Meeting Time: Tuesdays & Thursdays, 2:00 pm – 2:50 pm (starting Tuesday, August 22nd)

Meeting Location: Genome Sciences Building (GSB) 1374

Course Hours: 2

Instructor:
Steve Rogers  421 Fordham Hall  srogers@bio.unc.edu  919-843-7788

Overview:
This seminar focuses on molecular mechanisms of cytoskeletal components. The course will examine the actin cytoskeleton and the microtubule cytoskeleton. A sample of topics include 1) the core building blocks: actin and tubulin; 2) nucleators: Arp2/3 and gamma tubulin/gamma-TuRC/Augmin; 3) motors: myosin, kinesin and dynein; 4) regulators: formins and microtubule plus end binding proteins; 5) destabilizers: cofilin and stathmin; and 6) kinetochore-microtubule attachments complexes. Primary literature will be examined, presented and critiqued. Each topic will examine a molecular/mechanistic that correlates structure with mechanism. Emerging techniques in cell biology and structure will be discussed including single molecule fluorescent techniques (PALM, FIONA, speckle microscopy), and optical trapping. The seminar aims to develop presentation skills, scientific writing, as well as manuscript evaluation and critique.

Methodology:
As a seminar course, we will examine primary literature. Participation from all members is critical. Each week, papers will be presented to the group by one or two assigned members. During the presentation, the paper will be critiqued as a group. People presenting the paper will present the material via Powerpoint or equivalent program. Additional papers assigned for the
class will be examined in a round-table format. Be prepared to discuss the paper and the presenter should have familiarity with any supplemental material.

In order to familiarize students with the practice of reviewing papers for a journal, we will go over aspects of how to write a review of a manuscript for an editor. The student will choose one paper for review that focuses on a specific area of interest to them that overlaps with topics covered in class. The review will be due at assigned dates shown below.

At the final class (Saturday, Dec 9th), each student will give a mini-presentation on a recently published cytoskeletal paper that probes molecular/cellular mechanism. Papers should selected by the student and approved by the instructor by Nov 24th. This manuscript should be distinct from the two manuscripts that the student based their two mock reviews on.

**Grading:**

- Participation Throughout Course: 45%
- Presentations (2 x 15%): 30%
- Review: (Final Exam): 15%
- Final Mini Presentation: 10%

**Text:**

No text required, this course examines primary literature that will be available on PubMed and available for download from the class Sakai site.

**Exams:**

The final exam will take the form of the mock manuscript reviews outlined above. The final exam review will be due on Saturday, December 9th.

**Reading Assignments**

**Week 1 - Welcome**

Aug. 22 - Course overview and review of microtubule biology


**Week 2 - Microtubule growth**


**Week 3 - Microtubule depolymerizing factors**


**Week 4 - Microtubule nucleation at the centrosome**


**Week 5 - Using microtubule depolymerization to do work**


**Week 6 - Microtubule severing enzymes**


**Week 7 - Modifying the microtubule machine by post-translational modification**


**Week 8 - Actin cytoskeleton**
Oct. 10 - Review of the actin cytoskeleton


**Week 9 - Actin-based pushing forces**

**Week 10 - Actin-based pushing forces continued**


**Week 11 - Motor proteins**


**Week 12 - Motor proteins continued**


**Week 13 - How do motors drive cell shape changes?**


**Week 14 - Actin-microtubule cross-talk**


Nov. 23 - Thanksgiving recess - no classes

**Week 15 - Actin-microtubule cross-talk continued**

Nov. 28 - TBD

Nov. 30 - TBD

**Week 16 -**

Dec. 5 - TBD

**Finals Week**

Dec. 9 - Final Presentations