BIOLOGY 350 SYLLABUS

COURSE: Biology 350, Advanced Cell Biology, Fall 2016 (3 Units)
Lecture: MWF 12:15 – 1:10 @ Latter 1 Lab; Tues 1:30 – 5:00 PM @ Sater Hall 120

INSTRUCTOR: Dr. Mike Dorrell
Temporary Office = Trailer #6, 619-849-2962, mdorrell@pointloma.edu
Office Hours (most days): MWF 9:30 – 11:30, Wed 3 – 5.
I am in my office often. Feel free to set up a time by email to be sure I'm in, or just drop by.

PLNU mission: *To Teach ~ To Shape ~ To Send*. Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Description:
An in-depth study of the structure and function of eukaryotic cells. Topics include various aspects of subcellular structure, cytoskeleton dynamics and regulation, the mechanism of cell motility and intracellular transport cell adhesion, cellular signal transduction mechanisms, regulation of cell division and cancer. The laboratory provides exposure to important current methodologies. Lecture and lab.

My goal is that by the end of this course, you will be able to understand the mechanistic functions of the cell, which is the smallest and most fundamental unit of life. You will learn how the cell reacts and changes based on its environmental needs, and relate and apply your detailed knowledge of cell function to biological properties and medical issues that arise from problems with these cellular functions. Along the way, I hope that you will grow in your own appreciation of the creative brilliance of our God and Creator at work through evolution.

Learning outcomes; Besides these ultimate objectives, students will also be able to:

- Utilize major cell biology experimental procedures to section and stain tissues, and grow, maintain, differentiate, and stain cells in culture. (PLO #1)
- Understand the major principles of cellular life including the roles of cell membranes, cellular transport, cytoskeleton remodeling, cell signaling, and cell division and apply that knowledge to scenarios by which the cell must respond to its dynamic environment. (PLO #1)
- Comprehend, critically evaluate, and present current research from the primary literature in the topics of cell biology. (PLO #1)
- Utilize self-learning techniques to help yourself and others understand how to obtain, understand, and apply information about cell biology.
- Apply knowledge of cell properties to clinical diseases by describing how alterations in normal cell function can lead to detrimental phenotypes.

**REQUIRED TEXTS: ****Alberts et. al., Molecular Biology of the Cell, 6th Ed., (Big blue book) Garland Science, New York, 2014.

The Immortal Life of Henrietta Lacks; by Rebecca Skloot

***I realize that this is a thick and expensive textbook. However, this textbook is a great resource for Biology in general. I can tell you from experience that it will be a wonderful reference as you prepare for Graduate or Medical school, and while you are studying, or employed in, anything related to biology. Plus, after evaluating many texts, it doesn't cost much more that other text options.*

EVALUATION AND GRADING; Letter grades will be assigned at the end of the course based on your percentage of total possible points, according to the following **approximate** scale:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
NC/F	< 60%

As a general rule +/- 3% from the cutoff grades will usually be given +/- grades. For example, 87 – 90 would be a B+ and 90 – 93% would be an A-. Ultimately however, plusses and minuses (*e.g.*, B+/A-) will be determined at the instructor's discretion. A major factor in this decision will be consistent *class participation and preparation*.

Grading scale:

Laboratory grade	15%
Individual worksheets / crosswords	10%
Primary literature presentation	10%
2-page summaries	5%
Mixed group problems	7%
Group participation and contribution	8%
Midterms	30%
Final exam	15%
Total	100%

COURSE FORMAT:

Theory behind active learning:

The overall format for this class is likely to be different from most other courses that you have taken throughout your educational career. Extensive data has effectively demonstrated that students learn better by taking part in the learning process, a process called 'active learning', which provides opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues, and concerns of an academic subject." (Meyers and Jones, *Promoting active learning; strategies for the college classroom*. San Franscisco: Jossey-Bass). In addition, with the technology available today, science is becoming less and less about memorizing certain facts, and more and more about learning to think, analyze, and evaluate information scientifically. To this end, this course will incorporate several active learning techniques, a few of which are referred to as 'Jigsaw' and 'peer teaching'.

Classroom participation / Jigsaw learning / Peer teaching:
Students will be in charge of learning a portion of each unit on their own and then teaching that portion to the other members of a mixed group of students assigned different portions of the unit content. The group will work together to answer various questions and solve different problems both in and out of class.

Jigsaw / Peer teaching format:
Students will be assigned to one of 5 different groups. For each unit, different groups will be assigned portions of the content (rotating throughout the course)

General timetable within each unit:

Day 1: Introduction

- Exercise designed to initiate interest in, and thoughts about, the topic.
- Background information necessary to understand your assigned portions.

Day 2: Same group discussions and exercises

- Student discussion in groups with others assigned the same topic portion
- Come to class having completed the individual unit worksheet.
  - Submit to Canvas for grading **PRIOR** to class on that day.
  - Bring a copy for yourself to use as part of the discussion / teaching
- Discuss the assigned topic with peers who were assigned the same content
  - Revise misconceptions and clear up confusing aspects
  - Prepare / practice effective teaching of the key concepts and figures
  - Use instructor to help clarify any aspect that is unclear.

Prior to mixed group work (prior to Unit day 3):

- Submit a concise 2-page summary to Canvas **PRIOR** to the next class
- Come prepared to describe and teach your content in mixed group

Days 3 – 4: Mixed group work.

- Students will assemble in assigned mixed groups
- Students will teach each other their own assigned content (~20 minutes each)
- Throughout the group work, the professor will be helping clear up confusion

Days 5 – 8 (# of days vary slightly): Concept clarification and group problem work

- Instructor led discussions / lectures about different topics within the unit
  - Further implementation and application of the learned concepts such as how these relate to disease, normal cellular life and function, etc.
  - Clarifications of commonly misunderstood concepts
- Periodically during discussion, we will introduce a problem from the mixed group questions that you are to work on together in class with your mixed group.
- You should be working as a group some outside of class to complete the other mixed group problems. ***Note: I take group participation and evaluations very seriously so you should be sure to be pulling your own weight when questions require some time and effort outside of class to complete.***

Course Homework and Assessment Descriptions:

Worksheets:
In order to help you focus your thoughts while studying your particular assigned content, you will be given a worksheet to complete. These will be due before you meet in same groups (day 2 of the unit) so that you can bring the completed worksheet to class and use it to confer with students who were assigned the same content. Your individual worksheet is to be submitted to Canvas prior to the same groups class (**NO LATE SUBMISSIONS WILL BE ACCEPTED**). You will then work in "same group" with others assigned the same content, helping to explain important concepts and eliminate misconceptions and confusion. Please use your professor during this time (ASK QUESTIONS OF ME). If one considers the 2-page summaries, the mixed group work and participation, these worksheets really will help contribute to ~30% of your grade (at least indirectly) and thus should be taken very seriously.

2-page summaries:
There is a lot of content in this class. A big part of the success of this format is dependent on each student working hard to understand their assigned content to such a degree that he/she can adequately teach that content to other students and use their knowledge to help with the group answer problem sets. In order to help orient your thoughts into a concise package, you are required to make a 2-page summary of the main ideas and the details of the information contained in your particular content area. The 2-page summary **MUST BE 12-point font (Times New Roman), 1 ½ spaced lines, and less than 2 pages long**. You may find it difficult to adequately describe all of the pertinent information in this small a space, but this is part of the point…to force you to think about, and understand, the content in such depth that this becomes possible, thus making teaching it to others much easier. This will also help you practice to communicate the important concepts without extraneous verbage. You will print out copies of the summary for each of your mixed group members for use in teaching during mixed group work. The summary can be started at any time and is to be submitted individually, but you should use your 'same group' work to help you complete it. Submit via Canvas.

Mixed group problems
Groups of 5 or 6, with one person from each content area, will assemble and help teach each other the various content that everyone is ultimately responsible for in each unit. To help you assemble the information from each member of the group, the groups will work on, and turn in, various problem sets. These should be uploaded to Canvas by a single member of each group, with all the group members' names at the top. We will be working on some of the group problems together in class. However, some of the questions will require a effort outside of class. Be sure to work together and pull your own weight. I suggest designing a google document that everyone can add to and revise. You will be grading each other on participation and effort, and I will be taking account of that as well. **Remember that your participation is worth 8% of your grade and I reserve the right to dock points even further from the overall grades! Also, the concepts covered in these problems are very likely to appear on the exams so it is to your benefit to understand the answer to the problems and to learn from other members of your group.**

Crossword puzzle:
I will be generating crossword puzzles using key terms from the chapter. You are to complete these individually. Although I like to focus more on concepts, memorizing and understanding terms is key to Cell biology. Hopefully, this will be a 'fun' activity that will help you study and recognize terms throughout the book. While completing the puzzles, make sure you understand the terms and their importance to the topic. ***You are required to complete the Unit 1 crossword puzzle and 3 of the last 5 units. I suggest you complete them all for your benefit, but you have 2 that you can fail to turn in without penalty***.

Group participation / evaluation
As this course is largely designed based on group work, a significant portion of your overall grade (8%) will be based on your preparation, participation, and contribution to class. **There will be opportunities for students to evaluate their fellow group members for preparation, contribution to group problems, and ability to convey their content to the rest of the group.** Remember that your participation is worth 8% of your grade and I reserve the right to dock points even further from the overall grades!

Midterms and Final exam
There will be three scheduled midterms throughout the semester. These midterms will be given during the scheduled laboratory times. Tests will be a combination of multiple choice, short answer / problems, and essay. Each mid-term will mainly cover the recent material. However, since all of science is cumulative, you will still be responsible for material covered earlier in the sense that comprehension of this material may be key to answering questions on new material. The final exam will be approximately 40% new material and 60% cumulative. **You must take the final exam at the scheduled place and time.**

Primary literature presentation
During each lecture, one of the groups will be assigned to cover a primary literature article on the topic material. Your group will be presenting the article in a 30 – 45 minute, journal club-style presentation during the lab period. Although **you will not be required to write a worksheet or 2-page summary on the content of this article**, you should still come to the mixed groups prepared to participate. **Participation is key to your own learning**, and some of the group problems and content will require knowledge from the primary literature article. See the guidelines for article presentation for helpful hints, presentation formatting, and the grading rubric on this particular project.

Feedback
As you go through each unit, please let me know what concepts are clear, and which need extra clarification during the concept clarification classes. Also, I have continuously revised this course format to help make it as good as possible. However, I understand that people are different so please give me feedback throughout the course so that I can continue to make this better and optimize your learning experience. I also work very hard to give you feedback on assignments, etc. Use this to your advantage to learn and prepare for the exams.

Laboratory work
See laboratory syllabus for detailed information.

ACADEMIC HONESTY:
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. As explained in the university catalog, academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. Violations of university academic honesty include cheating, plagiarism, falsification, aiding the academic dishonesty of others, or malicious misuse of university resources. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for a) that particular assignment or examination, and/or b) the course following the procedure in the university catalog. Students may appeal also using the procedure in the university catalog. See Academic Policies for further information.

Academic accommodations:
While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.
If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

FERPA POLICY
In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by (Note: each faculty member should choose one strategy to use: distributing all grades and papers individually; requesting and filing written student permission; or assigning each student a unique class ID number not identifiable on the alphabetic roster.). Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the (undergrad/ graduate as appropriate) academic catalog.

FINAL EXAMINATION POLICY - Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. NO requests for early examinations or alternative days will be approved.

TENTATIVE COURSE SCHEDULE:

Week	Unit	Date	Topic	Textbook Reference	Homework due (due prior to class)
Week 1	Unit 1	8-28 (Tues)	Course introduction, Chapter 1, Ch. 3, Ch. 8 (review information)	Ch 1 (review), Ch. 3;Pg 149-169. Ch. 8; Pg 439-445, Ch.9; Pg 529-562	
		8-29			
		8-31			Unit 1 Crossword
Week 2	Unit 2	9-3	**No class: Labor day**		
		9-5	Unit 2 introduction	Ch. 10 – Ch. 11	Unit 1 worksheet.
		9-7	Group work (same groups)	Ch. 10 – Ch. 11	Unit 2 individual worksheet
Week 3	Unit 2	9-10	Cell membranes; mixed groups (teaching)	Ch 10 – 11 (cont.)	Unit 2 - 2-page summary
		9-12			
		9-14	Cell membranes; concept clarification		
Week 4	Unit 2	9-17	Cell membranes; concept clarification	Ch 10 – 11 (cont.)	
		9-19			
		9-21			Unit 2 crossword
Exam		**Tuesday 9-25; Lab Period**		**Exam I (covers Ch. 1, 3, 8-11)**	
Week 5	Unit 3	9-24	Intracellular trafficking; introductory activity	Ch. 12 - 13	Unit 2 mixed group problems and group participation eval.
		9-26	Group work (same groups)		Unit 3 individual worksheet
		9-28	Intracellular trafficking: Mixed group teaching		Unit 3 - 2-page summary
Week 6	Unit 3	10-1	Intracellular trafficking: Mixed group teaching	Ch. 12 - 13	
		10-3	Intracellular vesicular trafficking; concept clarification		
		10-5			
Week 7	Unit 3	10-8	Intracellular vesicular traffic; concept clarification (cont.)	Ch. 12 - 13	
		10-10			Unit 3 crossword
	Unit 4	10-12	Cell signaling; introductory activity	Ch. 15	Unit 3 mixed group problems and group participation eval.
Exam		**10-16; Lab Period**		**Exam 2 (covers Ch. 12-13)**	
Week 8	Unit 4	10-15	Cell signaling; same groups	Ch. 15	Unit 4 individual worksheet
		10-17	Cell signaling; mixed group (teaching)		Unit 4 - 2-page summary
		10-19	**No class: Fall break**		

Week	Unit	Date	Topic	Textbook Reference	
Week 9	Unit 4	10-22	Cell signaling; mixed group (teaching); cont.	Ch. 15	
		10-24	Cell signaling; concept clarification		
		10-26			
Week 10	Unit 4	10-29	Cell signaling; concept clarification (cont.)	Ch. 15	Unit 4 crossword
		10-31	Cytoskeleton / cell adhesion; intro. activity	Ch. 16, Ch. 19 (everyone read 889-896, 902-903, 1035-1038	Unit 4 Mixed group problems and eval. due
	Unit 5	11-2	Cytoskeleton and cell adhesion; (same groups)		Unit 5; individual worksheet
Week 11	Unit 5	11-5	Cytoskeleton; mixed group (teaching)	Ch. 16, Ch. 19	Unit 5; 2-page summary
		11-7			
		11-9	Cytoskeleton / cell adhesion; concept clarification		
Week 12	Unit 5	11-12	Cytoskeleton / cell adhesion; concept clarification	Ch. 16, Ch. 19	
		11-14			
	Unit 6	11-16			Unit 5 crossword
Exam	**11-20; Lab**		**Exam 3 (covers Ch. 15, 16, 19)**		
Week 13	Unit 6	11-19	Cell cycle / apoptosis / cancer introduction	Ch. 17, 18, 20	Unit 5; Mixed group problems
		11-21 11-23	**No Class; Thanksgiving break**		
Week 14	Unit 6	11-26	Cell cycle / apoptosis / cancer Same groups	17; 1053-67, 1101 – 13 Ch 18, 20; 1205 –23, 1256 - 64	Unit 6; individual worksheet
		11-28	Cell cycle / apoptosis / cancer; mixed group (teaching)		Unit 6; 2-page summary
		11-30			
Week 15	Unit 6	12-3	Cell cycle / apoptosis / cancer; Concept clarification	17; 1053-67, 1101 – 13 Ch 18, 20; 1205 –23, 1256 - 64	
		12-5			Unit 6 crossword
		12-7			Unit 6; mixed group problems (***due 12-10***)
Final exam (Wed)		**12-12**	**10:30 – 1:00; Final exam (~1/3rd covers Unit 6; ~2/3rds cumulative)**		

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