BIOLOGY 3050 SYLLABUS

COURSE: Biology 3050, Advanced Cell Biology + lab, Fall 2019 (4 Units; 3 + 1)
Lecture: MWF 12:15 – 1:10 @ RLC 102 Lab; Thurs: 7:30 - 11 AM @ Sater Hall 120

INSTRUCTOR: Dr. Mike Dorrell; Office: Rohr Science 158,
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, preparation, and effort.*

Grading scale:

Laboratory grade	10%
Individual worksheets / crosswords / 2-page summaries /mixed group problems	23%
Primary literature presentation	10%
Group participation, contribution, and discussion board posts	12%
Midterms	30%
Final exam	15%
Total	100%

COURSE FORMAT:

Theory behind the "jigsaw" format and 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 & (sometimes) 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. I have worked very hard to create these to help guide you through your reading. 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", helping explain important concepts and eliminate misconceptions and confusion. Please use your professor during this time (ASK QUESTIONS OF ME).

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 verbiage. You will provide 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 teaching – discussion board:
In addition to teaching in class, you are required to present a few of the most critical concepts and figures from your reading section via discussion board. You should present the figures using your textbook and record using Screencast-o-matic or whatever modality you find best. Then, save to YouTube and provide the link to your presentation in the discussion board. This allows us to get to some of the parts that you may not have gotten to in class and to help your fellow students review some of the more key aspects of your section. You should take advantage of this tool and be sure to watch everyone's posts and ask questions that you have. Monitor the discussion board and answer questions to the best of your ability. I will also step in and help answer questions as necessary.

Mixed group problems
Groups of 4, 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 10% of your grade, evaluated by peer evaluations and my own observations. 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 have generated crossword puzzles using key terms from the chapter. 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 individually 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. You may complete them all for your benefit, but have 2 that you can skip without penalty***.

Attendance and Group participation / evaluation
As this course is largely designed based on group work, a significant portion of your overall grade (10%) will be based on your preparation, participation, discussion board presentations, 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.** I reserve the right to dock points even further from the overall grades if I see that someone is not adequately contributing to the group teaching and group work.

Midterms and Final exam
There will be three scheduled midterms throughout the semester, given during the scheduled laboratory times. Tests will be a combination of multiple choice, short answer / problems, and essay. Each will mainly cover the recent material. However, all of science is cumulative and thus you will still be responsible for material covered earlier; comprehension of this material will likely be key to answering questions on new material. The final exam will be approximately 40% new material and 60% cumulative.

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.

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. As for the other sections, there will be a worksheet that you must complete, meant to guide you through understanding the article. Although **you will not be required to write 2-page summary on the content of this article, you should still come to the mixed groups prepared to participate, especially in the mixed group problems.** 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.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. 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. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

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.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Undergraduate Academic Catalog.

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.

TENTATIVE COURSE SCHEDULE:

Week	**Unit**	**Date**	**Topic**	**Textbook Reference**	**Homework due (due prior to class, unless otherwise noted)**
Week 1	**Unit 1**	**8-17 (S)**	Course introduction		
		8-19 (A)	Chapters 1 and 3; cell concepts and post-translational modifications	Ch 1 (review), Ch. 3;Pg 149-169.	Read and review syllabus and bring Q's
		8-21 (S)			
Week 2	**Unit 1**	**8-24 (A)**	Chapters 8 and 9; Key laboratory techniques	Ch. 8; Pg 439-445, Ch.9; Pg 529-562	Unit 1 Crossword *Henrietta Lacks Discussion board initial post due*
	Unit 2	**8-26 (A)**	Unit 2 introduction	Ch. 10 – Ch. 11	Unit 1 worksheet. ***(due Tues by midnight)*** ***(HeLa responses due)***
		8-28 (S)	Group work (same groups)	Ch. 10 – Ch. 11	Unit 2 individual worksheet
Week 3	**Unit 2**	**8-31 (S)**	Cell membranes; mixed groups (peer teaching)	Ch 10 – 11 (cont.)	Unit 2 - 2-page summary
		9-2 (S)	Cell membranes; mixed groups (peer teaching)		Posts of 2 key figures to discussion board (***by midnight on Wed)***
		9-4 (A)	Cell membranes; concept clarification 1		
Week 4	**Unit 2**	**9-7 (S)**	Cell membranes; concept clarification 2	Ch 10 – 11 (cont.)	
		9-9 (S)	Cell membranes; concept clarification 3		Unit 2 crossword (due by midnight)
		9-11 (A)	Cell membranes; concept clarification 4		Unit 2 mixed group problems and group participation eval.
Week 5	**Unit 3**	**9-14 (A)**	**Exam 1: Units 1 and 2**	Ch. 12 - 13	
		9-16 (A)	Unit 3; Introduction; Intracellular trafficking		
		9-18 (S)	Group work (same groups)		Unit 3 individual worksheet
Week 6	**Unit 3**	**9-21 (S)**	Intracellular trafficking: Mixed group teaching (day 1)	Ch. 12 - 13	Unit 3 - 2-page summary
		9-23 (S)	Intracellular trafficking: Mixed group teaching (day 2)		Posts of 2 key figures to discussion board (***by midnight on Wed)***
		9-25 (A)	Intracellular trafficking; concept clarification 1		

Week	**Unit**	**Date**	**Topic**	**Textbook Reference**	**Homework due (prior to class unless otherwise noted)**
Week 7	**Unit 3**	**9-28 (S)**	Intracellular trafficking; concept clarification 2	Ch. 12 - 13	
		9-30 (S)	Intracellular trafficking; concept clarification 3		Unit 3 - crossword
		10-2 (A)	Intracellular trafficking; concept clarification 4		Unit 3 mixed group problems and peer evaluation
Week 8	**Unit 4**	**10-5 (A)**	**Exam #2: Unit 3**	Ch. 15	
		10-7 (A)	Unit 4; Introduction to Cell signaling		
		10-9 (S)	Unit 4: Cell Signaling [Concept clarification only]		Henrietta Lacks 2 discussion board initial post due (responses due Wed the 14th)
Week 9	**Unit 4**	**10-12 (A)**	Unit 4: Cell Signaling [Concept clarification only]	Ch. 16 and 19	
		10-14 (S)	Unit 4: Cell Signaling [Concept clarification only]		Discussion board - signaling cascade (present assigned
		10-16 (A)	Unit 4: Cell Signaling [Concept clarification only]		Unit 4 Crossword (***due Fri***) Unit 4 – mixed group problems (***due Tues by midnt***)
Week 10	**Unit 5**	**10-19 (A)**	Unit 5; Cytoskeleton / cell adhesion; intro. activity	Ch. 16 and 19	
		10-21 (S)	Cytoskeleton and cell adhesion; (same groups)		Unit 5; individual worksheet
		10-23 (S)	Cytoskeleton / cell adhesion; mixed group (teaching)		Unit 5; 2-page summary
Week 11	**Unit 5**	**10-26 (S)**	Cytoskeleton / cell adhesion; mixed group (teaching)	Ch. 16, Ch. 19	Discussion board posts of 2 key figures ***(Due midnight)***
		10-28 (S)	Cytoskeleton / cell adhesion; concept clarification 1		
		10-30 (A)	Cytoskeleton / cell adhesion; concept clarification 2		
Week 12	**Unit 5**	**11-2 (S)**	Cytoskeleton / cell adhesion; concept clarification 3	Ch. 16, Ch. 19	Unit 5 crossword (***due midnight***)
		11-4 (A)	Cytoskeleton / cell adhesion; concept clarification 4		Unit 5 mixed group problems and peer evaluation
		11-6 (A)	**Exam #3; Units 4 - 5**		

Week	**Unit**	**Date**	**Topic**	**Textbook Reference**	**Homework due (prior to class unless otherwise noted)**
Week 13	**Unit 6**	**11-9 (A)**	Unit 6 introduction: Cell cycle, cancer, and apoptosis	Parts of Ch. 17, Ch. 18, and parts of Ch. 20	
		11-11 (S)	Unit 6: Same groups		Unit 6 individual worksheets
		11-13 (S)	Unit 6: Mixed groups 1		2-page summary Unit 6 discussion board – 2 key figures explained ***(due by midnight on Saturday)***
Week 14	**Unit 6**	**11-16 (S)**	Unit 6 concept clarification 1	Parts of Ch. 17, Ch. 18, and parts of Ch. 20	Henrietta Lacks discussion board – initial post due
		11-18 (A)	Unit 6 concept clarification 2		HeLa discussion responses due
		11-20 (S)	Unit 6 concept clarification 3		Unit 6 crossword ***(by midnight)***
Week 15	**Unit 6**	**11-23 (A)**	Unit 6 concept clarification 4		Mixed group problems and peer evaluations (***by midnight***)
		11-25	**No class (Happy Thanksgiving!**		
		11-27			
Final exam		**11-30; Mon**	**10:30 – 1:00; Final exam (~1/3rd covers Unit 6; ~2/3rds cumulative)**		

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.