

# Syllabus for MCB 5250: Techniques in Cellular Analysis

Fall 2021

Instructor: Professor David Knecht (pronounced: connect)  
david.knecht@uconn.edu

Tue/Thur, BPB 201 2:00-3:15 PM

## Overview:

We will explore one of the most important findings of the last 20 years: the discovery of the Arp2/3 complex and its function in cells. We will together read and discuss a series of papers to see how the complex was initially identified and the multidisciplinary approach that led to understanding of its function. We will focus both on the details of the methods used for each key experiment and how the results answered key questions of cellular function.

## Learning Objectives:

1. How are important scientific advances made? How do results from various labs using different approaches fit together to make a paradigm shift in a field.
2. What techniques were used to address the initial question of interest?
3. How do the techniques work?
4. What alternative techniques are available now to ask the same question?

The goal is understand these techniques and how they relate to each other so you can think about how you might investigate a new problem using a multi-disciplinary approach.

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## Grading:

1. **Participation in class (40%):** Students will present figures from the papers and in addition will be expected to participate in discussions.
  2. **Presentations (20%):** Students will choose a technique of interest and present to the class how it works and show an application of the technique from the literature.
  3. **Exams (40%):** There will be a take home midterm and a take home final exam.
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## **Preliminary Course Schedule- subject to change**

Week 1-2: Introduction and Preliminaries-  
General lab methods- solutions, pH, buffers  
Introduction to actin dynamics

Week 3-5: Machesky et al. (1994) JCB 127:107-115  
Discovery of the Arp2/3 complex-  
Protein purification  
Protein-Protein interaction- affinity chromatography and protein identification  
Introduction to Microscopy

Week 6-7: Discovery of WASp function: genetic screens for protein-protein  
interaction

Take-home Midterm exam

Week 8-10 Student Presentations of techniques

Week 11-14: Various potential topics based upon the interests of the group  
Discovery of an alternative actin activation pathway: RNAi screens  
Discovery of Inhibitors: high throughput chemical library screens  
Microscopy tools for investigating in vivo function, quantitative microscopy  
Flow Cytometry  
Specialized Microscopy Techniques, TIRF, FRET, FRAP, Superresolution, FCS,  
Speckle microscopy, multi-photon

## **Student Honor Code and Academic Misconduct**

### **Academic Integrity**

A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgement of the research and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned. Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, and examinations); any attempt to influence improperly (e.g. bribery, threats) any member of the faculty, staff, or administration of the University in any matter pertaining to academics or research; presenting, as one's own, the ideas or words of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved. A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in *The Student Code*.

### **Cheating – Student Academic Misconduct**

Academic misconduct is dishonest or unethical academic behavior that includes, but is not limited, to misrepresenting mastery in an academic area (e.g., cheating), failing to properly credit information, research or ideas to their rightful originators or representing such information, research or ideas as your own (e.g., plagiarism).

All cases of academic misconduct, both during examinations and in the laboratory, will be handled in accordance with the policies set forth by the University of Connecticut. Misconduct includes, but is not limited to: cheating on exams, plagiarism, copying the work of other students, presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved. A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation. The full text of the student code can be found at: <http://community.uconn.edu/the-student-code-preamble/>

### **Plagiarism**

**Misuse of Sources:** The misuse of sources is the failure to acknowledge properly the source of an idea and/or specific language that is presented in any work submitted for evaluation. The misuse of sources is a violation of academic codes of conduct and could result in serious penalty.

Plagiarism: Plagiarism is the theft of another's ideas, specific language, or other media, and the presentation—for the purposes of evaluation—of that material as one's own.

To avoid misusing sources or committing plagiarism, a student must include all of his sources with full and proper acknowledgment.

**Plagiarism is taken very seriously. The penalty for plagiarism will be determined by the instructor and dependent on the seriousness of the misconduct but may result in receiving an F for the course. In some cases, the misconduct will be reported to Community Standards for further action.**