



SLCC BTEC 1015
Introduction to Biotechnology Lab
Itineris Early College High School
Spring 2011

Instructor: Randy Booth Ph.D.

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Course Information: This class meets once a week for 3 hours.

Course Objectives:

This course teaches students fundamental theoretical and practical hands-on knowledge of commonly used instruments, preparation of solutions, reagents, and methodology appropriate to the life science laboratory.

PREREQUISITES: Students are required to have completed MATH 0990 and RDG 0990 with grades of C or better, or obtained an appropriate placement score prior to enrolling in this class.

COURSE MATERIALS: *Students will receive a standard issue lab notebook for use in this course. Students are advised to also bring a sharpie pen and obtain a 3-ring binder to organize protocols and handouts.*

BLACKBOARD: *Online course materials and announcements will hopefully be available through Blackboard. If we don't receive access we will do in-class quizzes. You access Blackboard by signing into MyPage and clicking on the tab My Courses. Scroll down to the Online Courses icon, and click to login using your MyPage login information. Then, choose BTEC 1015 from the Course List. Within Blackboard, the Course Tools panel on the left will direct you to Assessments and other categories. You may bookmark the Blackboard login site for easier access.*

COURSE FORMAT and OBJECTIVES: The course will utilize a mixed format in which classroom instruction is reinforced by select laboratory experiences. Students successfully completing this course will be well prepared for entry-level laboratory work and further advanced biotechnology laboratory instruction. Such students will be able to:

1. Understand and correctly use laboratory safety practices when using biological and chemical materials.
2. Maintain accurate laboratory notebooks.

3. Understand the principles of operation and be able to use common equipment found in a biotechnology laboratory. These include but are not limited to:
 - scales
 - micropipettors
 - centrifuges
 - spectrophotometers
 - pH meters
 - water baths
 - electrophoresis chambers
4. Understand and use common metric system quantities and conversions.
5. Apply math concepts to solve common biotechnology quantitative tasks.
6. Prepare solutions to correct pH, molar, percent, and “X” concentrations.
7. Correctly use aseptic technique in manipulation of bacterial cultures.

Required Materials:

1. Assigned Laboratory Notebook
2. Calculator
3. Sharpie Marker (fine tip works best)

Laboratory Fee:

Due to the expense of supplies for this course, a lab fee of **\$25** is required of each student enrolled. Failure to pay the lab fee will result in a failing grade for the course.

Grading: Remember grades are not given but earned!

Grade Assessment	
Class Attendance & Participation	200 pts
Laboratory Notebook	100 pts
Math Quizzes	100 pts
Exam	200 pts
Pipetting Test	100 pts
Safety, technique, and success	100 pts
Plasmid Identification Report	200 pts
Total	1000 pts

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

A grade below a C- will not qualify one for taking courses that require this class as a prerequisite.

Evaluation:

Attendance and participation: Because this course emphasizes hands-on training in the laboratory and moves at a fast pace, attendance and active participation in each session are crucial. Up to 200 points may be earned for regular attendance, class participation, and professional conduct. Absence, lack of fully engaged participation, and inappropriate behavior will result in loss of up to 50 points per lab session. Points lost for absence are not limited to 200; for example, 6 absences would result in loss of 300 points.

Lab notebook: Lab notebooks will be collected and graded at 4:00 pm the end of class. Employers require that lab notebooks be kept up-to-date at all times, and this course will uphold that standard as well. Notebooks will be scored using the 10-point rubric attached to the syllabus. Lab books will be available for pick up no later than the second day after class. You will be expected to come to class with the prelab completed in your lab books (worth 50% of the points). Failure to complete the prelab before class will result in a loss of 25% of the points for that lab book assignment.

Late Work: Any assignment that is not turned in when asked for and collected will be dock 25% of the total credit for the first 24 hours and 50% if turned in after the first 24 hours. No assignment will be accepted after 1 week from the due date.

Quizzes: One of two things will happen. Either five quizzes will be administered through Blackboard, or we will have five in-class quizzes. Quizzes are designed to promote practice; in some cases, students may be allowed to continue retaking the quiz (with randomized questions) until they are satisfied with their score. *Access Blackboard by signing into MyPage and clicking on the tab My Courses. Scroll down to the Online Courses icon, and click to login using your MyPage login information. Then, choose BTEC 1015 from the Course List. Within Blackboard, the Course Tools panel on the left will direct you to Assessments. You may bookmark the Blackboard login site for easier access*

Exam: One exam will test student understanding of *math concepts used to solve common biotechnology quantitative tasks*, and create buffers, and pH.

Pipetting test: Accuracy and precision in use of micropipettors will be assessed in class. Students will have multiple opportunities to practice prior to the official test.

Safety, technique, and success: Students will be evaluated on their ability to safely employ good lab techniques, and thereby achieve experimental success. When possible, objective measures of success (e.g. pH of a solution made, absence of contamination in media bottles) will be evaluated. Subjective observations of safety, technique, and success will also be considered.

Plasmid identification report: At the end of the course, students will be given an unidentified plasmid, and asked to use the skills they have learned in this course to identify it. Students will be required to submit a report of this activity, which should include background, methods, results, data analysis, and conclusions. Students will receive a rubric for the report before starting this assignment.

Make up lab: A single make up lab will be held the week of finals for anyone who missed a lab.

BTEC 1015 Semester Schedule Spring 2011*

Week of	Lab activity	Lecture topics	Assessments
1/10	Lab tour, form groups & practice using balances, micropipettors	Introduction to the course, lab safety & etiquette, metric system, dimensional analysis, Lab notebooks, micropipettors, balances	HW Packet
1/17	<i>Dr. MLK Holiday</i>	NO LAB	
1/24	Balances	Calculating percent and "x" concentrations	Lab 1
1/31	Practice making solutions	Molarity, pH, buffers	BB Quiz 1 / Lab 2
2/7	Make buffer solutions, test other group's buffer pH	Spectrophotometry	Lab 3
2/14	Spectrophotometry exercise	Gel electrophoresis	BB Quiz 2 / Lab 4
2/21	<i>Presidents' Day Holiday</i>	NO LAB	
2/28	Gel electrophoresis	Standard curves	BB Quiz 3/ Pipetting test/ Lab 5
3/7	Use Excel to generate standard curve, determine size of unknown DNA fragments	Sterile technique, plasmids, restriction digests	Lab 6
3/14	<i>Spring Break</i>	NO LAB	
3/21	Liquid cultures, spread and streak plates	Plasmids, restriction digests	BB Quiz 4 / Lab 7
3/28	Minipreps	Plasmid identification project	Lab 8
4/4	Restriction digests and gels		BB Quiz 5 / Lab 9
4/11	Exam		Exam
4/18	Plasmid identification project		
4/25	Plasmid identification project		
5/2	(Finals week) complete projects if necessary		Plasmid report Due May 5th

***Semester Schedule:** May be changed as needed by the instructor.

Black Board (BB) Quizzes are found on your SLCC My Page (see tutorial on the course website for instructions on finding the quizzes). The quizzes will be available Monday morning at 12:30 a.m. through Saturday at midnight for students to take the quiz on the indicated weeks. Students may take the quiz as many times as they wish to improve their score, but only have a total time of 3 hours to work on any one quiz.

Laboratory Notebook Format:

Table of Contents: Write the title of the lab on the next line of the table of contents and the page number of the first page of that lab write up in the lab book.

Title of Experiment: Title should be listed on each page of the lab book used for the experiment.

Purpose: What is the purpose of the lab? What does it have to do with the topic you have been discussing in the classroom? What information are we trying to gather or hypothesis are we trying to test? The purpose should be filled in before you start the lab.

Materials: What materials are needed for the lab? Underline any materials that are unfamiliar to you and ask the teacher for clarification. This should be done before the lab.

Procedure (Protocol): What are the steps in the lab? Make a list of what you will do once you are in the lab. Your experiments should be able to be repeated by someone else using your notes so be thorough and log as you go.

Flow Chart: Draw a flow chart of each step in the protocol to create an abbreviated procedure to help you keep track of where you are in the process.

Data/Results: What information did you gather in the lab? Make a list or tables to represent your information.

Calculations: If there are calculations to be done in the lab, use this section to write out your calculations.

Conclusion: Interpretation of your results. What does your data mean? Was your hypothesis correct? Answer analysis questions if listed in the lab.

Reflection: What did you learn from the lab experiment today? Did the lab help you better understand the topics being discussed in the classroom? What do you still not understand? This section is not data driven but rather a personal reflection on your learning.

Signature and Date: Sign and date each page that you write on for each lab.

Lab Book Scoring:	Points
Table of Contents completed	0.5
Title of Experiment	0.5
Purpose	0.5
Materials	1
Procedure (Protocol)	1
Flow Chart	1
Data	2
Calculations	1
Conclusion	1.5
Reflection	0.5
Signature and Date	0.5
Total Points	10

Classroom Policies Biotech 1015

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, is befitting the day's activities, and is consistent with the Jordan School District policies. No open toed shoes during laboratory exercises (bring and extra pair of shoes if 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.

Food: No food or drink in the laboratory.

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 and that parents be given the opportunity to review the curriculum.**

Laboratory Safety Agreement: Any student wishing to participate in the laboratory assignment must sign and hand in a laboratory safety agreement. If a student fails to turn in a signed laboratory safety agreement, he or she will not be allowed to participate in the laboratory exercise and lose points for that assignment.

Microbes: All microbes used in this course are not harmful (non pathogenic).

Laboratory Safety Rules

Biotech 1015 Spring 2011

1. Know the location and use of: fire extinguisher, fire blanket, fire exits, safety shower, eye wash, spill kits, and first aid kits.
2. The SLCC Police Emergency phone number is 9-911.
3. Conduct yourself in a responsible manner at all times in the laboratory.
4. No smoking, gum chewing, eating, or drinking in the laboratory. Never apply make-up in the laboratory.
5. Never fool around in the laboratory. Horseplay, practical jokes, and pranks are dangerous and prohibited.
6. Wear safety goggles when handling acids, bases, and organic solvents. Likewise, wear safety goggles if you are close to an unshielded UV light source. Contact lenses are not advised.
7. Wear sensible clothing. No shorts, short skirts, capris, or open-toed shoes allowed. Long hair must be tied back. Wear a lab coat at all times when in the lab.
8. Prevent cuts and burns. Discard broken or chipped glassware. Be aware and keep your neighbors aware of hot objects. Heat materials only in beakers, flasks, and porcelain ware; never heat graduated cylinders, burets, pipets, or watch glasses.
9. Immediately report any unsafe conditions to your instructor.
10. Report immediately any accident, no matter how minor, to your instructor.
11. Be aware and cautious of other's activities as well as your own.
12. Avoid all flames if flammable solvents are in use nearby. Most solvents other than water are flammable.
13. Pipeting by mouth is not allowed. Use a pipetting device to pipet all liquids.
14. Never conduct unauthorized experiments.
15. Never work alone in the lab.
16. Follow all safety precautions given by your instructor or protocol.
17. Keep all toxic and/or volatile materials in the fume hood.
18. Label all containers. Labels should include the name and concentration of the solution, the date it was prepared, the designation "SLCC BTEC 1015" and your initials. Unlabeled containers will be discarded!
19. Pipet tips that have been in contact with cells must be discarded in a biohazard container.
20. It is unethical to dispose of genetically-modified organism down the drain. Excess cell cultures must be treated with a 10% bleach solution before being discarded down the drain.

21. Certain aqueous solutions may be discarded down the drain, however, common sense dictates that volatiles (HCl, ammonia, etc.) be poured down drains **ONLY IN THE HOODS!!**
22. Do not pour down the drain any organic solvent (e.g. acetone, acetonitrile, etc.). Inform your instructor of any organic solvent that needs to be disposed of.
23. If there is a fire drill, containers must be closed, gas valves turned off, and electrical equipment turned off. Learn where the gas valves are located in the laboratory.
24. Limit the amount of time you wear gloves. Avoid touching lab doors and equipment as much as possible when wearing gloves.

Housekeeping and Etiquette

1. You are responsible for the cleanliness of the entire lab as well as your work bench. Your work in the lab is not completed until all areas are returned to a clean and orderly state.
2. Clean up areas around the reagent weighing balances immediately after use.
3. Wipe up spills immediately.
4. Dirty laboratory glassware and equipment must be placed in the appropriate receptacles (usually located next to sinks) and, if possible, rinsed off with distilled water prior to washing in the washing machine.
5. Place dirty spatulas in the dirty spatulas container after use.
6. Glass pipettes must be placed in the appropriate receptacles. If the receptacles are empty, refill with a solution of 10% bleach.
7. Solid chemicals, pipet tips, matches, filter papers, paper towels, eppendorf tubes, and all other insoluble materials should be disposed of in the proper waste container, not in the sink.
8. Keep aisles clear. Push your chair under (or up to) the bench when not in use. Books, purses, and backpacks should be stored away from lab benches and walking aisles.
9. Aliquots of stock solutions and media should be kept at your bench or in the freezer for your future use.
10. Never interfere with experiments or procedures conducted by others in the laboratory without their consent.
11. Immediately report short supply of any reagents or communal solutions or kits to your instructor.
12. Refill water and ethanol bottles when emptied.

**Biotechnology 1015
Safety Agreement Spring 2011
Instructor: Randy Booth**

Your commitment to the lab safety rules and your respect of the property in the laboratory are absolutely necessary. If you intentionally misuse or abuse of the lab and its property, you may be removed from the course and receive a failing grade.

I understand and agree to abide by the safety rules knowing the consequences of abusing the laboratory.

Student's printed name _____

Student's Signature _____

Date _____

My student has discussed with me the syllabus, the classroom policies, the lab safety rules, the importance of safety in the laboratory and consequences for misconduct. I am also aware that the microbes that will be used in the laboratory are not harmful and there is a \$25 lab fee associated with this course.

Parent/Guardian's Signature _____