

CHEM525: Biochemistry Laboratory Techniques (Spring 2016)

Instructor:

Dr. Nicholas E. Grosseohme

Office: Sims 302A

Office hours: T 1-3:00 (Sims 302A) or by appointment

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Meeting Times:

Prelab: Friday 12:30 - 1:20 PM Sims 113C

Lab Section: Laboratory Wednesday, 2:00 - 4:50 PM Sims 303

Credit Hours: 1

Textbook: All materials available online

Required Materials: Scientific calculator, laboratory notebook, safety goggles, closed toed shoes

Course Outline:

As a compliment to the Biochemistry Lecture Course (CHEM523), which introduces students to the basic concepts of biochemistry, this course will engage the student in the primary methodology used in everyday biochemistry research laboratories. We will cover bacterial growth, recombinant protein production and purification, enzymological analysis and the solution structure of enzymes in several experiments over the course of the semester. As we perform the experiments, I hope you will gain an appreciation of the various techniques performed in modern biochemical research. Upon completion of the course, you will be familiar with many of the basic principles of modern microbiology, protein chemistry and protein bioinformatics. You will also have a much better idea of the databases and software available for use in your own research and studies.

Tentative Course Schedule

Prelab Lecture	Lab Meeting	Lecture Topic	Lab	Due at beginning of class
	11-Jan		Bioinformatics - computer lab	
15-Jan		Introduction to Lab and Biochemistry Lab Techniques		Bioinformatics HW
	18-Jan	MLK Day - No Lab		
22-Jan		Overview of Molecular Cloning		
	25-Jan		PCR, Miniprep, and Digestion	
29-Jan		Working with Polynucleic Acids		
	1-Feb		Purification/Ligation	
5-Feb		Visualization of Biomolecules		Cloning Introduction
	8-Feb		In Lab: Transformation and media prep	

			Computer Lab: Visualization		
12-Feb		Bacteria Strain Specialization	In-lab: Colony selection and Inoculation		
	15-Feb		PCR Screen, Column Purification, Transformation	Visualization HW	
19-Feb			In-lab: Inoculation	Cloning Methods	
	22-Feb		Preparation for Protein Purification (Buffers, Gels, Media)		
26-Feb		Lecture: Protein Purification 1	In-lab: Colony selection and Inoculation	Cloning Formal Report	
	29-Feb		Induction and Lysis		
4-Mar		Protein Purification 2		-	
	7-Mar		Chromatography and Electrophoresis		
12-Mar		Quantitation Methods			
	14-Mar	Spring Break			
18-Mar					
	21-Mar		Concentration and Quick Activity Assay		
25-Mar		Enzyme Activity Analysis			
	28-Mar		Enzyme Kinetics	Purification Formal Report	
1-Apr		pH and Activity			
	4-Apr		pH Dependence of Activity		
8-Apr		Structure and Activity			
	11-Apr		Denaturation and Activity		
15-Apr		Inhibition		Introduction and Methods of Kinetics Analysis	
	18-Apr		Inhibitors and Activity		
22-Apr		Exam			
	25-Apr		Lab Practical	Final Paper Due	

Grading for the Course

Computer Assignments: Two exercises will be conducted to familiarize you with the computation and online tools that biochemists regularly use. These assignments will significantly support your work in the Biochemistry Lecture Course.

Prelab Assignments:

Prelab assignments and relevant background material will be available online at least one week prior to each experiment. Prelab lectures are designed to help you understand the material, however are not a substitution for individual preparation. These assignments must be completed before you may begin work on your scheduled laboratory session. This requirement is necessary to ensure that you will be able to perform the myriad tasks that need to be accomplished each week.

Section Writeups

Three partial papers are due throughout the semester. Each of these are meant to guide you in your preparation of the formal reports. The feedback you receive should serve as a guide to the expectations of the formal reports. Please follow the Journal of Biological Chemistry (www.jbc.org) format when composing these writeups.

Formal Reports

Two formal reports are due during the term; each of these should stand alone as a report of laboratory practices and accomplishments for the work completed in each respective section and should include all appropriate components of a scientific manuscript (Abstract, Introduction, Materials and Methods, Results, and Discussion, References). Please follow the Journal of Biological Chemistry (www.jbc.org) format when composing these writeups.

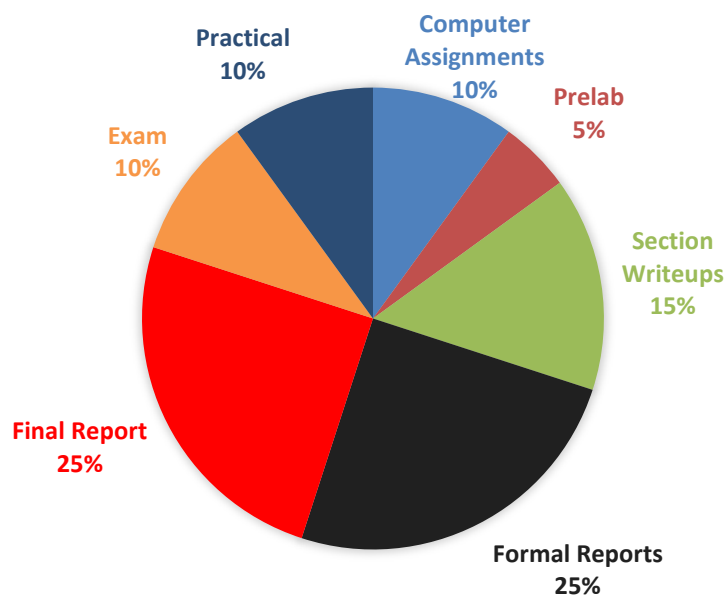
Final Report

A final report will be due on the last prelab meeting of the course (27-April). This report will be a compilation of the corrected section writeups you turned in during the semester and will take the form of a complete scientific journal article published in Journal of Biological Chemistry (Abstract, Introduction, Materials and Methods, Results, and Discussion, References).

Laboratory Notebook

A laboratory notebook is one of most important tools a scientist has and is just as important in this class. You must carefully document all of the procedures and reagents you use as well as the data you collect during the semester. Any of your peers should be able to pick up your lab notebook and be able to reproduce what you did without any problem. Keep this in mind should you have any questions about what you should enter into your notebook. We will discuss how to properly keep a notebook in the first prelab session and examples will be provided.

POINT DISTRIBUTION



A: > 90% **B+: > 87%** **B: > 80%** **C+: > 77%** **C: > 70%** **D: > 60%** **F < 60%**

Students taking the course for graduate credit

Any student taking the course for graduate credit will be required to prepare a final presentation (20 minutes) summarizing the experimental results from the semester. This presentation must clearly introduce the family of enzymes under study in the class, describe the theoretical basis of each of the experiments performed and clearly discuss and interpret the results. This presentation will count as 20% of the final grade.

Technology in the Classroom

You will need to make certain that you bring a scientific calculator to the lab each session, and, more importantly, that you know how to use the linear regression mode of your calculator. No laptop computers or cellular phones may be used in the laboratory when class is meeting as the distractions they cause present a significant safety hazard. Anyone caught using these devices during class without prior permission will immediately be asked to leave for the day.

Drop Policy: As described in the Winthrop University Undergraduate catalog

Student code of conduct

As noted in the Student Conduct Code: "Responsibility for good conduct rests with students as adult individuals." The policy on student academic misconduct is outlined in the "Student Conduct Code Academic Misconduct Policy" in the online *Student Handbook* (<http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf>).

Students with Disabilities

Winthrop University is dedicated to providing access to education. If you have a disability and require specific accommodations to complete this course, contact Services for Students with Disabilities at 323-3290. Once you have your official notice of accommodations from Services for Students with Disabilities, please inform me as early as possible in the semester.