within a week of the date of its return to the class after grading. You must also provide a **written** explanation as to why you feel the question should be re-graded. Exams **will not be accepted for re-grading after this one-week period**, so go over your exam carefully soon after it has been returned to you.

Diversity and Inclusion

It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and course content that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally, or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let us know so that we can make arrangements for you.

Important information for students: All students are expected and required to report any COVID-19 symptoms to the university immediately, as well as exposures or positive tests from a non-CSU testing location.

If you suspect you have symptoms, or if you know you have been exposed to a positive person or have tested positive for COVID, you are required to fill out the COVID Reporter (<https://covid.colostate.edu/reporter/>). If you know or believe you have been exposed, including living with someone known to be COVID positive, or are symptomatic, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you. If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600. You may also report concerns in your academic or living spaces regarding COVID exposures through the COVID Reporter. You will not be penalized in any way for reporting. When you complete the COVID Reporter for any reason, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

For the latest information about the University's COVID resources and information, please visit the **CSU COVID-19 site**: <https://covid.colostate.edu/>.

CSU Academic Integrity Policy and LIFE 210

By registering for this class you enter into a contract between each student (you) and the instructors (us) constituting an agreement on our respective roles in gaining the knowledge and understanding of cell biology and earning the grade that you desire. As the instructors, our role is to organize and present the material and stimulate, facilitate and guide you through learning and understanding the core concepts in eukaryotic cell biology. As the student, your role is to attend class, **not to talk during class** unless you are asked to or are asking the instructor a question and to participate in class discussions and in answering iClicker questions. If you wish to do well in this course (earn an A or B), we strongly suggest that you attend every class and listen (not text or surf the internet or watch movies, *etc.*), use the outlines, clicker questions and lecture notes, form study groups, attend review sessions, schedule office hours with the instructors and/or the teaching assistants (TAs) to clarify concepts, and study by *practicing* rather than merely looking over your notes (please ask us if you do not know what this means).

More specifically, in LIFE 210 the students and the instructors will abide by the Academic Integrity Policy of CSU as defined in the General Catalog (<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>) and the Student Conduct Code (<https://resolutioncenter.colostate.edu/conduct-services/academic-integrity/>). While taking an exam, the use of any written material, phones (or similar electronic devices), or the assistance of others by looking at their exam or communicating verbally or by text, email, *etc.* is strictly prohibited. Studying in groups is encouraged. We do suggest that you attempt to complete the quizzes and clicker questions (when provided) individually first (before meeting in groups) to get the maximum benefit in your exam preparation. For answering the iClicker questions during class, discussing the possible answers is strongly encouraged (after attempting to answer them on your own the first time). However, answering these questions for other students that did not decide to attend class (using multiple iClickers) is not permitted,

and is against the student conduct code.

Maintaining academic integrity is important in LIFE 210 not just to get the most out of the class, but also because conducting yourself with integrity is core to everyone's self-worth and societal worth. If you let the small stuff slide, the next step is justification of doing a poor job, then plagiarism, then cheating on exams, your homework assignments, your taxes, etc. Even if you are not caught, conducting yourself without integrity eats at your self-esteem. To learn more visit the Practicing Academic Integrity on the Learning@CSU Website (<http://learning.colostate.edu/integrity/index.cfm>).