



SLCC Biotechnology 2020
Biomolecular Separation and Analysis
Itineris Early College High School
Fall 2010

Instructor: Randy Booth Ph.D. Email: rbooth@iechs.org
Course website: <http://www.iechs.org/staff/booth/BTEC2020.htm>

Course Information: This class meets twice a week for 3 hours (3 cr).

Course Objectives: Prereq: BTEC 2010 with C grade or better. Purification and analysis techniques that are applied to biologically active substances are taught. Attention will be given to protein purification and analysis and includes immunological, electrophoretic, and chromatographic technologies.

Required Materials for each student:

- Calculator
- A Sharpie permanent marker
- At the Bench – A Laboratory Navigator by Kathy Barker
- Principles of Biochemisry 4th edition

Laboratory Fee:

Due to the expense of supplies for this course, a lab fee of **\$25** is required of each student enrolled. Please pay lab fees early at the office.

Grade and Corresponding Percentage

A	93 – 100 %	C+	77 – 79.9%
A-	90 – 92.9%	C	73 – 76.9%
B+	87 – 89.9%	C-	70 – 72.9%
B	83 – 86.9%	D	60 – 69.9%
B-	80 – 82.9%	E	below 60%

Category	Value	Grade Breakdown
Attendance and Participation	3 points per day	90 points
Laboratory Notebook	4 at 25 points each	100 points
Homework	4 at 10 pts each	40 points
First Lab Report	40 pts	40 points
Second Lab Report	60 pts	60 points
Third Lab Report	100 pts	100 points
Laboratory Duties	20 pts	20 points
Attendance Final	50 pts	50 points
Total		500

Evaluation:

Attendance and Participation: Due to the accelerated pace of college courses, that this course is primarily hands on training in the laboratory, and the absence of time for makeup labs, attendance and participation are extremely important. *The experiments for this course may require time outside of regular class time to complete.* The points awarded will be directly proportional to the time in class minus lost points for lack of participation or inappropriate behavior. Each class is worth 3 points if on time, 2 if tardy, 1 if more than 15 minutes late. The Itineris Early College High School attendance policy also applies to this class. A comprehensive final exam will be given the last day of the semester for any students with excessive absences (>2). Students with 2 or less absences will be awarded the 50 points. It is the discretion of the teacher and the nature of any excused absences determining who will be required to take the final exam.

Homework: As this course content intensive, it is imperative that each student complete the assigned readings and assignments to reinforce the concepts covered in class. The homework assignments must be handed in on time to receive full credit. If you anticipate that you may miss a class when an assignment is due, you need to turn it in prior to the due date to receive full credit. If the assignment is turned in within 1 day of the due date, 50% of the points will be taken away. No assignment will be accepted if more than a day late.

Laboratory Notebook: Maintaining a laboratory notebook is an important part of many science jobs. In Industry the laboratory notebook is property of the company and must stay at the company. You are expected to keep the lab notebooks at school. Lab books will only be graded four times and each check is worth 25 points. Points will be lost if the notebook is not current, legible, or not completed following proper scientific method.

Lab Reports: The curriculum is divided up into three major projects. A laboratory report will be required for the first two projects. Reports follow the same guidelines as homework as far as deadlines. Scientific writing is different than most writing assignments in a typical high school. One of the goals of this course is to teach you how to correctly construct a scientific paper. Papers will be rigorously graded (see PaperGradingCriteria.PDF) and the first two papers may be resubmitted after making corrections for grading. Resubmissions must be reviewed by an writing tutorial teacher and turned in with the original submission before they will be regarded. If you resubmit a paper the grades of both submissions will be averaged. Science writing is still writing. Your graded draft which have been edited or graded is a good place to accomplish. After you correct the errors, have the revised copy signed by the tutorial advisor and return the original and revised paper to Dr. Booth. If an error has been previously marked with a check and the same error occurs in a subsequent assignment, the grade for that assignment will drop according to the following scale: A will go to B+; A- to B; B+ to B-, B- to C+, and so forth. The Writing Tutorial class is a great place to get help from the advisor and from other English 2010 students in order to correct your errors and strengthen your writing. Editing and writing well are essential skills for success in any career and for living a deeply satisfying life.

Laboratory Maintenance / Evaluation: Each student will be assigned a roll in maintaining the order of the lab. Assignments will be rotated monthly. Failure to complete your assigned tasks will result in loss of points. Working together with others is important for work in the laboratory. Each student will be evaluated by the other students in each project group.

SCHEDULE FOR BIOTECHNOLOGY 2020*

Day	Topic	Activity
1	Course introduction/ Laboratory Notebook/ Lab Safety/ Bradford Assay, Serial Dilutions	Prepare standards and perform a microplate Bradford assay/ prepare PAGE reagents
2	Linear Regression and SDS-PAGE	Analyze Bradford Data/ prepare PAGE reagents
3	Chromatography	Pour and run gel
4	SDS-PAGE/ GST-PLC δ purification overview/ explain protein induction	
5	Bacterial Growth and Protein Expression/ centrifugation	SDS-PAGE/ run and stain a gel/ start GST-PLC δ culture
6	Affinity Chromatography	Purify GST-proteins/ bug busters
7	ELISA/Western blotting techniques (pipstrips)	Batch purify GST-PLC δ / measure concentration by Bradford assay
8	Writing a report and using EndNotes	Run gel of purification steps
9		Analyze by PIPstrips
10	Alkphos Project overview/ Ion-exchange chromatography	Finish GST project
11		Start Alkphos Culture/ prep buffers
12	Homogenation	Express and harvest alkphos/ Report #1 due
13	Training on the FPLC	Purify alkphos
14		
15		Purify alkphos
16	Analyzing Enzyme Kinetics	Purify alkphos
17		Run gel/ analyze fractions
18		Data Analysis
19		
20	Purification Project Overview	Start on independent Protein Purification Projects
21		Work on independent projects/ Report #2 due
22		Present purification schemes
23		
24		
25		
26		
27		
28		
29		
30		
31	Clean up	Report #3 due

* This schedule is tentative and may be modified as the semester progresses to better fit the needs of the class

Data for each paper –

1st - gel, Bradford, western blot, pipstrip

2nd – gel, Bradford, enzyme analysis (enrichment and Km)

3rd – gel, Bradford, western blot, enzyme analysis.

Classroom Policies Biotech 2020

Students' conduct and dress should be in accordance with Jordan School District and Salt Lake Community College policies. Failure to learn the policies is not an excuse. A link for the Jordan School District policy of student conduct can be found on the course website.

Laboratory Dress Code: Students shall dress in a manner that shows respect for the educational environment and is befitting the day's activities. This means no revealing or skimpy clothing, wear lab coat when conducting experiments, no open toed shoes in the lab (bring and extra pair of shoes if necessary), and eye protection when necessary.

Classroom Behavior: Students who demonstrate through their actions to be a distraction from a learning environment will be dismissed from class for the day. If multiple offenses occur that student may be asked to not return to the class and will receive a failing grade.

Academic Honesty: Students will be expected to adhere to the Itineris Early College High School academic honesty policy. And violation of this policy will result in a minimum of a zero for the assignment and could lead to dismissal from the course with a failing grade. The academic honesty policy can be found at <http://www.iechs.org/docs/AcademicHonestyPolicy.pdf>.

Cell phones and other electronic devices: Possession of a cellular telephone by a student is a privilege that may be forfeited by any student that uses their cell phone inappropriately. Cellular telephone use during classroom time, instructional activities and field trips is prohibited. Cellular telephones must remain off during these times. Failure to comply with this policy will result in dismissal from the class for the day with loss of the day's points. Cells phones will not be tolerated in class and 5 points will be deducted from a students' grade each time a cell phone is seen, heard, or used in lab. Calculators are available for checkout at the front office.

Food: **No food or drink in the laboratory.**

Safety: Students will be working with lethal chemicals. Students will be trained in laboratory safety procedures. Students must return a signed laboratory safety contract to continue to participate in the laboratory activities (see attached contract). **Any activity endangering the safety of any students WILL NOT be tolerated and may result in dismissal from the course.** Contact Dr. Booth if you have any questions about laboratory activities and/or safety issues.

Microbe use: All bacterial strains used in this course have been selected and genetically altered to be non-pathogenic to humans.

Disease Education: During the course of Biotechnology the topics of viruses, bacteria, and disease transmission will be discussed. This topic MAY address the issues of AIDS/HIV and other health issues. **State law requires that written parental consent must be obtained before a student can participate in learning about contraception devices and/or substances that includes issues such as AIDS/HIV and that parents be given the opportunity to review the curriculum. The curriculum of this course does not include the topics of contraception, but we will discuss the process of viral infection as it pertains to the field of biotechnology.**

Lab Safety Agreement Biotech 2020 Fall 2010

For success in our laboratory, everyone must agree to respect the same laboratory rules, to obtain and use the proper safety equipment, and to take appropriate precautions during a lab activity. I as your teacher will prepare you ahead of each lab on the safety issues, but it is up to you to remember good lab protocol and obey those warnings announced ahead of time.

Very Important things to remember:

1. **ABSOLUTELY NO** food or drink in the laboratory. Never eat or drink in the laboratory.
2. NEVER taste chemicals. NEVER directly touch chemicals.
3. No pipetting by mouth.
4. Never work alone in the laboratory.
5. Never perform any experiment not specifically assigned by your teacher.
6. Use lab equipment properly and only after training and instruction.
7. Do not apply cosmetics in the laboratory.
8. It is best not to wear contact lenses in the lab. Chemical vapors can get between the lenses and the eyes and cause permanent eye damage.
9. Know the location of all safety and emergency equipment used in the laboratory.
10. Become familiar with the specific hazards of an experiment before you begin.
11. Before beginning work: tie back long hair, roll up loose sleeves and put on any personal protective equipment required by your teacher.
12. Report any accidents, incidents, or hazards to the teacher immediately.
13. Keep your work area neat and uncluttered.
14. Clean your work area at the conclusion of a lab activity, disinfect your station with bleach solution.
15. Follow the proper disposal of all reagents, sharps, and broken glass.
16. Wash your hands with antibacterial soap and water.
17. Always respect lab work. Due to the amount of students that will utilize the biotech lab, there will be other experiments at or around the workstations. Please leave them alone.

Your commitment to the lab safety rules and your respect of the property in the laboratory are absolutely necessary. If intentional misuse or abuse of the lab and its property is intended, you may be removed from the course.

I understand the safety rules and agree to conduct myself appropriately by adhering to safe laboratory practices as instructed.

Student's printed name _____

Student's Signature _____

Date _____

My student has discussed with me the disclosure, safety contract, and the importance of safety in the laboratory and I support my student in safe laboratory practices.

Parent/Guardian's Signature _____