ME.110 (CELL BIOLOGY)

Courses

ME.110.696. Research Elective in Cell Biology.

ME.110.699. Cell Biology Elective.

ME.110.726. Nuclear Structure and Human Disease. 1 Credit.
This interactive class covers the 3D organization and dynamics of the cell nucleus and genome in health and disease. Topics include the nuclear envelope, lamina networks, nuclear pore complexes, nuclear import/export, LINC complexes, 3D chromosome organization, dynamic chromatin tethering, phase-partitioning, mitotic disassembly & reassembly of nuclear structure, and diseases (e.g., progeria, heart/muscle disease, brain disorders, metabolic disease) caused by mutations in nuclear lamina proteins. Students are expected to pre-watch lecture videos and come prepared for in-class discussion.

ME.110.727. The Cytoskeleton. 1 Credit.

ME.110.728. Cell Structure and Dynamics. 1.5 Credits.
The objective of this course is to provide the basics of cell biology, including the structure, function and biogenesis of cellular organelles. Also covered are essential concepts on the cytoskeleton, cell-cell and cell-extracellular matrix interactions, cell motility, chaperones, protein turnover and stem cells.

ME.110.732. Developmental Biology. 1 Credit.
Team-taught combined lecture and problem solving course designed to (1) impart the general molecular and cell biological principles that underlie embryonic developmment across a range of model organisms, (2) convey key experimental approaches and findings that have provided significant insight into the governing principles, and (3) expose students to enough descriptive embryology to allow them to comfortably read any paper in the field of developmental biology.

ME.110.733. Principles of Genetics. 2 Credits.
This module covers fundamental principles of genetics, focusing on eukaryotic model systems. Problem sets are an integral learning tool in this course. The course is taught by faculty from the Departments of Molecular Biology and Genetics, Biological Chemistry, Cell Biology, and Physiology.

ME.110.734. Theoretical Models in Cell Biology. 1 Credit.
The aim of the course is to provide the proper basis for cell biologists to understand the roles of theoretical models in cell biology research. We will read and critique approximately a dozen classic papers in which theoretical models were used to explain and predict cell biology experiments. In the class, we will discuss how the theoretical models are constructed, what the key model assumptions are, whether and how these assumptions root in experiments, why did not the authors make a simpler or more complicated models, and the pros and cons of each model etc.

ME.110.800. Cell Biology Research. 1 - 18 Credits.
Laboratory Research

ME.110.807. Fundamentals of Fluorescence and Confocal Microscopy. 1 Credit.
Teach fundamental concepts of fluorescence and confocal microscopy so that students can pose appropriate question for meaningful research results. Emphasis on computer-based tools, including ImageJ, Imaris and CellProfiler, for image preparation and analysis with sessions in computer lab almost every week, complementing lectures. Two additional lab days required for operating a generic fluorescence microscope and a confocal microscope, respectively, learning to avoid common errors that preclude quantitative image interpretation and evaluating signal-to-noise effects of confocal settings.