**CBPH 850 MODERN CONCEPTS IN CELL BIOLOGY Fall 2020** *v2020 08 03*

**Tuesday and Thursday 3:00-5:00 PM, 4 credit hours**

Course Directors: Sarah Cohen (SarahCoh@med.unc.edu)

Richard Cheney (Richard\_Cheney@med.unc.edu)

To register, contact Janice Warrford (Janice\_Warrford@med.unc.edu)

**Exploiting microscopy to reveal subcellular organelle localization, dynamics, and function (Stephanie Gupton, Sarah Cohen, Wes Legant, Tony Amelio, Rick Baker)**

Thu Aug 13 Introduction: light and fluorescence microscopy for cell biological research (Gupton)

Tue Aug 18 TIRF and confocal microscopy (Gupton)

Thu Aug 20 Superresolution microscopy (Cohen)

Tue Aug 25 Light sheet and expansion microscopy (Legant)

Thu Aug 27 Opto-chemogenetics: emerging bioluminescent tools for cell biology (Amelio)

Tue Sept 1 Transmission and scanning EM to study cell compartmentalization (Cohen)

Thu Sept 3 Cryo-EM for protein structure (Baker)

**Genetic and functional genomic approaches in cell biology**

**(Pat Brennwald, Amy Gladfelter, Jay Brenman, Amy Maddox, Rob Dowen, Laura Herring)**

Tue Sept 8 Intro to yeast genetics and the secretory pathway (Brennwald)

Thu Sept 10 Classical genetics and epistatic analysis of transport (Brennwald)

Tue Sept 15 Molecular genetics: cloning the first rab GTPase (Brennwald)

Thu Sept 17 Advanced yeast genetics (Brennwald & Gladfelter)

Tue Sept 22 Introduction to fly genetics (Brenman)

Thu Sept 24 Modern fly genetics (Brenman)

**Midterm exam posted at end of class;**

Midterm due Monday, Sept 28 at 5:00 PM

Tue Sept 29 NO CLASS

Thu Oct 1 C. elegans as a model system for cell biology (Maddox)

Tue Oct 6 Functional genomics in C. elegans (Dowen)

Thu Oct 8 C. elegans genetics: mechanisms of aging (Dowen)

Tue Oct 13 Proteomics to study post-translational regulation (Herring)

**Discoveries & Controversies in Membrane Trafficking**

**(Stephanie Gupton, Patrick Brennwald, Jimena Giudice, Sarah Cohen)**

Thu Oct 15 An intergolgi assay and the directionality of transport

Tue Oct 20 Coat proteins and vesicle production

Thu Oct 22Fusogenic factors from yeast to man & the SNARE hypothesis

Tue Oct 27 Resolutions & ongoing controversies in membrane trafficking

Thu Oct 29 Non-vesicular trafficking and membrane contact sites

Tue Nov 3 NO CLASS – Election Day

Thu Nov 5 NO CLASS

**Protein Quality Control and Proteostasis (Doug Cyr)**

Tue Nov 10 ER quality control (Cyr)

Thu Nov 12 Chaperones (Cyr)

**Final exam posted at end of class**

Tue Nov 17 Final due at 5:00 PM

**Time & Place**

Class will meet via Zoom on Tuesdays and Thursdays 3:00-5:00 PM unless noted otherwise.

**Format**

Classes generally begin with a faculty member discussing the key ideas and points in a given area. The second half of each class is usually reserved for a student led discussion of papers from the primary literature. Because the course is driven by discussions of the primary literature, it provides excellent experience both in cell biology and in the analysis of scientific papers. Active participation of all students in all presentations and discussions is a key part of the course.

Even when other students have been assigned to provide background and present a given paper, **everyone is expected to read the paper and contribute to the discussion.**

**Course Website**

Course materials such as reading assignments and discussion papers will be posted to the course website on Sakai under “Resources”.

**While reading the papers, consider the following questions for each figure:**

1) What experiment are they doing?

2) Why did they do this experiment?

3) What did they find?

4) How well are the conclusions supported and do you agree?

5) What is the next step?

**Grading**

Paper Presentations: ~ 25%

Class Participation: ~ 25%

Midterm (take-home exam): ~ 25%

Final (take-home exam): ~ 25%

Students are also required to complete an anonymous course evaluation at the end of the semester.

Optional text

Although the reading materials for course such as review articles and research papers will be posted to the Sakai website, those who want or need to strengthen their background in a given area will benefit from reading the relevant chapters in Alberts et al, Molecular Biology of the Cell (6th edition). Alberts is an excellent text that provides a systematic coverage of cell biology.