Course Syllabus – BIOL 430

Course Information

Course Number: BIOL 430 WI23
Course Name: Cell Biology
Term: WI 2023
Start Date: 01/03/2023
End Date: 03/24/2023
Credits: 3.0

Meeting Days / Times

Tuesdays and Thursdays, 10:00-11:30am PT / 1:00-2:30pm ET
(See Calendar on Canvas for the most up-to-date schedule.)

Location

CA: Graduate Dining Room (Hazen Theory Building)
FL: C212
Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Course Director	Grotjahn	Danielle	grotjahn@scripps.edu
Course Director	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. 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 (see Class Lecture Schedule below). Each weekly topic will be presented on Tuesday by expert faculty to provide

context for the students to understand critical aspects of cellular function highlighted below. Thursday 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.

Text and Journal Reading Assignments

Required reading: One recent original research paper in the relevant area of cell biology will be provided for each Thursday class and will be the basis for the class discussion. The required reading list will be posted on the Canvas page.

Recommended Reading: One short, topical review to accompany each research paper will also be provided and posted on the website.

Useful to Consult: *Molecular Biology of the Cell* (Alberts et al, 6th Edition). Copies are available in the grad office and library for anyone who needs to reference them. *For students unfamiliar with cell biology methods, these are described in Chapters 8 and 9 of Alberts et al. Many of these methods will be integral to the course material.* In addition, chapters from this textbook have been suggested for the main topic of each class period. We recommend that you read this background, especially if you are new to Cell Biology.

Cell Biology Seminars

TSRI 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 Thursday of the month at 1 PM PST (4 PM EST). Attendance is strongly recommended and will be encouraged in class.

Course Requirements & Assignments

1) Class Paper Discussions: All students, not just the presenters, will be responsible for reading the Thursday 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, 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 meeting with the faculty mentor ~2 weeks prior to the assigned presentation date to discuss the paper and to 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 Thursday class: Each student will submit a written document on Canvas describing the "Strengths/Weaknesses" of the manuscript and one "Next Experiment" suggested for the assigned paper. This is due **before** the respective student-led discussion. The "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 ½ page of single-spaced printed text (11 point, Arial). 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 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 Tuesday of each week.

Expectations and Logistics

1) Student Paper Discussion Teams: The class will be divided into teams of two students each, who will present papers on specific weekly topics. These teams will rotate over the duration of the course, such that every team will lead at least 1 discussion. *The student team assigned to each paper will meet with the relevant faculty discussant as a team at least 1-2 weeks before the paper is presented* to get help and suggestions in identifying and understanding the literature that will be used to prepare the "Introduction" and the "Conclusions", and to select the key figures or parts of figures to present for class discussion. It is critical that students contact the faculty moderator early in the course to coordinate schedules as faculty can have busy travel schedules. The student teams will prepare the PowerPoint slides of the Introduction, Figures, and Conclusions for each class (see below), and should plan to send their PowerPoint presentation to the faculty discussant at a prearranged time before their presentation (at least 3 days), so the faculty can give them feedback for modifying it, if necessary.

2) Class Format: At the beginning of the Thursday discussion, one member of each student team will give an Introduction (~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 ~60 min 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 (~10 min) presentation of the Conclusions, in which the overall conclusion, approaches used, and conflicting conclusions from other studies will be presented. Enrollent permitting, 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 (see below).

3) 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. **If the "Next Experiment" assignment is 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 Thursday class, students will submit a written document describing the strengths/weaknesses of the manuscript and one "Next Experiment" for the paper of the day (see above for details). 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.

4) 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, enrollment permitting. 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.*

5) Selection of Papers/Student Teams: The discussion paper for each class (together with a related short review) will be posted on the Canvas page by **December 15, 2022**. Student teams and assigned papers will be determined in the first class. Everyone will have the chance to present ~1 time, depending on enrollment.

Class Format and Schedule

Classes are Tuesdays and Thursdays at 10:00-11:30am PT / 1:00-2:30pm ET in person with the potential for hybrid attendance (Dining Room in CA and Room C212 in FL). The exam will be administered on **March 23, 2023** and will include questions related to the topics discussed in the course.

At the beginning of the Thursday 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.

Attendance

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 Experiment" 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).

Course Grading

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

25%: **Written text for "Strengths/Weaknesses" and "Next Experiments", for each class discussion paper.**

Learning Purpose: Supports points 1, 2, 3, 4, 5 of learning outcomes, and allows assessment of mastery of course material**.**

25%: **Participation in class discussions of each paper**.

Learning Purpose: Supports points 1, 2, 3, 4, 5 of learning outcomes, involves active learning, and allows assessment of mastery of course material.

25%: **Short PowerPoint presentations for each Discussion Paper (Student Teams):** Each student will make 1 or 2 presentations during the course as described.

Learning Purpose: Supports points 1-6 of learning outcomes, involves active learning and allows assessment of mastery of course material.

25%: **Final Exam**

Learning Purpose: Supports points 1 of learning outcomes, demonstrating a clear understanding of emerging topics in cell biology and the capacity to apply these concepts to address important scientific questions.

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)

Scientific and Professional Ethics

The work you do in this course must be your own. You must be aware when you are building on someone else's ideas, including ideas of classmates, professors, and authors you read. You must explicitly acknowledge the ideas of others. 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. The course instructors will address all questions concerning the line between others' work and the student's own work.

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 Summary:

Date	Details
Mon Jan 2, 2023	No Class (New Year's Day day off)
Tue Jan 3, 2023	Cell Biology (Organelle Dynamics (Danielle Grotjahn – CA))
Thu Jan 5, 2023	Cell Biology (Manuscript Discussion - Grotjahn)
	Next Experiment 1
Tue Jan 10, 2023	Cell Biology | Proteostasis (Luke Wiseman - CA)
Thu Jan 12, 2023	Cell Biology | Proteostasis | Manuscript Discussion (Luke Wiseman - CA)
	Next Experiment 2
Mon Jan 16, 2023	No Class (Martin Luther King Jr. Day)
Tue Jan 17, 2023	Cell Biology | Stress Signaling and Redox Regulation (Michael Bollong – CA)
Thu Jan 19, 2023	Cell Biology (Manuscript Discussion - Bollong)
	Next Experiment 3
Tue Jan 24, 2023	Cell Biology | – Endolysosomal Trafficking in Neuronal Function and Neurodegeneration (Sandra Encalada – CA)
Thu Jan 26, 2023	Cell Biology (Manuscript Discussion - Encalada)
	Next Experiment 4
Tue Jan 31, 2023	Cell Biology | Surfaceome & Glycocalyx (Mia Huang – CA)
Thu Feb 2, 2023	Cell Biology (Manuscript Discussion - Huang)
	Next Experiment 5
Tue Feb 7, 2023	Cell Biology | Cellular Differentiation (Luke Lairson – CA)
Thu Feb 9, 2023	Cell Biology (Manuscript Discussion - Lairson)
	Next Experiment 6
Tue Feb 14, 2023	Cell Biology | Cancer Cell Biology (Michalina Janiszewska – FL)
Thu Feb 16, 2023	Cell Biology (Manuscript Discussion - Janiszewska)
	Next Experiment 7
Mon Feb 20, 2023	No Class (President's Day)
Tue Feb 21, 2023	Cell Biology (Neuronal Cell Biology - Lippi)
Thu Feb 23, 2023	Cell Biology (Manuscript Discussion - Lippi)
	Next Experiment 8
Tue Feb 28, 2023	Cell Biology (Immune Cell Biology - Solt)
Thu Mar 2, 2023	Cell Biology (Manuscript Discussion - Solt)
	Next Experiment 9
Tue Mar 7, 2023	Cell Biology | Cell Biology of Ozanimod (Hugh Rosen – CA)
Thu Mar 9, 2023	Cell Biology (Manuscript Discussion - Lairson)
	Next Experiment 10
Tue Mar 14, 2023	Cell Biology (Systemic Homeostasis - Drouijinine)
Thu Mar 16, 2023	Cell Biology (Manuscript Discussion- Droujinine)
	Next Experiment 11
Tue Mar 21, 2023	Cell Biology
Thu Mar 23, 2023	Cell Biology
	Final Exam