# BIOL 300L: Experimental Biology Laboratory

***This detailed course description provides information about course topics & content. It is not a course syllabus. Summer 2013 course syllabi are updated in the spring, and may not be available until summer classes begin.***

## Instructor Information

| Instructor | Email | Course Format | Number of Credits |
|---|---|---|---|
| Karen Whitworth | whitworth@umbc.edu | Lecture, Lab | 2 |

## General Information

### Course Format Other

Lecture:

Lectures will be pre-recorded and posted on Blackboard. The students will watch these lectures before coming to lab, and will take a pre-quiz on Blackboard on the lecture material and lab manual readings. The students will likely spend ~1hour a week preparing for the upcoming lab.

Lab:

This is a lab course, so the students will spend 4-8 hours in lab per week. The lab is scheduled for 4 hours long (twice a week), but the rate at which the student works will determine how long they spend in lab each week. They will spend no more than 8 hours in lab each week.

### Delivery Format

Hybrid

### Prerequisite /Co-requisite:

CHEM102 or CHEM102H, CHEM102L, and BIOL302

## Course Materials

### Currently Used Materials

• Professor's own work, printed by UMBC Bookstore

## Course Objectives/Learning Outcomes:

Practical Lab skills:

1. Accurately use serological pipets to measure the volume of solutions.
2. Accurately use a scale to weigh out solids.
3. Know which micropipettor to select to deliver a given volume, and use it accurately.
4. Plan and make solutions of any molarity using the solid chemical, diluent, and knowing the MW. Know how to calculate a percent solution.
5. Plan and carry out a dilution of a stock solution, both in single-step and serial formats.

6. Properly focus a compound microscope. Control contrast using the condenser diaphragm. Be able to locate any specimen, transparent or opaque, in the microscope. Be able to measure the size of an object in the microscope. Use a microscope to get quantitative data.
7. Properly use a spectrophotometer to measure absorbance. Understand the principles upon which this technique is based, including Beer's law.
8. Conduct timed reactions (coordinating incubations, calculating rates)
9. Familiar with universal graphing software such as Excel. Generate a standard curve and use it to calculate amount of an unknown. Design and conduct an experiment demonstrating concentration dependence of a phenomenon.

Intellectual Lab skills:

1. Keep a neat, accurate, up-to-date laboratory notebook.
2. Know and follow all University rules regarding academic integrity. Know how academic integrity applies to laboratory practice.
3. Knowing the hypothesis of an experiment, and having carried out that experiment, be able to analyze the data, using basic statistics (including mean, standard deviation, and t test) when appropriate. Be able to portray that data in appropriate format (table, chart, graph) in a style ready for publication. Be able to use graphing software like Excel.
4. Having properly portrayed and analyzed the data, be able to make all possible conclusions from the data, especially with reference to the hypothesis of the experiment.
5. Demonstrate a mastery of the biology content for the experiments we do.

## Potential Topics Covered:

- Determination of Protein Concentration: Colorimetric Assays, Bradford Assay, How a Spectrophotometer works, How to calculate Absorbance and Transmittance, Molar Extinction Coefficient, Micropipettes, Serological Pipets, Serial Dilution, Single-Step Dilution
- Solutions and Dilutions: Making a solution of a given Molarity, Molarity, Absorbance Spectrum, Dilutions, Micropipettes, Serological Pipets
- Bacterial Gene Transfer: Conjugation, Plasmid versus Chromosome, Auxotrophs, Working with single colonies of bacteria, Sterile Technique, Selection with growth media, Antibiotic resistance genes, Genetic mapping based upon linkage
- Alpha Amylase: Inhibitors and Activators of a pathway, Prediction of experimental results based upon known information, Sterile technique, How to measure activity of an enzyme,
- Flagella Regeneration: Microscopy skills, Quantitative reasoning, Cyclohexamide, Visualize Chlamydomonas (live and fixed), Measure the re-growth of Chlamydomonas flagella regeneration in real time
- Agrobacterium Infection of Plants: Plant wound repair, Sterile technique, Correlation between bacteria applied and size of plant tumor formed, Genetic manipulation of plants
- Enzymes: How to measure enzyme activity, Testing experimental conditions to maximize enzymatic activity, Saturation of Enzyme Kinetics, Inhibition of the enzyme with competitive and non-competitive inhibitors, Active site, Substrate to Product conversion, timed reactions

## Instructions for Visiting Students:

Visiting students must provide proof of completing the pre-requisites for this course.