Syllabus
BIBC 103: BIOCHEMICAL TECHNIQUES
Section B00
Winter Quarter 2022

Instructor:
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Office Hours: Anytime I'm around the labs, or by appointment (I have a desk in 3306, so please find me there whenever you have a question.)

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IAs:
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Lecture: Tu/Th 8:00 AM - 9:20 AM Sequoyah 147
Lab: Tu/Th 9:30 AM - 1:20 PM; York 3306 (B01), 3406(B02).

What to bring to lab each day:

1. **double masks or KN95/N95 mask**
2. Lab Manual (2021 edition)
3. Lab Research Notebook with 100 numbered duplicate pages
4. Pen (must use ink for notebook)
5. lab coat
6. UV safety glasses
7. proper attire and shoes

Course Objectives:
This course will introduce some of the experimental methods used in biochemistry and molecular biology, with an emphasis on those techniques used to study proteins.You will gain conceptual understanding and hands-on experience in various protein purification techniques and methods for analyzing the different properties of proteins. The laboratory work will consist of three big multi-week projects and some shorter side projects. All the lab work will emphasize mastery of the skills that are essential to work independently in a biochemistry lab, including hands-on wet-lab and quantitative reasoning skills.

More importantly, this course is designed to give an appreciation of what science is and how it works. Science is not just a bunch of random facts… it is a process! It is easier to understand biology, or any field, when you understand how we know what we know. Understanding how information in biology is brought to light is just as important as the information itself. Through the laboratory projects we will develop the skills necessary to interpret data from experiments in order to answer questions about biological system, and to design experiments to ask new questions. In keeping with this, the importance of good experimental design, including the use of appropriate controls, will be highlighted in all experiments.

Point cutoffs for grade assignments:

A+	990-1000	B+	890-899	C+	790-799	D	590-699
A	910-989	B	810-889	C	710-789	F	0-589
A-	900-909	B-	800-809	C-	700-709		

Course Structure

Activity	Point Value
LDH Purification: Lab notebook	40
LDH Purification: Purification table analysis	115
FGF Signaling: Questions from lab manual data (Jan 18)	10
FGF Signaling: Lab report	230
Lab 1 part E calculations (Jan 4)	10
Bioinformatics: Lab manual questions	60
Bioinformatics: PyMOL protein image	50
Fluorescent Proteins: Lab notebook	35
Fluorescent Proteins: Identify unknowns	20
Quizzes: Three at 30 points each	90
Exam 1	130
Exam 2	210
Total	1000

Lab Quizzes and Exams

All quizzes and exams will be taken in person during the lab sessions. The purpose of the lab quizzes is to be sure that you are mastering the basic concepts behind the experiments as we go through the class. This includes understanding the purpose of the lab projects and how each experiment fits into this, the basic concept underlying the procedures, and simple mathematical and analytical skills based on what you have actually done in lab. The quiz and exam dates are on the lab schedule. Quizzes will be given at the beginning of lab, will take 15-30 minutes, and will consist of 5-7 questions. The topics that will be covered on each quiz will be posted in an announcement on Canvas on the Monday prior to the quiz.

The two exams are cumulative and will be problem solving-based. They may include some basic questions on the concepts we have covered, but will emphasize taking the information you have learned and extrapolating to solve problems you have not seen before. Some practice problems (not practice exams) will be provided on Canvas to help you prepare.

Lab Attendance Policies

In-person attendance at each lab is mandatory. If you test positive for COVID-19 or feel ill, however, stay home and contact the instructor by email. If you test positive for COVID-19 and must isolate, we will work to keep you in the class. Details on each day's lab experiments will be available in the lab

manual. You are required to read the manual BEFORE coming to lab. Attendance will be taken at each lab session. If you are more than 10 minutes late to lab, or you leave lab before your group is done, you will be counted as absent for that day. Your attendance will be factored into your final grade. An unexcused absence will result in 10 points being deducted. If you know that you need to miss a lab session, discuss this with the instructor (not the IA, they are not authorized to give you permission) to see if it will be possible to make up the lab session or excuse you from the lab with no consequences. Please bring this to the instructor's attention as soon as you know that it will be an issue. **Only the instructor can excuse an absence. Two unexcused absences will result in the student failing the course. Athletic competitions are not excused absences.**

Turning in Lab Report/HW

Lab report and data write-ups will be submitted electronically on Canvas. Lab reports are due before the end of the day (by 11:59 PM) on the due date. Late assignments will be deducted 10 points for each day late. Students agree that by taking this course all required papers will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

Academic Integrity

Cheating will not be tolerated. The administrative policy on Academic Dishonesty outlined by this institution will be followed. Students caught cheating during an exam or quiz will be removed and given a "zero" for that exam or quiz. A report will also be filed with the Academic Integrity Coordinator. Cheating includes, but is not limited to, plagiarism, talking during tests, tampering with graded tests, or making use of forbidden materials during tests. Students will be permitted to bring only non-programmable calculators and writing implements to exams.

During laboratory sessions, student cooperation and collaboration is highly encouraged. This includes discussion of experimental data with fellow students during lab hours. After the laboratory session is over, however, you are required to work on your own. ***Each student must hand in an independently written and independently thought-out data analysis for each lab***. If you are caught working with another student on your written assignments, both of you will receive a "zero" for that lab report, and you might be reported to the Academic Integrity Coordinator.

It is NOT acceptable to use any old lab reports to assist you in any way. If you happen to be in possession of old copies of lab reports for this class, it is best that you do not even look at them, since they could unintentionally influence the way that you write your own report. If we discover that you have used an old lab report in any way, you will automatically receive a "zero" for that lab report, and you might be reported to the Academic Integrity Coordinator.

While your lab reports and homeworks will be returned to you, you are NOT permitted to share them with anyone for any reason. If we find that you have shared your reports with anyone, you will be reported to the Academic Integrity Coordinator, even if you have already completed the class.

Make-up Exams
If a student is unable to take an exam, he/she must contact the instructor *as soon as possible*, and with as much advance notice as possible. If there is a valid reason, and solely at the discretion of the instructor, an oral exam or an alternate written exam will be administered.

Re-grading Exams
Exams will be available for you to review as soon as they are graded. You may NOT take the exams with you. Any exam that is not returned will receive a grade of zero. Exam keys will be available in lab on the day that exams are returned. Please review the key and check over your answers. If you feel that an error has been made in the grading of your exam, please write a note (on the exam or on an attached piece of paper) stating the discrepancy and it will be reviewed by the professor and/or the IA who graded that question. **UNLESS THERE IS A SIMPLE ADDITION ERROR, ALL REGRADES WILL BE DONE TO THE ENTIRE EXAM.**

Re-grading Lab Reports
All requests for re-grades of lab reports must be in writing. Attach a note or write directly on your lab report, and return it to your IA. The option of re-grades is solely at the discretion of the IA, and all re-grade decisions are final. The request must be received by the next lab period after the lab report has been returned.

Note that the IA will have the discretion to re-grade your entire lab report, not just the section that you feel is in error.

Course Requirements
In order to pass this course, you must successfully complete the following:

Turn in all assignments, even if they are late.
Take all exams, or get instructor's approval on alternates.

Course Shifted to Remote Format Through Monday, Jan 31

The first four weeks of the class will be conducted remotely. Lectures, lab sessions, and office hours will be conducted by Zoom. Log into Canvas and join through the link on the Zoom LTI page or in the Calendar. The lectures will be recorded, but the lab sessions will not be recorded. <u>You are required to attend lab on Zoom with your video on</u> (please contact me if you are not set up for this). You will work in groups of four to complete the lab work, and during the lab sessions you will go back and forth between your lab class of 24, and breakout rooms where you will work in your lab groups. Some of the lab work is for credit for what is completed during the lab sessions. After Jan 31st, the class will shift to an in-person format for lectures and labs. Lectures will be video-recorded and made available by podcast. <u>There will not be a remote option for the labs after the first two weeks, and attendance in person will be mandatory.</u>

Lab Schedule7

Week	Date	Experiment/Activity	Chapter
1 Remote	1/4	Arrange groups; pipetting video, convert absorbance to percent concentration for pipetting accuracy calculation	Lab 1 part E, read pp. 1-11
	1/6	Bioinformatics 1	Lab 19 part A
2 Remote	1/11	Bioinformatics 2	Lab 19 part C
	1/13	Bioinformatics 3	Lab 19 part D
3 Remote	1/18	Fibroblast Growth Factor (FGF) Signaling: Examine dataset, come up with questions Quiz 1 - Asynchronous Canvas quiz	Lab 9B
	1/20	FGF 2: Develop hypotheses to explain dataset and design experiments to test	Lab 9B
4 Remote	1/24	PyMOL protein image assignment due Mon by 11:59 PM	
	1/25	FGF 3: Examine Western blot and ELISA data	Labs 10-12
	1/27	FGD 4: Design figures for lab report; Electrophoresis & SDS-PAGE - calculations for SDS-PAGE	Labs 10-12 Lab 2
5	2/1	Safety orientation; Electrophoresis & SDS-PAGE - run SDS-PAGE	Lab 2
	2/3	LDH 1: Initial purification of LDH from crude homogenate: centrifugation, ammonium sulfate precipitations	Lab 3
6	2/8	Exam 1 in lab; prepare size exclusion chromatography columns	Lab 5
	2/10	LDH 2: Affinity Chromatography	Lab 4
	2/11	**FGF signaling lab report due Friday 11:59 PM**	
7	2/15	LDH 3: Size exclusion chromatography	Lab 5
	2/17	LDH 4: LDH activity assays; Bradford protein assays	Lab 6
8	2/22	LDH 5: SDS-PAGE of LSH purification fractions Quiz 2	Lab 7
	2/24	LDH 6: Agarose gel electrophoresis of LDH isozymes	Lab 8
9	2/28	**LDH purification table analysis due Mon by 11:59 PM**	
	3/1	Fluorescent proteins (FP): Make competent cells and transform with plasmid Quiz 3	Lab 15
	3/3	Purification and analysis of fluorescent proteins	Lab 16
10	3/8	SDS-PAGE of fluorescent proteins	Lab 17
	3/10	Exam 2 in lab	