

Advanced Signal Transduction
BIOL- 6200/8200 (3 credit hours)
Spring 2014
TR 4:00-5:15, WO3246

Instructors:

Coordinator – Guofa Liu, Ph.D. WO4268, ph: X2869, Email: Guofa.liu@utoledo.edu
Instructors – Biology Faculty (see tentative schedule)

Course Format:

This course will provide an in-depth discussion of signal transduction topics important for cell and molecular biology research. Examples include the general principle of signal transduction and signaling in response to growth factors, cytokines, TNF family members, morphogens, cell cycle cues, steroid hormones and pathways implicated in innate immune responses. Several lectures on plant signaling will also be presented. Emphasis throughout the course will be on the interplay between signaling molecules and positive/negative regulation of responses.

The Signal Transduction course will be primarily lecture-based. There is no required textbook but lecture notes for some of the topics will be available for downloading from the course website. These lecture notes cannot substitute for class attendance. Some handouts will also be provided throughout the semester to students enrolled in the course and useful papers from the primary literature will be discussed regularly. In most cases, these papers will be distributed prior to class, and students will be expected to have read them and prepared themselves for discussion during the lecture period.

The students can expect to benefit from the course in four ways: 1. to understand **the general principles** of signal transduction cascades in different model organisms and systems; 2. to keep up with the latest **progresses and knowledge** in signal transduction topics. 3. to get familiar with the cutting-edge **technology** in signal transduction field; 4. to gain more ideas on how to **design and implement experiments** in hypothesis- or question-driven research.

Midterm Discussion:

Students will be required to write a short review on a designed paper and present their comments on the midterm discussion. In this critique, you will focus on three fundamental scientific aspects: **Significance, Innovation and Approach.**

Significance. Does the paper address an important problem or a critical barrier to progress in the signal transduction field? Will the paper improve our scientific knowledge, technical capability, and/or clinical practice related to the signal transduction cascades?

Innovation. Does the paper challenge and seek to shift current research paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel in a broad sense?

Approach. Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the paper? What are the strong and weak parts of this project or paper? Are there any problems in the experimental design, results and data interpretation? Any alternative strategies to address same questions?

Oral Presentations:

At the end of the course, every student is required to present one paper from a CNS journal (Cell, Nature, Science including their sister journals) that should represent thorough studies and have a significant impact on the signal transduction. Students should avoid choosing the same paper and inform the course coordinator the title of the presentation 2 weeks in advance. There is a mandatory question/answer time following each presentation. In reading and presenting a paper the following should be evaluated by the student: background information, question or hypothesis being tested, experimental design, quality of data, and whether the conclusions are justified by the data.

Term Papers:

Students will be required to write a short term paper on a topic related to signal transduction. The instructors will provide a list of suggested topics within the first 3 weeks of the semester. The topic selected should not be directly related to the student's primary field of study. The term paper should cover general background in designed topics and current progress in the specific research area. Use standard paper size (8 1/2" x 11) with one inch margins (top, bottom, left, and right). The text should be in a standard, single-column, double-spaced format and no less than 1,000 words. The type size should be 12-pt Times New Roman.

Office Hours:

The instructor is available by appointment or can answer questions by email. No consultation will be required when the students choose their own papers for their presentation.

Student Evaluation:

Students will receive a letter grade for this course. Grades will be based upon student performance on the following criteria: 1. Two midterm discussions: 30%. 2. Oral presentations of selected papers: 30%. 3. The term paper: 30%. 4. Class participation: 10%. Students enrolled in this course are required for attending all lectures. In an extreme situation requiring absence from class, an effort should be made to inform the instructor or the coordinator in advance. Whether an excuse for missing a class is acceptable is entirely at the instructor's discretion. During the question/answer period, naive or stupid questions will not count against your grade, failure to participate will. Ph.D. and M.S. students will be evaluated in the same way. Grades will utilize a straight scale (see below) unless overall class performance dictates use of a curve.

Grade	% Correct		Grade	% Correct
A	93-100		C	73-76
A-	90-92		C-	67-72
B+	87-89		D+	66-60
B	83-86		D	59-55
B-	80-82		D-	54-51
C+	77-79		F	50-0

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Tentative Class Schedule – Spring 2014
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<u>Date</u>	<u>Topic</u>	<u>Instructor</u>
1/7	Organization and Overview	Dr. Guofa Liu
1/9	Signal Transduction-General Principle	Dr. Guofa Liu
1/14	Protein Modification	Dr. Guofa Liu
1/16	RTKs	Dr. Guofa Liu
1/21	MAPKs/JNK	Dr. Deborah Chadee
1/23	Integrin Signaling	Dr. Rafael Garcia-Mata
1/28	Rho Family of GTPases	Dr. Robert Steven
1/30	Midterm Discussion 1 (1)	Dr. Guofa Liu
2/4	Midterm Discussion 1 (2)	Dr. Guofa Liu
2/6	Midterm Discussion 1 (3)	Dr. Guofa Liu
2/11	JAK/STAT	Dr. Maria Diakonova
2/13	TLRs & Cytoplasmic PRRs	Dr. Douglas Leaman
2/18	Class I Cytokines	Dr. Fan Dong
2/20	Class II Cytokines	Dr. Deborah Vestal
2/25	Mitotic Checkpoint	Dr. Song-Tao Liu
2/27	CPC/Cohesion	Dr. William Taylor
3/4, 3/6	Spring Break - No class	
3/11	Midterm Discussion 2 (1)	Dr. Guofa Liu
3/13	Midterm Discussion 2 (2)	Dr. Guofa Liu
3/18	Midterm Discussion 2 (3)	Dr. Guofa Liu
3/20	Steroid Hormone	Dr. Lirim Shemshedini
3/25	Small RNAs	Dr. Malathi Krishnamurthy
3/27	Ion Channel Signaling	Dr. Bruce Bamber
4/1	The Primary Cilium: A Cellular Signaling Center Critical for Development and Physiology	
4/3	GPCR	Dr. Tomer Avidor-Reiss
4/8	Plant Signaling	Dr. Richard Komuniecki
4/10	Plant Signaling	Dr. Scott Leisner
4/15	Student Presentations (1)	Dr. John Gray
4/17	Student Presentations (2)	Dr. Guofa Liu
4/22	Student Presentations (3)	Dr. Guofa Liu
4/24	Student Presentations (4)	Dr. Guofa Liu
4/30	Finals Week (Papers due)	Dr. Guofa Liu