

Biochemistry Laboratory (CHEM 4121)
Syllabus, CRN: 28577
Fall 2016

Instructor

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Class Meeting Time

W 1:00 -4:50pm, Laney-Manion 302

Office Hours

MWF 9:30am – 11am
Appointments are also available.

Course Description and Objective

This course is an overview of biochemical laboratory techniques, focusing on protein purification and characterization. It is designed to introduce students to common techniques that are currently used in biochemistry research.

Course Prerequisites

Grade of C or better in CHEM 3411 and previous or current enrollment in CHEM 4320 are required for this course. You WILL be expected to remember and use material covered in this course. The topics you are expected to have knowledge of include, but are not limited to: atomic structure, bonding, intermolecular forces, acid/base chemistry, organic functional groups and their properties, thermodynamics, equilibrium, cellular structure, and basic human anatomy.

Course Materials

- Composition notebook
- Calculator
- Approved (ANSI Z. 87) laboratory eye protection.
- All other course materials can be found on blackboard (www.bblearn.uca.edu)

Class Attendance

Class attendance is strongly recommended, and attendance counts as a part of your grade (detailed below). Any student who is absent from two classes may be dropped from the course with a WF.

Make-up Policy

There will be no make-up labs. If you must miss lab for an unavoidable, valid, and significant reason, contact me by email or phone (leave a message) **BEFORE** the scheduled lab, and we can discuss how to deal with the missed lab.

Course Assignments

1. **Laboratory Experiments**

The majority of your learning experience and grade will come from the experiments that you do during laboratory time. These are experiments that would be done in many protein biochemistry research laboratories. To make your experience as true-to-life as possible, you will be responsible for all buffer and reagent preparation, setup, and cleanup. On occasion this will mean coming to the lab outside of scheduled laboratory time to do initial setup or collection for an experiment. Because our time in the lab is limited you **MUST** come to lab prepared to do lab work. This means reading the background material and protocol **in detail** well before lab time. You should also print the protocol, take any notes you may need, and bring the printed protocol to lab.

2. **Attendance and Participation**

Because experiments are the main point of this class, attendance and participation are mandatory and will be incentivized through your grade. Each lab period you will receive a 10 point attendance and participation grade. Showing up prepared and on time is one part of this grade, the other is doing your share of the lab work. You will be working in groups of three, and I expect each of you to participate fully in your experiments.

3. **Lab Notebooks**

You will keep your laboratory record in a composition notebook following the instructions I outline for you. The point of a lab notebook is to keep a record of your experiments and findings that is detailed enough for another scientist to repeat your experiments and (hopefully) obtain the same findings just by following your notebook. However, a well-kept lab notebook has just as much benefit to you directly. When you begin to write the journal article that will detail your findings (see below) it will be MUCH easier to write your methods and results if you have a good record in your notebook. For every lab period you will receive 10 points for a well-kept lab notebook. I will check your notebook before you leave lab.

4. **Journal Article**

As the culmination of your lab experience, you will write a journal article that details your findings from your experiments. Research articles include the following sections: abstract, introduction, methods, results, discussion, and references. I will provide instructions and examples for the article on blackboard.

5. **Protocol Quizzes**

I expect that you are a responsible junior or senior level student who is capable and motivated to do as I ask and come prepared for lab by reading and examining background material and protocols. However, if I begin to suspect that you have not prepared for lab I will give quizzes at the beginning of each lab over the background material and protocols.

Grading

Bioinformatics Report	= 100 points	<u>Grading Scale</u>
Attendance and Participation	= 130 points	A: 90 – 100%
Lab Notebook	= 130 points	B: 80 – 89%
Journal Article	= 140 points	C: 70 – 79%
<u>Protocol Quizzes</u>	= <u>0-100 points</u>	D: 60 – 69%
Total points	= 500-600 points	F: Below 60%

ASK BEFORE YOU DO

For each experiment I will give you a protocol to follow. However, you will likely have questions about some aspect of the experiment. **ASK ME** any questions you have **BEFORE** you do something. Every scientist has to ask questions of other scientists. It is worth saving your experiment and avoiding a doing harm to yourself or others by just asking your question.

Academic Honesty

Cheating or representing someone else's work as your own is **severely discouraged**. The penalties for cheating are **severe** and include, but are not limited to, assigning an "F" for the work and/or the course to expulsion from the University. The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy.

UCA Policies

Students are encouraged to familiarize themselves with all the policies listed in the UCA Student Handbook. Students should pay particular attention to the Academic Policy on page 37 and the Sexual Harassment Policy on page 115.

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Disability Resource Center, 450-3613.

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

If a student discloses an act of sexual harassment, discrimination, assault, or other sexual misconduct to a faculty member (as it relates to "student-on-student" or "employee-on-student"), the faculty member cannot maintain complete confidentiality and is required to report the act and may be required to reveal the names of the parties involved. Any allegations made by a student may or may not trigger an investigation. Each situation differs, and the obligation to conduct an investigation will depend on the specific set of circumstances. The determination to conduct an investigation will be made by the Title IX Coordinator. For further information, please visit: <https://uca.edu/titleix>. *Disclosure of sexual misconduct by a third party who is not a student and/or employee is also required if the misconduct occurs when the third party is a participant in a university-sponsored program, event, or activity.

Lab Schedule

*This is a tentative schedule. All dates and content are subject to change.

Date	Lecture	Lab	Reading
Jan 25	Introduction	Safety, Micropipetting	
Feb 1	Bioinformatics	CaM bioinformatics	Protein intro, CaM review articles
Feb 8	Experimental overview, protein care, buffers Bioinformatics report due	Prep work	Bacterial expression systems, sterile technique
Feb 15	Expression	Begin Expression (finish R) Finish prep work	
Feb 22		Cell lysis and clarification	
Mar 1	Chromatography	Hydrophobic Interaction Chromatography	Chromatography, HIC ch1, calcium binding protein HIC
Mar 8	Protein analysis: identification, purity, concentration	Gel Analysis	Gel Analysis
Mar 15	Mass spectrometry	UV absorbance, BCA, MALDI-TOF	UV absorbance, BCA, and MALDI-TOF introductions
Mar 22	Spring Break		
Mar 29	Structural stability and binding using fluorescence and UV absorbance.	Structural and binding studies	Protein Structure Fluorescence
Apr 5		Structural and binding studies	
Apr 12		Structural and binding studies	
Apr 19		UAMS Trip	
Apr 26		Catch-up day	
May 1	Monday: Journal Article Due		