

CHEM 3381 – Biochemistry Techniques

Spring 2019

revised 1/18/2019

Instructors:

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

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

Instructional Assistants:

L01 (Tues 8 am – noon): Brianna Norbury, bin29@txstate.edu

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

L03 (Wed 8 am – noon): Samantha Zepeda, sk1203@txstate.edu

L04 (Wed 2 pm – 6 pm): Ruby Escobedo, rae37@txstate.edu

Soroush Omidvarnia, soroush.omidvarnia@txstate.edu

L05 (Thurs 8 am – noon): Brianna Norbury, bin29@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 – 10 am.

Dr. Lewis' office hours are Mon – Fri, 9 – 10 am.

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.

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.

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
- shirt with sleeves
- safety goggles/glasses

Course Grades

Lab Participation/Cooperation/Safety (5 pts each)	60
Pre-Lab Quiz (15 pts each)	180
Pre-/In-Lab Notebook Duplicates (15 pts each)	180
Post-Lab Analysis (30 pts each)	360
Formal Lab Report	150
Final Exam (lab practical final)	100
TOTAL	1030

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.
- IAs 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 (on TRACS).
- 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 next lab session. Assignments will be considered late if they are turned in more than 5 minutes after the lab session is scheduled to begin.

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	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 First Lecture	26
27	28 Lewis Lecture	29 Lab 1 Pipette/ Solutions	30 Lab 1 Pipette/ Solutions	31 Lab 1 Pipette/ Solutions		

FEBRUARY

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

MARCH

					1 Whitten Lecture	2
3	4 Whitten Lecture	5 Lab 6 Bradford	6 Lab 6 Bradford	7 Lab 6 Bradford	8 Whitten Lecture	9
10	11 Whitten Lecture	12 Lab 7 LDH Activity Assay	13 Lab 7 LDH Activity Assay	14 Lab 8 LDH Activity Assay	15 Whitten Lecture	16
17	18 S P R I N G B R E A K	19	20	21	22	23
24 31	25 Whitten Lecture	26 Lab 8 LDH SDS-PAGE	27 Lab 8 LDH SDS-PAGE	28 Lab 8 LDH SDS-PAGE	29 Whitten Lecture	30

APRIL

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 Lewis Lecture	2 Lab 9 LDH Kinetics	3 Lab 9 LDH Kinetics	4 Lab 9 LDH Kinetics	5 Lewis Lecture	6
7	8 Lewis Lecture	9 Lab 10 Denaturation	10 Lab 10 Denaturation	11 Lab 10 Denaturation	12 Lewis Lecture	13
14	15 Lewis Lecture FORMAL REPORT DUE	16 Lab 11 Denaturation	17 Lab 11 Denaturation	18 Lab 11 Denaturation	19 Lewis Lecture PEER REVIEW	20
21	22 Lewis Lecture PEER REVIEW	23 Lab 12 Nonlinear Regression	24 Lab 12 Nonlinear Regression	25 Lab 12 Nonlinear Regression	26 Lewis/ Whitten Lecture	27
28	29 Lewis/ Whitten Lecture	30 FINAL PRACTICAL EXAM				

MAY

			1 FINAL PRACTICAL EXAM	2 FINAL PRACTICAL EXAM	3 no class	4
8	6 no class	7	8	9	10	11
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

IMPORTANT DATES

January 22	First day of class
January 29	Laboratories begin
February 5, 6, 7	First Post-Labs Due
March 18-22	Spring Break
April 2	Drop/Automatic W deadline
April 15	Formal Lab Report Due
April 19	Peer Review: Introduction
April 22	Peer Review: Methods
April 25	Withdrawal deadline
April 30, May 1, 2	Final Practical Exam
May 6	Last day of semester classes