

BIO 406/506 SIGNAL TRANSDUCTION

This course is intended to focus on the basic concepts of how cells communicate with each other and how signals are transmitted within a cell in response to a stimulus to the cell. Students who successfully complete this course should be able to describe how cells generate responses when stimulated, understand how these signals are regulated, and characterize why different types of stimulus result in unique responses and how that affects cellular reactions.

Time and Location: T,Th 11:00-12:20 PM
127A Cooke Hall

Instructors: Dr. Kathryn Medler	Dr. Paul Cullen
C619 Cooke Hall	C341 Cooke Hall
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Office Hours: Office appointments are intended to clarify lecture material, NOT to review entire lecture contents. Questions about specific lecture material need to be directed to the presenting lecturer. If you need to make an appointment, please send an email to the instructor.

Dr. Medler	M 10-12pm
Dr. Cullen	F 2-5pm

Textbook: Cellular Signal Processing by Marks et al; ISBN: 978-0-8153-4215-1

Grading: Letter grades will be determined from 400 total points. No extra credit will be given. Any assignment of +/- or curving of grades will be at the discretion of the instructors and will be made at the end of the semester. No decision will be made until final grades are assessed.

Grading scale: >360=A range, 320-359=B range, 280-319=C range, 240-279=D range, <239=F

Four exams (in class), 100 points each, 400 points total

An optional comprehensive final exam will be offered during finals week which can be used to replace the lowest test grade or a missed test from earlier exams.

Makeup policy: Makeups may only be scheduled for medical reasons. To schedule a makeup exam, the student must submit a signed doctor's note within 24 hours explaining why the student couldn't attend the exam at the correct time. The note must include the doctor's name and phone number for verification. Makeup exams will be all short answer/essay questions and must be taken before exam keys are posted and exams are returned. Otherwise, any missed exams will count as a 0 towards the final grade. There will be NO MAKE UPS for the final exam.

It is each student's responsibility to obtain lecture notes and learn the material covered. Similarly, each student is responsible for any announcement given in class - 'Not being in class' is not an excuse.

This course follows UB's Academic Integrity Policy. Students that need accommodations for disabilities must register with the Accessibility Resources Office and inform the instructors at least two weeks prior to an exam.

Course Outline

Date	Topic	Lecturer	Readings
8/29	Introduction to cell signaling	Medler	Ch 1 & Ch 2 (p 44-55)
8/31	Receptors	Medler	Ch 2 (p 64-74), Ch 5 (p 183-204) & Ch 14 (p 477-492)
9/5	G protein coupled receptors & heterotrimeric G proteins	Medler	Ch 4 (p 129-140) Ch 5 (p 204-216)
9/7	G proteins (monomeric) & Effector enzymes-Cyclase pathways	Medler	Ch 4 (p 141-143, 168-170) Ch 10 (p 353-364) Ch 14 (p 508-510)
9/12	Effector enzymes-Cyclase & Phospholipase pathways	Medler	Ch 4 (p 150-152, 166-168, 170-171)
9/14	Calcium signaling	Medler	Ch 14 (p 492-527) Ch 15 (p 546-553)
9/19	Journal club meeting	Medler	Grads only
9/21	EXAM 1	Medler	
9/26	Ser/Thr kinase receptors	Cullen	Ch 6 (p 219-225)
9/28	Receptor tyrosine kinases and growth factors	Cullen	Ch 7 (p 239-258), Ch 10 (p 361); outside reading
10/3	Signaling pathways operated by RTKs	Cullen	Ch 10 (p 353-358)
10/5	RTK regulation of gene expression	Cullen	Ch 8 (p 283-295, 313-314)
10/10	Non-receptor protein tyrosine kinases	Cullen	Ch 7 (p 258-264), Ch 6 (p 237)
10/12	Downregulation mechanisms of RTKs	Cullen	Ch 2 (p 57-62) Ch 7 (p 274-279)
10/17	Journal club meeting	Cullen	Grads only
10/19	EXAM 2	Cullen	
10/24	Effector enzymes -Phosphodiesterases	Medler	Ch 4 (pg 143-146), Ch 15 (pg 546-553)
10/26	Effector enzymes-Phospholipase pathways	Medler	Ch 4 (p 158-166)
10/31	Effector enzymes -Phosphoinositide 3-kinases and protein kinase B	Medler	Ch 4 (p 146-150, 175-180)
11/2	Developmental signaling pathways (Wnt) Developmental signaling pathways (Notch)	Medler	Outside readings
11/7	Journal club meeting	Medler	Grads only
11/9	EXAM 3	Medler	
11/14	MAPK Pathways, Specificity Mechanisms	Cullen	Chapter 11
11/16	Cancer and the Regulation of Cell Division	Cullen	Chapter 12
11/21	Adhesion-Dependent Signaling and PCD	Cullen	Chapter 13
11/23	NO CLASS		
11/28	Small G-proteins (Cdc42) – Polarity Integration	Cullen	Chapter 10
11/30	Journal club meeting	Cullen	Grads only
12/5	NO CLASS		
12/7	EXAM 4	Cullen	
12/12	OPTIONAL FINAL EXAM (12:45-2:45)		NSC 215

BIO 506

Students enrolled for graduate credit (BIO 506) will have additional course requirements. This portion of the course is designed to give graduate students better insight into the current literature, by analyzing recent or seminal papers in great detail. Recitation sessions will be held during some class periods (see syllabus). Be prepared to answer detailed questions related to the importance of the paper, the methods used, the experimental findings, and the significance of the study. The grade for 506 is based on performance on the exams (400 points) plus in class journal clubs (100 points). Grades are not curved. Attendance at all journal clubs is required and cannot be made up. Missing two or more recitations will result in a zero for the entire recitation grade.

This class is designed to meet specific learning objectives for students for both students in BIO 406 and students in BIO 506. These learning objectives are listed in the table below:

	Program Learning Outcome	Depth	Specific outcome objectives	Assessment instrument
1	Provide breadth of knowledge of basic principles and concepts	1	Master a wide range of basic concepts in signal transduction	Exams
2	Provide depth within specialized areas	2	Students will acquire in depth understanding and advanced knowledge of a range of specialized areas in signal transduction	Exams
3	Provide an understanding of experimental design and methodology	1	Experimental underpinnings of selected topics in signal transduction are developed in depth.	Exams Journal club (506)
4	Develop approaches for integration of information	1	Examples are presented that integrate information from molecular events to cellular structures to cellular functions.	Exams
5	Encourage critical thinking and hypothesis building	1	Emphasis is placed on critical thinking of how specific experimental findings support basic concepts as well as considering alternative interpretations of the findings.	Exams Journal club (506)
6	Provide contemporary information	2	Exposure to recent findings in the topics studied and the application of modern interdisciplinary approaches to signal transduction.	Exams Journal club (506)

Depth

1=covered

2=extensively covered