

CB311qc: Experimental Approaches to Cell Biology

Catalog Number: (pending)
David VanVactor (Medical School) 4957
Quarter Course (spring term) January Course

Provides a comprehensive overview on the most recent advances in cell biology, covering hands-on experimental sessions including, electron microscopy, live cell imaging, single molecule imaging, 3D cultures, quantitative proteomics, protein interaction mapping, and more.

Note: Open to first-year and second-year BBS students; permission of instructor required. Not repeatable for credit.

Meeting dates and times: Monday, January 6 2014 from 4-8pm; Tuesday, January 7 to Wednesday, January 22, 2014 from 9-6 pm. If not indicated otherwise mornings will consist of a lecture and discussion followed by instruction to the laboratory component over lunch (9am-1pm). The afternoon will be spent in the respective faculty's laboratory conducting experiments (1-6pm).

Course Director: David VanVactor, davie_vanvactor@hms.harvard.edu
Co-Director: Wade Harper, wade_harper@hms.harvard.edu
Curriculum Fellow: Henrike Besche, henrike_besche@hms.harvard.edu

Module 1: Imaging Cells and Cellular Dynamics

Day 1: Mon, January 6, 2014 (SGM-502, 4-6pm) – joined with DRB Bootcamp
Course Introduction (Davie Van Vactor/Wade Harper)
Lecture: Davie Van Vactor - A historical overview of breakthroughs in cell and developmental biology
Lecture: Jennifer Waters - Visualizing molecules and cells in real time

Day 2: Tues, January 7 – joined with DRB bootcamp
Lecture: Jennifer Waters – Introduction into light microscopy (Goldenson 122)
Lab: Microscope tutorial (Nikon Imaging Center)

Day 3: Wed, January 8
Lecture: Tomas Kirchhausen – Cytoskeletal architecture and mechanics (C-216)
Lab: TBA

Module 2: Cycle of Cell Life and Death

Day 4: Thur, January 9
Lecture: Joan Brugge – Cell Signaling in 3-D (C1-513)
Lab: Studying morphogenesis and tumorigenesis in 3D culture models

Day 5: Fri, January 10
Lecture: Randy King – Cell cycle checkpoints and proliferative control (LHRRB-313)
Lab: Realtime imaging and analysis of cell cycle transitions, part I

Day 6: Mon, January 13
Lecture: David Pellman – Mechanics of cell division and its role in cancer (LHRRB-313)
Lab: Realtime imaging and analysis of cell cycle transitions, part II

Module 3: The cytoskeleton and cell signaling

Day 7: Tues, January 14

Lecture: Sam Reck-Peterson – Molecular motors and protein trafficking (SGM-106A)

Lab: In vitro and in vivo analysis of molecular motors

Day 8: Wed, January 15

Lecture: John Flanagan – Development and regeneration of axonal connections (C-216)

Lab: Tracing axon trajectories and molecular patterns in the embryo

Day 9: Thu, January 16

Lecture: Introduction to electron Microscopy (C-216)

EM lab: Tissue and Cell Electron Microscopy Lab - Sample prep, sectioning, and visualization using EM (EM facility)

Lecture: Tom Walz - Electron microscopy from cells to structure (LHRRB-313)

Module 4: The dynamic proteome: modifications, interactions, and methods

Day 10: Fri, January 17

Steve Gygi & Wilhelm Haas – Fundamentals of mass spectrometry and multiplexing proteomics (LHRRB-313)

Lab: Analysis of protein interactions by mass spectrometry Part 1 (complex purification and sample preparation, possibly will require some time on Saturday AM)

Day 11: Mon, January 20

Wade Harper – Methods for analysis of protein complexes and interactions (LHRRB-313)

Lab: Analysis of protein interactions by mass spectrometry Part 2 (data analysis)

Module 5: Molecular Biology of the Cell; Regulating the Genome

Day 12: Tues, January 21

Lecture: Danesh Moazed – Genome regulation by non-coding RNAs (Folin Wu)

Lab: TBA

Day 13: Wed, January 22

Lecture: Davie Van Vactor – MicroRNA regulation of synapse development (C-216):

Lab: Developmental genetics and neurobiology with Drosophila

Lecture: Anders Naar – The biology and function of microRNAs

Concluding discussion & joined course party with DRB bootcamp on Friday, January 24th in the Queen's Head, Cambridge, MA.