Course Syllabus – BIOL 430

Course Information

Course Number: BIOL 430 WI21
Course Name: Cell Biology
Term: WI 2021
Start Date: 01/04/2021
End Date: 03/26/2021
Credits: 3.0

Meeting Days / Times

Mondays and Wednesdays, 9:45-11:15am PT / 12:45-2:15pm ET
(See Calendar in Canvas for the most up-to-date schedule.)

Location

Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Instructor	Grotjahn	Danielle	grotjahn@scripps.edu
Instructor	Huang	Mia	miahuang@scripps.edu
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Course Description

This is a hybrid lecture/literature based course that exposes students to important concepts and emerging issues related to cell biology. Cells are the fundamental unit of life; thus it follows that an appreciation for the underlying principles and complexities of the living cell is essential for any biomedical researcher. In particular, cell biology is the study of molecules, structural assemblies, and organelles in the context of the whole cell. The class will be presented with specific weekly topics that cover critical or emerging aspects of cell biology. Each weekly topic will be presented on Mondays by expert faculty to provide context for the students to understand critical aspects of cellular function highlighted below. Wednesday classes will involve student-led discussion on recent literature related to the weekly topic. Students will be

asked to identify and discuss the strengths and weaknesses of papers discussed in the class, and to propose 'next experiments' that arise from the work and the experimental means to address them. Written assignments will include the 'strengths/weaknesses' and the 'next experiments' for each paper discussed in class. Furthermore, students will take a final exam that covers the basics from each of the weekly topics as discussed in the faculty lectures.

Broad Objectives:
1) Students will gain an appreciation of exciting areas and emerging issues in cell biology research and the methods used to pursue them.
2) Students will learn how to critically and constructively read and review a paper.
3) Students will learn how new research projects emerge from existing literature.
4) Students will learn how to present critiques of papers from the primary literature, both orally and in writing.

Program Learning Outcomes

By the end of the program, students will have accomplished these objectives:
PLO1: Original Research – graduate students are expected to develop the skills critical for generating high-quality research output. This would include absorbing, recalling, and contextualizing scientific knowledge, evaluating scientific information and data, creating testable hypotheses and investigating hypotheses, mastering scientific tools and techniques, displaying ethical behavior, and receiving and giving feedback.
PLO2: Communication – graduate students are expected to demonstrate the oral, written, and media skills to effectively communicate the impact of a study or a body of work to the greater scientific community and to the public at large using a number of methods.
PLO3: Critical Thinking – graduate students are expected to develop a self-directed process to analyze information, form opinions or judgments, and use this process to improve the quality of their scientific thoughts, navigate problems, and make informed decisions.
PLO4: Intellectual Curiosity – graduate students are expected to acquire the capacity to build their intellectual curiosity and demonstrate problem solving approaches that serve their professional growth and ability to impact a field.
PLO5: Career and Professional Development – graduate students are expected to develop a variety of transferable skillsets throughout their graduate experience, including management and leadership, inclusiveness, resilience, scientific rigor, collaboration, accountability, time management, teamwork, networking, and career planning.

Course Learning Outcomes

Upon completion of this course students will be able to:
CLO1: Establish a basic understanding of current emerging scientific fields pertaining to cell biology and to be able to critically evaluate the literature related to that field.
CLO2: Understand the strengths and limitations of various experimental approaches for studying cell structure and function.
CLO3: Judge when the stated scientific conclusions derived from original experimental data are

justified, and when they are not justified.
CLO4: Devise alternative scientific approaches to allow more robust conclusions on specific cell biological questions.
CLO5: Identify and formulate important new questions that are inspired by specific scientific results, and design experiments to answer these questions.
CLO6: Develop and present succinct oral presentations describing the background of specific cell biology papers and their relationship to other work in the field.

Background Preparation (Prerequisites)

Most students will have taken a Cell Biology course (or the equivalent) as an undergraduate, but this is not required. Nonetheless, these students will find it helpful to read relevant background material for each class from the Molecular Biology of the Cell textbook (Alberts et al, 6th edition) as a refresher.

Course Materials

One recent original research paper in the relevant area of cell biology will be provided for each Wednesday class and will be the basis for the class discussion.

Useful to Consult: Alberts et al (2014). Molecular Biology of the Cell. ISBN: 978-0815344322

Expectations and Logistics

Class Preparation: Every student in the class will be responsible for reading the day's discussion paper prior to class. Every student should be prepared to discuss each figure. Each student must also submit a written "next experiments" document upon arrival to class (see below). Scripps Florida students should send their "next experiments" to one of the TAs by email *prior to the start of class, by 9am PT / 12pm ET, so that the TAs can print it out for the faculty*. **If not received prior to the start of class, the assignment will be considered missing and a zero score will be received for that assignment**. A short review(s) related to the topic of the discussion paper will be provided for most papers on the reading list. More basic background may be obtained by reading relevant sections of the textbook, *Molecular Biology of the Cell* (Alberts et al., 6th edition).

Strengths/Weaknesses and Next Experiments: For every Wednesday class, students will submit a written document describing the strengths/weaknesses of the manuscript and two "next experiments" that are suggested by the paper of the day. These will be graded by the faculty discussant for that class, and the composite scores from these assignments (for a total of 15 classes) will comprise this portion of the course grade. *No late submission of these "next experiments" will be allowed, except under extenuating circumstances approved, in advance, by the course director (see grading).* If you do not submit the "next experiments" page for a particular class, your grade will be diminished by 1/11th.

First Two Classes of the Course: The goal of these first two classes is 1) to provide an introduction to the field of cell biology and to define the expectations of the course, and 2) to provide a clear sense of the class format by providing a guided template of a paper discussion class. The first class will be didactic, taught by the course director, and the second class will be a model paper discussion presented by the two TAs. A discussion paper will be assigned for the model paper discussion class (to be read by all class members beforehand), but our two student TAs (instead of class members) will perform the job of the student team. *However, all students will still be required to submit their "next experiments" assessment at the beginning of class*.

Selection of Papers/Student Teams: The discussion paper for each class (together with a related short review) will be posted on the cell biology course website. Student teams and assigned papers will be determined in the first class. Everyone will have the chance to present ~1 time, depending on enrollment.

1) Class Paper Discussions: All students, not just the presenters, will be responsible for reading the Wednesday discussion paper prior to class and should be prepared to discuss each figure and the strengths and weaknesses of the paper. Strengths might be important new insights emerging from the results, new methodologies and/or innovative application of existing methodologies, an innovative approach to addressing the question, the importance of the question being addressed, the integration of current and existing results to present a new model, etc. Weaknesses might be mis- or over-interpretation of presented data, lacking control experiments, or sub-optimal choice of methodology. Note that a substantial portion of your grade will be based on class discussion and a demonstration that you a) have read and attempted to understand the paper, b) thought about the implications of the results and next experiments, and c) can articulate your thoughts on the paper's experiments and results.

2) Student Paper Discussion Team Presentations: Student teams (2 students each) will be responsible for leading the paper discussion for ~1 class (depending on enrollment numbers). Each team will prepare a short PowerPoint presentation for the class. These presentations will be prepared with advice from the assigned faculty mentor. Each student team should plan to meet with the faculty mentor approximately two weeks prior to the assigned presentation date to discuss the paper and prepare the presentation. Subsequent meetings will be defined by the faculty mentor and the students. The students' presentation will include an introduction to the manuscript including previous work, the key figures related to the manuscript, and discussion of the primary conclusions from the manuscript. The student team will lead the class discussion, eliciting comments from all members of the class to evaluate the data, its interpretation, the experimental approaches, validity of conclusions, etc.

3) Written "Strengths/Weaknesses" and "Next Experiments" due at each Wednesday class: Each student will submit a written document describing the strengths/weaknesses of the manuscript and one "next experiment" suggested by the paper of the day. Each next experiment should produce an amount of data that would be expected to fit into one manuscript figure. The short description of each "next experiment" should include: a) a rationale for doing the experiment, b) a brief description of the experiment, including

experimental methods, and c) the expected outcome(s) and reasons why they are expected. The description of the "next experiment" should be short so that together, the text for the "next experiment" is about half a page of single-spaced printed text (11-point Arial font). Concise, focused descriptions that cover the points above will be rewarded. Inclusion of a diagram may be helpful but is not required.

4) Final Exam: A final, in-class exam will be given on the last day of the course. The questions from this exam will be derived from the faculty lectures given on the Monday of each week.

Class Format

Classes are Monday and Wednesdays at 9:45-11:15am PT / 12:45-2:15pm ET. There will NOT be a class on Monday, January 18th (Martin Luther King Jr. Day) or Monday, February 15th (President's Day). This classes will be moved to Wednesday/Friday of that week, as indicated. The exam will be administered in class and will include questions related to the topics discussed in the course.

At the beginning of the Wednesday discussion, one member of each student team will give an introduction (approximately 10-20 minutes, PowerPoint format) to provide the specific background material for the discussion paper and frame the problem being studied (i.e., the preceding experiments leading to this particular study and the relevance of this problem to the cell biology topic of the week). Next, the student team will project slides of selected figures or parts of figures from the paper and lead the class discussion. All students should be prepared to actively contribute to this approximately 60 minute discussion, including identifying the main strengths and weaknesses of the experiments. After the figures have been discussed, the second member of the student team will make a short (approximately 10 minutes) presentation of the conclusions, in which the overall conclusion, approaches used, and conflicting conclusions from other studies will be presented. Class TAs will serve as the student team members for the model paper discussion class so that students will have an example of the format.

Cell Biology Seminars

Scripps Research has a "Molecular Medicine Seminar Series." This is a major monthly seminar series on campus bringing eminent national and international scientists who speak about diverse Cell Biology topics. These seminars provide the very latest and most exciting developments in Cell Biology, many of which are still unpublished. Seminars are held on the 2nd and/or 4th Wednesday of the month at 1pm PT (4pm ET) (unless otherwise listed). All seminars will be available to both the CA and FL campuses via teleconferencing. Attendance is strongly recommended and will be encouraged in class.

Attendance Statement

Students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from the course director or teaching assistant. Unapproved absences or late attendance for three or more classes may result in a lower grade or an "incomplete" for the course. If a student has to miss a class, he or she should arrange to get notes from a fellow student and is strongly encouraged to meet with the teaching assistant to obtain the missed material.

Attendance is mandatory and a portion of the grade is based upon class participation. Unjustified class absence will be appropriately factored into the grade representing "participation in class discussions."

The "next experiments" must be submitted prior to the presentation of the paper to which they pertain. No late submission will be allowed, except under extenuating circumstances approved in advance by the course director. If a student does not submit the “next experiments” page for a particular class, the points for that portion of the material will be lost.

All students will be required to make the designated number of PowerPoint presentations (~1 depending on enrollment).

Scientific and Professional Ethics

The work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and authors you read. If you ever have questions about drawing the line between others' work and your own, ask the course professor who will give you clear guidance. Exams must be completed independently. Any collaboration on answers to exams, unless expressly permitted, may result in an automatic failing grade and possible expulsion from the Graduate Program.

Technology Requirements and Support

For issues related to Canvas, please contact the Graduate Office by email at: gradprgm@scripps.edu or by phone at: 858-784-8469.

Course Grading

Grading is in accordance with the academic policies of the Skaggs Graduate School. The breakdown of grading is as follows:

- Participation: 25%
- Presentations: 25%
- Next Experiments: 25%
- Final Exam: 25%

Letter Grade	Percent	GPA	Description
A	93-100	4.00	Outstanding achievement. Student performance demonstrates full command of the course subject matter and evinces a high level of originality and/or creativity that far surpasses course expectations.
A-	90-92	3.67	Excellent achievement. Student performance demonstrates thorough knowledge of the course subject matter and exceeds course expectations by completing all requirements in a superior manner.
B+	87-89	3.33	Very good work. Student performance demonstrates above-average comprehension of the course subject matter and exceeds course expectations on all tasks as defined in the course syllabus. There is notable insight and originality.
B	83-86	3.00	Satisfactory work. Student performance meets designated course expectations and demonstrates understanding of the course subject matter at an acceptable level.
B-	80-82	2.67	Marginal work. Student performance demonstrates incomplete understanding of course subject matter. There is limited perception and originality.
C+	77-79	2.33	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
C	73-76	2.00	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
P	73-100	0.00	Satisfactory work. Student performance demonstrated complete and adequate understanding of course subject matter. Course will count toward degree.
F	0-72	0.00	Unacceptable work/Failure. Student performance is unacceptably low level of knowledge and understanding of course subject matter. Course will not count toward degree. Student may continue in program only with permission of the Dean.

I	0.00	Incomplete is assigned when work is of passing quality but is incomplete for a pre-approved reason. Once an incomplete grade is assigned, it remains on student's permanent record until a grade is awarded.
W	0.00	Withdrew from the course with Dean's permission beyond the second week of the term.

- All courses will be recorded and maintained in the student's permanent academic record; only courses that apply towards the degree will appear on the academic transcript. Non-credit or audited courses will not appear on the transcript.
- 4 core courses taken for a letter grade (pass = B- or higher for a core course)
- 2 elective courses taken pass/fail (pass = A, B, C for an elective)

Course Schedule:

Date	Details
Wed Jan 6, 2021	Posttranslational Modification/Glycocalyx (Huang)
Fri Jan 8, 2021	Manuscript Discussion (Huang)
Mon Jan 11, 2021	Systemic Homeostasis (Droujinine)
Wed Jan 13, 2021	Manuscript Discussion (Droujinine)
Mon Jan 18, 2021	No Class (Martin Luther King Jr. Day)
Wed Jan 20, 2021	Stress Signaling/Redox Regulation (Bollong)
Fri Jan 22, 2021	Manuscript Discussion (Bollong)
Mon Jan 25, 2021	Neuronal Cell Biology (Lippi)
Wed Jan 27, 2021	Manuscript Discussion (Lippi)
Mon Feb 1, 2021	Organelle Dynamics (Grotjahn)
Wed Feb 3, 2021	Manuscript Discussion (Grotjahn)
Mon Feb 8, 2021	Organellar Interactions (Bao)
Wed Feb 10, 2021	Manuscript Discussion (Bao)
Mon Feb 15, 2021	No Class (President's Day)
Wed Feb 17, 2021	Cancer Biology (Janiszewska)
Fri Feb 19, 2021	Manuscript Discussion (Janiszewska)
Mon Feb 22, 2021	Bacteria/Membrane-less Organelles (Racki)
Wed Feb 24, 2021	Manuscript Discussion (Racki)
Mon Mar 1, 2021	Nuclear Envelope (Gerace)
Wed Mar 3, 2021	Manuscript Discussion (Gerace)
Mon Mar 8, 2021	Differentiation (Lairson)
Wed Mar 10, 2021	Manuscript Discussion (Lairson)
Mon Mar 15, 2021	Immunology (Solt)
Wed Mar 17, 2021	Manuscript Discussion (Solt)