

## **Syllabus MCB110L:**

This laboratory for majors in Chemical Biology and Biochemistry and Molecular Biology is designed to have students learn the theory and practicality of modern laboratory science by investigation of unknown properties of the yeast kinesin Cin8.

The course breadth covers Molecular and Cell Biology with a special emphasis on protein biochemistry: overexpression, purification, assays, characterization and structure-function analyses. The course also includes cloning and other molecular biology tools, genetics, and cell biology. Upon completion of the course, the student should be able to evaluate data collected by laboratory experimentation, develop hypotheses to explain results, and design experiments to test these hypotheses.

### **Teaching Goals**

#### **Learning Objectives:**

- Make and analyze mutants in a gene/protein.
- Characterize enzyme activity of mutant protein.
- Compare a gene/protein between organisms.
- Consider why multiple related genes/proteins are used in one organism.
- Consider relationships between the structure and function of a protein.
- Consider how an organism regulates expression of a gene/protein.

#### **Basic methodologies:**

- Quantitative analyses (including dilutions and unit conversions)
- Polymerase Chain Reaction (PCR) and reverse-transcriptase-PCR (RT-PCR)
- DNA Cloning
- DNA Sequence Analysis
- Protein purification
- Enzyme and protein assays
- DNA and RNA isolation and manipulation
- Protein and nucleic acid gel electrophoresis
- Gel staining / Immunoblots (Westerns)
- Structure-function analyses
- Genetic manipulation and phenotypic testing
- Fluorescence microscopy with living and fixed cells
- Microarray analysis