LIFE210 - Introductory Eukaryotic Cell Biology

This syllabus is for sections 1 (general) and 231 (honors)

Lecture: Recorded lectures will be posted to the Canvas class page no later than 2 hours prior to normal class time: 12:00-12:50 PM MWF

In-person recitation: Optional in-person recitations will be held in Clark A104 during normal class time (12:00-12:50 PM MWF). The class has been divided into 5 sections (sections A through E; see the Canvas class page to determine to which section you have been assigned, and for the schedule), and each group has the option of attending one recitation approximately every two weeks. Given limitations in classroom occupancy, you are only permitted to attend recitation during your designated time.

Honors Recitation (Life 211): Section R90: 11:00-11:50 AM R (for more information on this course, see the Life 211 Canvas class page)

Instructor (1st half): Steven Markus
Office Hours: By appointment (phone, email, or meet after class to schedule)
Contact Information: Office: 245 MRB, Phone: 491-5979 Steven.Markus@ColoState.edu

Instructor (2nd half): Santiago Di Pietro,
Office Hours: By appointment (phone, email, or meet after class to schedule)
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Teaching Assistants: Meghan Stettler Meghan.Stettler@rams.colostate.edu
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Virtual Office Hours: 4:00-5:00 pm R; will take place with the instructors via Zoom (link will be posted on Canvas)
*To meet your TAs outside this time, contact them for an appointment.*


Important information: All students should fill out a student-specific symptom checker each day before coming to class (https://covidrecovery.colostate.edu/daily-symptom-checker/). In addition, please utilize the symptom checker to report symptoms, if you have a positive test, or exposed to a known COVID contact. If you know or believe you have been exposed or are symptomatic, it is important for the health of yourself and others that you report it through this checker. You will not be in trouble or penalized in any way for reporting. If you report symptoms or a positive test, you will receive immediate instructions on what to do and CSU’s Public Health Office will be notified. Once notified, that office will contact you and most likely conduct contact tracing, initiate any necessary public health requirements and/or recommendations and notify you if you need to take any steps. For the latest information about the University’s response, please visit the CSU COVID-19 site (https://covidrecovery.colostate.edu/).

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) in-class questions that were posed in class; and (4) example exams (pending availability, and up to the instructor’s discretion). You are expected to attend 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 in-class questions, ask about them at the next review session, and/or make an appointment to go over them individually with a TA. Use the quizzes, lecture notes, outlines, and in-class 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/](https://tilt.colostate.edu/learning/tutoring/)

**Syllabus**

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<tr>
<th>Date</th>
<th>Period</th>
<th>Topic</th>
<th>Text Reading (page #s)</th>
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<tbody>
<tr>
<td>Aug 24</td>
<td>SM1</td>
<td>Introduction and course overview &amp; Unity and diversity of cells; definition of cancer</td>
<td>8-14; 35-42; 1205-13; 1224-5</td>
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<tr>
<td>Aug 26</td>
<td>SM2</td>
<td>Chemical composition of cells</td>
<td>45-48</td>
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<td>Aug 28</td>
<td>SM3</td>
<td>Chemical bonds, Part I</td>
<td>48-49; 53-54; 44-45</td>
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<td>Aug 31</td>
<td>SM4</td>
<td>Chemical Bonds, Part II</td>
<td>106 (panel 2-1)</td>
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<td>Sep 2</td>
<td>SM5</td>
<td>Molecules found in cells, Part I</td>
<td>51-53</td>
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<tr>
<td>Sep 4</td>
<td>SM6</td>
<td>Molecules found in cells, Part II</td>
<td>55-65; 65; 153; 157-8</td>
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<td>Sep 7</td>
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<td>**Quiz 2 due @ noon <strong>Tuesday, September 8</strong></td>
<td>106 (panel 2-1)</td>
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<td><strong>Labor Day - NO Class</strong></td>
<td>90 (panel 2-1)</td>
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<tr>
<td>Sep 9</td>
<td>SM7</td>
<td>Amino acids, Peptide Bonds &amp; Intermolecular interactions</td>
<td>125-127; 128-129 (panel 3-1)</td>
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<tr>
<td>Sep 11</td>
<td>SM8</td>
<td>Protein structure and folding</td>
<td>130-131; 134-135; 142-151</td>
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**Quiz 3 due @ noon Monday, September 14**
Sep 14  SM9  Proteins as catalysts I
Sep 16  Catch up/review of material
Sep 18  E1  EXAM 1 (covering lectures SM1-9)
Sep 21  SM10  Proteins as catalysts II  (same as Sept. 16)

Unit 3: Macromolecular Structure and Function: Lipids and Membranes
Sep 23  SM11  Membrane composition and assembly  617-625; 626-629; 565-72; 573-76
Sep 25  SM12  Membrane proteins  629-635; 576-82
Quiz 4 due @ noon Monday September 28
Sep 28  SM13  Solute diffusion and transport across membranes  651-55; 667-69; 597-601; 611-14
Sep 30  SM14  Solute diffusion and transport across membranes  673-75
Oct 2  SM15  Transmembrane transport in disease  663; 665-67; 609-11
Quiz 5 due @ noon Monday October 5

Unit 4: Metabolism – Flow of Matter and Energy in Cells
Oct 5  SM16  Overview of cellular metabolism I  65-72; 77-83; 88-93; 51-6; 63-8; 73-8; 96-100; 101-03; 81-5
Oct 7  SM17  Overview of cellular metabolism II  (same as lecture SM16)
Quiz 6 due @ noon Monday October 19
Oct 8  **Review for Exam 2** On Thursday evening via zoom!
Oct 9  E2  EXAM 2 (covering lectures SM10-16)
Oct 12  SM18  Regulation of cellular metabolism  106-08; 87-8
Oct 14  SM19  Metabolic changes in cancer cells  -; 1098-99

Unit 5: Intracellular Compartments, Protein and Lipid Sorting
Oct 16  SDP20  Compartmentalization of cells  26-30; 695-704; 24-28; 641-49
Quiz 7 due @ noon Monday October 26
Oct 19  SDP21  Protein sorting to cellular compartments I  704-20; 649-66
Oct 21  SDP22  Protein sorting to cellular compartments II  723-45; 669-91
Oct 23  SDP23  Protein sorting to cellular compartments III  749-79; 695-722
Quiz 8 due @ noon Monday October 29
Oct 28  SDP24  Lipid and protein sorting IV  779-809; 722-50

Unit 6: Cellular Communication
Oct 25  SDP25  Principles of cell signaling  879-904; 813-831; 874-76
Quiz 9 due @ noon Monday October 30
Oct 29  **Review for Exam 3** On Thursday evening via zoom!
Oct 30  E3  EXAM 3 (covering lectures SM17-19 & SDP20-24)
Nov 2  SDP26  Membrane receptors/G-proteins  904-21; 832-49
Nov 4  SDP27  Enzyme-linked receptors  921-45; 850-67
Nov 6  SDP28  Signaling through proteolysis  946-55; 867-75

Unit 7: Cell Shape and Movement
Quiz 8 due @ noon Monday November 9
Nov 9  SDP29  Molecular dynamics of the cytoskeleton  965-91; 889-960
Nov 11  SDP30  Regulation of cytoskeletal dynamics I  992-97; 889-960
Nov 13  SDP31  Regulation of cytoskeletal dynamics II  997-1010; 889-960
Quiz 9 due @ noon Monday November 16
Nov 16  SDP32 Motor proteins  1010-25  889-960
Nov 18  SDP33 Cytoskeleton and cellular behavior  1025-50  889-960
Nov 19  **Review for Exam 4** On Thursday evening via zoom!
Nov 20  E4 EXAM 4 (covering lectures SDP25-31)
Nov 23 - 27  **Fall Recess/Thanksgiving Break – NO Classes**

Unit 8: Cellular Growth Control

<table>
<thead>
<tr>
<th>Date</th>
<th>SDP</th>
<th>Lecture</th>
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<tr>
<td>Nov 30</td>
<td>SDP34</td>
<td>Cell cycle I: An overview</td>
<td>1053-60</td>
<td>963-967</td>
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<tr>
<td>Dec 2</td>
<td>SDP35</td>
<td>Cell cycle II: Regulation</td>
<td>1060-1112</td>
<td>967-1018</td>
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<td>Dec 4</td>
<td>SDP36</td>
<td>Programmed cell death</td>
<td>1115-28</td>
<td>1021-32</td>
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<td>Dec 7</td>
<td>SDP37</td>
<td>Cellular senescence</td>
<td>292-94; 505</td>
<td>262-265; 442-444</td>
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<tr>
<td>Dec 9</td>
<td>SDP38</td>
<td>Cell biology of cancer I</td>
<td>1205-40</td>
<td>1091-1141</td>
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<tr>
<td>Dec 11</td>
<td>SDP39</td>
<td>Cell biology of cancer II</td>
<td>1241-65</td>
<td>1091-1141</td>
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Dec 16 (Wed)  E5  4:10-6:10 pm, EXAM 5 (covering lectures SDP32-39)

Last add/drop and W-drop days

**Wednesday September 9** – last add/drop day; you will have taken 2 quizzes by then.

**Monday October 19** – last course withdrawal day (with W grade); you will have taken 6 quizzes & 2 exams by then.

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 8 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. As with the quizzes, they will all be administered on Canvas. With the exception of the final exam, the exams will be administered during the regular class time. 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), in-class 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. If you achieve the following point totals for LIFE 210 you will be assured the minimum letter grade shown:

1. 495-550 (≥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.

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 emailed 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.

**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. 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, in-class questions, and lecture notes, form study groups, attend virtual office hours with the instructors and/or schedule office hours with 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](http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity)) and the Student Conduct Code ([https://resolutioncenter.colostate.edu/conduct-services/academic-integrity/](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 in-class questions (when provided) individually first (before meeting in groups) to get the maximum benefit in your exam preparation.

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](http://learning.colostate.edu/integrity/index.cfm)).