Course Syllabus – BIOL 540

Course Information

Course Number: BIOL 540 SP24
Course Name: Signal Transduction
Term: SP 2024
Start Date: 04/01/2024
End Date: 06/21/2024
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.)

Locations

CA: Graduate Office Dining Room (Hazen Theory Building)
FL: A116

Course Managers

Role	Last Name	First Name	Email Address
Course Director	Solt	Laura	lsolt@scripps.edu ; lsolt1@ufl.edu
TA	Kutseikin	Sergei	skutseikin@scripps.edu
TA	Schell	Bin-Bin	aschell@scripps.edu

Course Description

Our everyday jobs depend on communication among diverse constituents. Likewise, in the body, various internal or external signals, via stepwise coordination, regulate essential functions in cells such as division, growth, metabolism, immunity, and even death. Signal transduction is evolutionarily developed to maintain cellular homeostasis. Accordingly, aberrations in signal transduction disrupt the homeostasis and lead to various diseases such as cancer, diabetes, obesity and neurodegeneration. Thus, signaling pathways are being extensively targeted for disease therapy. Knowledge of the mechanism and regulation of signal transduction pathways is necessary.

The objective of this course is to provide an in-depth knowledge of the physiological functions and aberrations of disease-related signaling pathways. Therefore, each lecture will discuss the fundamentals of the specific signaling pathway and its implications in respective diseases. Additional topics that have been covered in conventional courses will be also optimally discussed to demonstrate their disease linkage, including the neuroendocrine system, hormones and neurotransmitters.

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.

For a detailed description of each outcome and specific success indicators, please refer to this web page: https://education.scripps.edu/graduate/doctoral-program/.

Course Learning Outcomes

Upon completion of this course students will be able to:
CLO1: Understand the basic concepts of signal transduction.
CLO2: Appreciate the impact of signal transduction on physiology and pathology.
CLO3: Establish a basic understanding of emerging scientific fields relevant to signal transduction to be able to critically evaluate the literature related to that field.
CLO4: Understand the strengths and limitations of various experimental approaches for studying signal transduction.
CLO5: Acquire knowledge of animal models, cell culture and molecular techniques used to study various signaling processes in healthy and diseased states. Manuscript discussion lectures will be designed to meet these criteria.

CLO6: Identify specific experimental results; formulate them into important new questions; Design experiments to answer these questions and devise alternative approaches to reach a definitive conclusion.
CLO7: Develop succinct presentation skills; describe the background, questions addressed, approach, conclusions, as well as strengths and weaknesses of scientific papers.

Background Preparation (Prerequisites)

Prior courses on a cell, molecular biology or biochemistry are recommended but not required. Students would find helpful to read relevant material before the class.

Course Materials

Required reading will be selected from current journal articles to exemplify the subject of each lecture.

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.

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:

- Contributions to discussions, written papers, and attendance**:** 35%
  - Class attendance: 5%
  - Journal club discussions: 10%
  - Journal club assignments: 20%
- Take-Home Midterm Exam Based on the First 6 Lecturers**:** 30%
- Take-Home Final Exam Based on the 7 Lecturers Following the Midterm**:** 35%

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 Summary

Date	Details
Mon Apr 1, 2024	Introduction to Signal Transduction (Solt)
Wed Apr 3, 2024	Lipid Signaling (Hansen)
Mon Apr 8, 2024	Nuclear receptors in metabolic and inflammatory signaling (Solt)
Wed Apr 10, 2024	Journal Club (Hansen)
Mon Apr 15, 2024	Neuroendocrine signaling (Xu)
Wed Apr 17, 2024	Post translational regulation of signaling pathways (Huang)
Mon Apr 22, 2024	Journal Club (Huang)
Wed Apr 24, 2024	GPCR Signaling (Martemyanov)
Mon Apr 29, 2024	Cell signaling in immunity and inflammation (Solt)
	Take home exam distributed
Wed May 1, 2024	No Class - Work on Take-Home Midterm Exam
Mon May 6, 2024	Journal Club (Solt)
Wed May 8, 2024	Integration of signaling through the epigenetic landscape of chromatin (Janiszewska)
Mon May 13, 2024	Introduction to Molecular Circadian Rhythms (Lamia)
Wed May 15, 2024	Signal transduction pathways that regulate energy metabolism (Saez)
Fri May 17, 2024	Commencement
Mon May 20, 2024	Journal Club (Janiszewska)
Wed May 22, 2024	The unfolded protein response (Wiseman)
	The unfolded protein response
Mon May 27, 2024	No Class (Memorial Day)
Wed May 29, 2024	Journal Club (Wiseman)
Mon Jun 3, 2024	Small G protein regulated signaling (TBD)
Wed Jun 5, 2024	Signaling in Aging (TBD)
Mon Jun 10, 2024	Journal Club (TBD)
Wed Jun 12, 2024	Bioinformatics of signaling pathways (Wu)
	Take home exam distributed
	Final Exam
Mon Jun 17, 2024	Take home exam due
Wed Jun 19, 2024	No Class (Juneteenth)