

CHEM 3381 – Biochemistry Techniques

Spring 2018

revised 1/12/2018

Instructors:

Dr. Karen Lewis (KAL137@txstate.edu) CENT 401B

Dr. Steven Whitten (SW50@txstate.edu) CENT 408B

Instructional Assistants:

L01 (Tues 8 am – noon): Rachel Russek, r_r385@txstate.edu

L02 (Tues 2 pm – 6 pm): Samantha Zepeda, sk1203@txstate.edu

L03 (Wed 8 am – noon): Nestor Rodriguez, ndr23@txstate.edu

Corina Foster, clf85@txstate.edu

L04 (Wed 2 pm – 6 pm): Nestor Rodriguez, ndr23@txstate.edu

Samantha Zepeda, sk1203@txstate.edu

L05 (Thurs 8 am – noon): Rachel Russek, r_r385@txstate.edu

Locations

Lectures will be held in Centennial G01 on Mondays and Fridays from 12:30-1:20 pm, unless otherwise noted. All changes will be clearly announced in lecture, lab session, and on TRACS. All lab sections meet in Chemistry 109.

Office Hours

Dr. Whitten's office hours are Mon, Wed, and Fri from 9 am – 10 am.

Dr. Lewis' office hours are Mon – Thurs, 2 – 3 pm.

Course Description

This course introduces biochemistry majors to the fundamental laboratory techniques used in analytical and physical biochemistry. Weekly experiments will reinforce concepts presented in pre- and co-requisite courses and utilize modern instrumentation. Experimental design, interpretation of results, analysis, and reporting of experimental data will be emphasized.

Prerequisite: CHEM 3375 with a C or better.

This course is a Service-Learning Course, part of the Service-Learning Excellence Program.

Course Objectives

Upon completion of this course, students will be able to:

1. Calculate concentrations in different units and prepare aqueous solutions.
2. Recognize the causes of various experimental errors and know how to identify, evaluate, and minimize them.
3. Perform successful titrations and calculate/report the experimental results (*i.e.*, concentrations, purity, *etc.*) with appropriate number of significant figures.
4. Isolate a protein from a native source using standard purification techniques.
5. Analyze various biomolecules using a variety of methods, including detection, separation, and characterization techniques.
6. Operate instruments used in biochemical experiments.
7. Use the scientific literature to write an experimental protocol.
8. Properly document laboratory experiments in a notebook.
9. Relay scientific concepts and studies to other scientists and the local community.

Required Materials (for every lab session)

- 100 pg duplicate copy laboratory notebook (ISBN 978-1930882744)
- Ball point pen for writing in lab notebook
- an external storage drive (USB type)
- three-ring binder
- closed-toe shoes
- long pants/jeans
- shirt with sleeves
- safety goggles/glasses

Course Grades

Lab Participation/Cooperation/Safety (5 pts each)	55
Pre-Lab Quiz (15 pts each)	165
Pre- & In-Lab Notebook Duplicates (15 pts each)	165
Post-Lab Analysis	
Single-week experiment (30 pts each x 2)	60
Multiple-week experiment (60 pts each x 4)	240
Formal Lab Report	150
Outreach Essay	50
Final Exam (lab practical final)	100
TOTAL	985

Grading Scale:	> 89.45%	A
	79.45 – 89.44%	B
	69.45 – 79.44%	C
	59.45 – 69.44%	D

Attendance and Tardiness:

Lecture and lab attendance is **mandatory**.

- Students should arrive on time for lecture and laboratory sessions. Extra time will not be given for the pre-lab notebook quiz.
- Students who are not prepared to begin lab on time may not be able to complete the experiment and will lose credit on their in-lab grade.
- **A laboratory absence** will result in a zero for the in-lab notebook grade, but data may be obtained from your lab partner and used to complete the post-lab notebook assignment for full credit (30 or 60 pts).
- **There are no make-up labs.** If you have any conflicts with your current lab section, you should immediately discuss them with Drs. Lewis and Whitten **and** provide a written explanation via email.
- TAs are *not permitted* to extend the laboratory session times or adjust assignment due dates.

Laboratory Safety:

- It is **your responsibility** to observe and follow the departmental laboratory safety policy and all course-specific safety policies. These include following direct instructions from the IA and the instructors.
- Proper laboratory attire, including safety glasses, must be worn at all times. Safety glasses must be on your eyes from the minute you cross the threshold into the laboratory and remain in place throughout the laboratory session.
- In the event of a safety violation:
 - Safety violations will be penalized as a deduction in lab participation points.
 - Depending on the severity of a safety violation, a student may be given a warning for a first violation. Major and/or repeat safety violations may result in a student being asked to leave the laboratory.
 - Upon removal from the laboratory as a result of a safety violation, a student may not be given the opportunity to make up the missed experiment(s).

Lab Notebook:

- Your notebook is extremely important for success in this course. It will also serve you as a reference in subsequent biochemistry laboratory courses. **Each student is required to maintain a duplicate page lab notebook** that will contain all pre-lab assignments, sample calculations, procedures to be performed, results, and conclusions of the experiment. See “Laboratory Documentation Guidelines” document for complete details.
- The notebook entry for each lab experiment will consist of three sections: pre-lab, in-lab, and post-lab. Details for each can be found in the “Laboratory Documentation Guidelines” document.
- **Pre-Lab Quiz:** A pre-lab quiz will be administered in lecture on Mondays. No make-up quizzes will be given. If you are absent, then your grade for the pre-lab quiz will be zero. Extra time for quizzes will not be given without documented and pre-arranged accommodations (see below).
- **Pre- and In-Lab Grading:** A duplicate copy of the pre- and in-lab notebook pages will be turned in to the IA at the end of the lab session. Late pre-/in-lab notebook pages will not be accepted.
- **Post-Lab Grading:** A duplicate copy of the post-lab notebook assignments will be turned in to the IA at the beginning of the lab session on the date due. Assignments will be considered late if they are turned in more than 5 minutes after the lab session is scheduled to begin.

Deadlines for Post-Lab Analysis Assignments:

Assignment	L01 & L02	L03 & L04	L05
Lab 1-2	Feb 6	Feb 7	Feb 8
Lab 3	Feb 13	Feb 14	Feb 15
Lab 4-5	Feb 27	Feb 28	Mar 1
Lab 6-8	Mar 27	Mar 28	Mar 29
Lab 9	Apr 3	Apr 4	Apr 5
Full LDH Lab Report	Apr 10	Apr 11	Apr 12
Lab 10-11	Apr 20		
Outreach	Apr 27		

Service-Learning Component:

A major component of professional science careers is outreach to one's community. Much of our research is publicly funded, and therefore we have a responsibility to share our work with all citizens. In fact, the National Science Foundation *requires* that a component of all funded projects be of "Broader Impacts", which can range from increasing the participation of under-represented groups in science, enhance scientific research and education infrastructure, and disseminate our scientific findings and advances to the general public.

To lay a foundation for a lifelong scientific career that incorporates these critical elements, every student in CHEM 3381 will undertake at least 4 hours of science-based community outreach. In mid-April, a formal outreach experience is coordinated by the course instructors (see Calendar below) in which Biochemistry majors lead several sessions at the Hernandez Elementary School 5th Grade Science Camp, to help the elementary students prepare for their state tests. However, Biochemistry majors may choose to participate in any science-based outreach activity during the semester, as long as it is at least 4 hours of service. Throughout the semester, the instructors will share additional outreach opportunities with Texas State University student science organizations as well as area professional societies (like American Chemical Society). Documentation of the alternative outreach must be provided to the course instructor by the coordinator of the outreach event.

After completion of the outreach, students will write a 2-page reflection essay on the experience. Detailed instructions for this essay will be discussed in class and posted on TRACS.

Resources

- The laboratory instructors will maintain a TRACS course website, which will be used for posting course information throughout the semester (including experimental protocols, instructions, and resources) and maintaining grades. You can access TRACS at <https://tracs.txstate.edu/portal> or from the link on the Texas State homepage.
- Students are encouraged to use supplementary materials provided on the course TRACS site as well as materials from CHEM 3380 Analytical Biochemistry and CHEM 3375 Principles of Biochemistry.
- Students should check their Texas State email accounts *daily* for lab announcements. Copies of each announcement will be posted on TRACS in the email archive.

Lab Glassware and Supplies

- Each student is responsible for proper care of all equipment and supplies.
- Students (as partners) will be assigned a drawer at the beginning of the semester to hold assigned equipment (such as spatulas, tips, and stir bars) and personal items. Students are responsible for returning their items to their assigned drawer and locking it at the end of each lab session.
- Micropipettors, including a P-1000, P-200, and P-20, will be checked out from the IA at the beginning of each lab session and must be returned at the end of each lab session. Failure to promptly return all pipettes will result in loss of Lab Participation/Safety points. If repair or replacement of pipettes is necessary due to misuse, the responsible students will be charged.
- On occasion, specialized equipment may need to be checked out from the stockroom, using your Texas State ID or driver's license as collateral. It is **your responsibility** to return this equipment in a complete, unbroken, and properly cleaned condition.
- Replacement of lost or damaged supplies, glassware, or equipment will be charged to both lab partners (*i.e.* 50% per partner) if the responsible party cannot be identified. The balance(s) will be paid through Texas State University Business Services. Unpaid balances may prevent registration and/or graduation.

Honor Code

- **No collaboration** is permitted on graded work (including tests, quizzes, and post-lab analysis.).
- Lab partners will perform the experiment and collect data together. However, collaborations are **not** allowed on discussions, conclusions, or written reports. This policy is not intended to discourage students from studying together or working together to prepare for lab or perform the experiments. Lab partners must carry out their post-lab analysis **independently**.
- This policy explicitly forbids copying or paraphrasing the work of others, including a text, journal article, another student's lab report, or any site on the Internet. All outside sources must be clearly acknowledged. *Referencing or otherwise acknowledging the source of text (even a portion of a single sentence) that has been **copied directly or closely paraphrased is still considered plagiarism**.* A complete description of the Texas State Honor Code is at <http://www.txstate.edu/effective/upps/upps-07-10-01.html>.

If you need additional clarification, see Drs. Lewis and Whitten.

- Violation of the Texas State Honor Code will result in academic penalties at the instructors' discretion, up to and including failure in the course.

Professionalism and Respect

The University and Drs. Lewis and Whitten are committed to an educational community in which each individual is respected, appreciated, and valued. Class rosters are provided with the student's legal name. All requests to address you by an alternate name, pronunciation, and/or gender pronoun will be honored. Please advise us (either in person or by email) of this preference early in the semester.

Special Needs

If you are a student with a disability who will require an accommodation(s) to participate in this course, please contact both Drs. Lewis and Whitten as soon as possible. You will be asked to provide documentation from the Office of Disability Services. Failure to contact us in a timely manner may delay your accommodations.

The University recognizes that students may have extreme emergencies that affect academic performance. Students should contact Emergency Student Services (through the Dean of Students Office) to seek assistance. Detailed information can be found at <http://www.dos.txstate.edu>.

Drop Policy

The automatic "W" deadline is March 27, 2018 at 11:59 pm. After March 27, 2018, students cannot drop any course. Students may *withdraw* from the University (*i.e.*, drop all courses, and go to zero credit hours for the current semester) by April 19, 2018. Note that withdrawal from the University is not the same as dropping a course.

JANUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
	Lewis Lecture	Lab 1 Pipette/ Solution	Lab 1 Pipette/ Solution	Lab 1 Pipette/ Solution	Lewis Lecture	
28	29	30	31			
	Lewis Lecture	Lab 2 AA Titration	Lab 2 AA Titration			

FEBRUARY				1	2	3
				Lab 2 AA Titration	Lewis Lecture	
4	5	6	7	8	9	10
	Whitten Lecture	Lab 3 SEC	Lab 3 SEC	Lab 3 SEC	Whitten Lecture	
11	12	13	14	15	16	17
	Whitten Lecture	Lab 4 LDH Extraction	Lab 4 LDH Extraction	Lab 4 LDH Extraction	Whitten Lecture	
18	19	20	21	22	23	24
	Whitten Lecture	Lab 5 LDH Affinity	Lab 5 LDH Affinity	Lab 5 LDH Affinity	Whitten Lecture	
25	26	27	28			
	Whitten Lecture	Lab 6 Bradford	Lab 6 Bradford			

MARCH				1	2	3
				Lab 6 Bradford	Whitten Lecture	
4	5	6	7	8	9	10
	Whitten Lecture	Lab 7 LDH Activity	Lab 7 LDH Activity	Lab 7 LDH Activity	Whitten Lecture	
11	12	13	14	15	16	17
18	19	20	21	22	23	24
	Whitten Lecture	Lab 8 LDH SDS-PAGE	Lab 8 LDH SDS-PAGE	Lab 8 LDH SDS-PAGE	Whitten Lecture	
25	26	27	28	29	30	31
	Lewis Lecture	Lab 9 LDH Kinetics	Lab 9 LDH Kinetics	Lab 9 LDH Kinetics	Lewis Lecture	

APRIL

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
	Lewis Lecture	Lab 10 Denatur- ation	Lab 10 Denatur- ation	Lab 10 Denatur- ation	Lewis Lecture	
8	9	10	11	12	13	14
	Lewis Lecture	Lab 11 Denatur- ation	Lab 11 Denatur- ation	Lab 11 Denatur- ation	Lewis Lecture	
15	16	17	18	19	20	21
STAAR Outreach Week	Lewis Lecture	outreach	outreach	outreach	No lecture	
22	23	24	25	26	27	28
	Whitten Lecture	Final Practical Exam	Final Practical Exam	Final Practical Exam	no class/ Outreach Due	
29	30					
	no class					

IMPORTANT DATES

January 16	First day of class
January 16	Laboratories begin
March 11-18	Spring Break
March 27	Automatic W deadline
April 19	Withdrawal deadline
May 2	Last day of class

