



BIOCHEM / PHMCOL-M / ZOOLOGY 630 – Cellular Signal Transduction Mechanisms

Credits: 3

<https://canvas.wisc.edu/courses/118469>

Course Designations and Attributes

Breadth - Biological Sci. Counts toward the Natural Sci req
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

Meeting Time and Location

MWF at 2:25pm in Microbial Sciences Bldg 1420

Instructional Mode

All face-to-face

How Credit Hours are met by the Course

Three hours (i.e. 50 minutes) of classroom or direct faculty/instructor instruction and a minimum of three to six hours of out of class student work (for reading, quizzes, preparation of paper) each week over approximately 15 weeks.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor Title and Name

Professor T. Martin tfmartin@wisc.edu Office hours by email.
Professor R. Anderson raanders@wisc.edu Office hours by email.
Professor E. Bresnick ehbresni@wisc.edu Office hours by email. q
Professor S. Miyamoto smiyamot@wisc.edu Office hours by email.
Associate Professor B. Weaver baweaver@wisc.edu Office hours by email.

Graduate Teaching Assistant

M. Blackburn mrblackburn@wisc.edu Office hours by email.

OFFICIAL COURSE DESCRIPTION

Course Description

Lecture-discussion. Comprehensive coverage of human hormones, growth factors and other mediators; emphasis on hormone action and biosynthesis, cell biology of hormone-producing

cells. Enroll Info: Intro biochem ([BIOCHEM 501](#) or [507](#) 508) cell biology (Biocore 303 or Zool 570 or Path750) or cons inst

This course is a survey of cellular signal transduction mechanisms viewed as interconnected protein machines set in motion by extracellular ligands; emphasis on protein trafficking, receptors, second messengers, GTPases, post-translational modification, and nuclear regulation in health and disease; some emphasis on how such knowledge was obtained experimentally; appropriate for advanced undergraduates and graduate students in cell & molecular biology, biochemistry, genetics, molecular pharmacology, molecular pathology, neurobiology, oncology and other disciplines.

Requisites

Survey of biochemistry and cell biology courses are desirable as previous courses

LEARNING OUTCOMES

1. Understand cellular signal transduction mechanisms viewed as interconnected protein machines set in motion by extracellular ligands
2. Understand the mechanisms and roles of protein trafficking, receptors, second messengers, GTPases, post-translational modification, and nuclear regulation in health and disease
3. Understand broadly how such knowledge was obtained experimentally

GRADING

Your grade in the course will be determined by adding weekly quiz grades (0-4 pts each) plus paper grade (0-40 pts), and determining class distribution with median = B.

REQUIRED TEXTBOOK, SOFTWARE & OTHER COURSE MATERIALS

Reading assignments will be posted on Canvas site.

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

Exams

Weekly quizzes will be given via the website. Each week questions will be posted after F lecture with responses due M before class; alternatively, questions will be posted after W lecture due F before class. These will be short essay questions based on M-F lectures and reading materials or on assignments for F. Questions will be problem solving-rather than content-oriented. Exception is week of thanksgiving break where there are only M, W lectures.

Quizzes will be worth 4 points.

Paper

One written assignment in the form of a short paper will be due Dec 12 submitted via website. This paper will be in a Nature News & Views format consisting of 1000 words or fewer with a focus on 1-3 recently-published (≥ 2012) research articles that are a breakthrough or an important step forward in signal transduction research. While you may pursue topics related to class lectures, make sure your paper does not overlap with class material. This is your opportunity to pursue topics of your choice- something that interests you. You might chose a

series of papers published from a single lab or chose a cluster of papers published by several labs on the same topic. References should be cited in the text with an overall limitation of 10 citations listed at the end of your paper. You may need to read many more articles than this including review articles to write your paper. Your paper is not a review article but a focus article. If you are not familiar with Nature N&V (or Science Perspectives) articles, read several to familiarize yourself with the specialized format.

HOMEWORK & OTHER ASSIGNMENTS

Readings and lectures

Lectures as PDF/PPT files will be posted on Canvas site. Reading assignments will be posted for each lecture or series of lectures. These will be review or research articles indicated as optional or required reading.

COURSE ETHICS

You are free to share resources and collaborate with one another during the course. However, the effort you display in quizzes and in the paper must be yours alone without collaboration. We compare quiz answers across the class and compare papers with the published literature.

WEEKLY TOPICS

Weekly topics (below) covered in M/W lecture/discussions highlighted in F special exercises (journal articles etc.);

General themes	TM
Synthesis of signaling peptides	TM
Cell surface receptors	TM
G protein-coupled receptors	TM
G proteins/regulation of adenylyl cyclase & phospholipase C	TM
Ser/Thr Protein kinases	RA
Receptor protein tyrosine kinases	RA
Ras regulation	RA
Signaling from internalized receptors	RA
Regulation of cell cycle	BW
Signal transduction by proteolysis & programmed cell death	SM
Nuclear factor kB modules	SM
Signaling into the nucleus	EB
Nuclear receptors	EB

[me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [!], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." <https://diversity.wisc.edu/>