

BSC 792: Cell Signaling

Lecture time: TTH, 9:30 - 10:45 am

Instructor: Dr. Yanlin Guo, Office: JST 618

Office Hours: by appointment

Reading materials: Selected chapters in *Molecular Biology of the Cell* 4th Ed. Alberts et al,
Selected current review articles and research papers

Course Description: Living organisms have developed elaborate systems to perceive and respond signals from their environment. At the cellular level, precise cell-to-cell communication is essential for an organism's proper reaction to various stimuli. Cell signaling refers to the process by which a signal, such as a hormone or an environmental stress, on the cell surface is converted into a specific cellular response. The information flow from the cell surface to the physiological response involves a series of cellular reactions called signal transduction. The study of cell signaling is crucial for our understanding normal physiological processes as well as pathological conditions. For the past three decades, cell signaling has been an extremely active area merged with a broad spectrum of disciplines in biological sciences including biochemistry, molecular biology, genetics, physiology, microbiology, and cell biology. This graduate level course, which is open to MS and PhD students of Biological Sciences and Biochemistry, will introduce general principles of cell signaling followed by the discussion of specific signaling pathways and their implication in the regulation of several cellular processes. This course will be tentatively offered every other year or every two years.

Prerequisites: Basic Cell Biology, Biochemistry, and Molecular Biology or permission of the instructor

Grading: A term paper (40%), an oral presentation (30%), and an open book exam (30%).
A, 90-100%; B, 80-89%; C, 70-79%; D, 60-69%; F, 0-59%.

List of Tentative Topics

1. Introduction to cell signaling
2. Cellular foundation for cell communication
3. General principles of cell signaling
4. Extracellular and intracellular signaling molecules
4. Cell signaling through intracellular receptors
6. Cell signaling through cell surface receptors
7. The major cell signaling pathways
8. Cell cycle control and cancer biology
9. Apoptosis in normal development and in diseases
10. Stem cell proliferation and differentiation
11. Cell signaling in prokaryotic cells
12. Cell signaling in plant cells