



**SLCC BTEC 1020  
Fundamentals of Biotechnology 2  
Itineris Early College High School  
Spring 2010**

**Instructor:** Randy Booth Ph.D.

**Email:** [rbooth@iechs.org](mailto:rbooth@iechs.org)

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

**Course Objectives:**

- Gain proficiency in basic lab skills such as pipetting, applied math, reagent preparation, lab notebook documentation, protocol preparation
- Implement industry regulatory affairs and standards

**Required Materials:**

1. Assigned Laboratory Notebook
2. 3-ring Binder for handouts
3. Calculator
4. Blue or black pen

**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!

<b>Grade Assessment</b>	
Class Participation	12 classes X 20 pts = 240 pts
Laboratory Notebook Write-up	11 labs X 20 pts = 220 pts
Homework	8 X 10 pts = 80 pts
Lab Math Test	70 pts
Citizenship	20 pts
Final	70 pts
<b>Total</b>	<b>700 pts</b>

<b>Grade and Corresponding Percentage</b>					
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.

<b>Week of:</b>	<b>Laboratory Activity*</b>
Jan 11	Introduction, Orientation, Safety Quiz, Lab Math, & Gram staining
Jan 18	<b>No Labs This Week</b>
Jan 25	Agar plates, inoculation, and streaking
Feb 1	Bacterial Transformation Lab (1 <sup>st</sup> Lab Math Test)
Feb 8	Plasmid purification prep
Feb 15	<b>No Labs This Week</b>
Feb 22	Plasmid purification and Quantitation Lab
Mar 1	Miniprep plasmid purification and Quantitation Lab
Mar 8	Restriction Digest on plasmids (2 <sup>nd</sup> Lab Math Test)
Mar 15	<b>Spring Break – Don't come to class!</b>
Mar 22	Freeze & Squeeze Lab
Mar 29	CSI PCR Lab I (3 <sup>rd</sup> Lab Math Test)
Apr 5	CSI PCR Lab II (HW)
Apr 12	Chromatography
Apr 19	Protein Analysis & SDS-PAGE
Apr 26	Microplate Bradford Assay
May 3	Final Exam

\*Semester schedule may be changed as needed by the instructor.

#### **Evaluation:**

Attendance and Participation: Due to the accelerated pace of college courses, attendance and participation are extremely important and account for 40% of the final grade. The points awarded will be directly proportional to the time in class minus lost points for lack of participation or inappropriate behavior. The Itineris Early College High School attendance policy also applies to this class. There will be **NO MAKE-UP LABS**, but the lowest lab grade will be dropped. *Parental waivers are due the second week of classes. Failure to turn in a waiver by the week of Jan 25 will prohibit that student from participating in any subsequent laboratory activities until a signed waiver is submitted.*

Laboratory Notebook: Students will be responsible for maintaining a laboratory notebook by documenting activities completed in the laboratory. Laboratory notebooks must be completed in *blue or black ink only (automatic 3 point deduction)*. The lab write-up will be due by 3:30 p.m. the day following the lab class (20 pts each). As the time in class is for conducting experiments, it is the students' best interest to have read the lab material before coming to class and fill out as much of the lab write-up as possible. Only work done in the laboratory notebook will be graded. Students are expected to be working out of the lab book, not out of the lab notes. Failure to bring and use a lab notebook in class will result in loss of 10 points for that lab write-up. Notebooks should be signed by the instructor before the student leaves the class as part of the daily check out procedure. Lab notebooks will be graded and be made available for pick up within two school days of the due date. Late work policy is loss of 25% of the score if less than 24 hours late. A loss of 50 % of the points if later than 1 day but before 1 week after due date. No credit will be received for work turned in after 1 week from the due date.

Homework: Students will be given eight homework assignments throughout the semester to reinforce the concepts in the lab and practice data interpretation.

Lab Math Test: The ability to correctly calculate grams, volumes, and concentrations is extremely important in the laboratory. A test of laboratory math problems will be offered three times during the semester. Full points are awarded to any students who achieves a score of 80% or higher for this assignment. Failure to achieve an 80% or higher on any of the three tests will result in a grade of zero for this assignment. There are no make exams for absences as you have three opportunities to pass this exam

Citizenship: Students will be evaluated at the end of the course on their ability to be productive in the lab and work well with other students.

Final Exam: The final exam is the Utah State Office of Education Biotechnology Skills Assessment. It is a computer-based exam and will be taken in the computer lab. Biotechnology standards and objectives over which students will be assessed can be found at the following web address. <http://www.usoe.k12.ut.us/ate/Skills/hst/708.htm>

STUDENT NAME: \_\_\_\_\_

**BIOTECHNOLOGY**  
**Performance Evaluation Checklist**  
**2009**

**Performance rating scale:**

- 4 = highly skilled** Successfully demonstrated without supervision
- 3 = moderately skilled** Successfully demonstrated with limited supervision
- 2 = limited skill** Demonstrated with close supervision
- 1 = not skilled** Demonstration requires direct instruction and supervision

***A minimum score of 3 for each of the following performance skills must be achieved to meet State skill certification requirements. Transfer the average score for each of the following performance skills onto the Performance Evaluation Score Sheet.***

**1.2 Research and present biotechnology concepts using effective communication skills.**

\_\_\_\_\_ **Average Score**

**2.1 Demonstrate appropriate use of personal protective devices.**

\_\_\_\_\_ Wearing and safe removal of gloves.

\_\_\_\_\_ Wearing goggles and lab coats when required.

\_\_\_\_\_ **Average Score**

**2.2 Demonstrate proper aseptic/sterilizing procedures.**

\_\_\_\_\_ Cleaning of work area.

\_\_\_\_\_ Flaming of inoculation devices.

\_\_\_\_\_ Hand washing.

\_\_\_\_\_ **Average Score**

**2.4 Demonstrate proper use and handling of micropipettes.**

\_\_\_\_\_ Use of micropipetting devices (adding/removing tips, changing volume settings).

\_\_\_\_\_ Drawing and expelling liquid correctly.

\_\_\_\_\_ **Average Score**

**3.2 Maintain accurate records and documentation according to minimum good documentation practices (GDP).**

\_\_\_\_\_ Maintain a designated lab notebook (to include table of contents, lab title, purpose, materials, protocol/procedure, observations/results, conclusion/discussion, signatures and dates).

\_\_\_\_\_ Documentation mistakes (single line through mistake, initial, date).

\_\_\_\_\_ Record procedural mistakes (document all that is done including mistakes).

\_\_\_\_\_ **Average Score**

#### **4.2 Prepare solutions of defined concentrations and pH.**

- \_\_\_\_\_ Calculating correct concentrations and volumes of solutions.
- \_\_\_\_\_ Demonstrate proper use of a balance (taring, use of weigh boats).
- \_\_\_\_\_ Proper labeling of solution containers.
- \_\_\_\_\_ Correctly adjust pH as needed.
- \_\_\_\_\_ **Average Score**

#### **6.1 Prepare bacterial growth media.**

- \_\_\_\_\_ Pour plates aseptically.
- \_\_\_\_\_ Add screening reagents appropriately.
- \_\_\_\_\_ Proper labeling of plates or tubes.
- \_\_\_\_\_ **Average Score**

#### **6.2 Demonstrate the ability to culture and maintain microorganisms.**

- \_\_\_\_\_ Isolating single bacterial colonies.
- \_\_\_\_\_ Inoculating media.
- \_\_\_\_\_ Identifying unknown microorganisms.
- \_\_\_\_\_ Utilizing Gram stain technique.
- \_\_\_\_\_ Balancing a centrifuge correctly when pelleting bacteria or DNA.
- \_\_\_\_\_ Proper use of microscopes in viewing microorganisms.
- \_\_\_\_\_ **Average Score**

#### **7.1 Perform a restriction digest and analyze the results with gel electrophoresis.**

- \_\_\_\_\_ Make and pour agarose gel.
- \_\_\_\_\_ Perform a restriction digest.
- \_\_\_\_\_ Load gels with sample.
- \_\_\_\_\_ Analyze stained gels.
- \_\_\_\_\_ **Average Score**

#### **7.2 Demonstrate the ability to use PCR technology.**

- \_\_\_\_\_ Prepare template DNA.
- \_\_\_\_\_ Set up PCR mixture.
- \_\_\_\_\_ Analyze results.
- \_\_\_\_\_ **Average Score**

#### **7.3 Demonstrate the ability to use proper separation techniques to differentiate between proteins based on size and structure (chromatography and SDS-PAGE).**

- \_\_\_\_\_ Perform chromatography or polyacrylamide gel electrophoresis.
- \_\_\_\_\_ Analyze results.
- \_\_\_\_\_ **Average Score**

#### **8.1 Perform a bacterial transformation and analyze results.**

- \_\_\_\_\_ Transform bacteria with plasmid DNA.
- \_\_\_\_\_ Identify transformed bacteria through use of selective media.
- \_\_\_\_\_ **Average Score**

## **Classroom Policies Biotech 1020**

**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 must first 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.

## Lab Safety Agreement Biotech 1020 Spring 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.

Eye Safety	Electrical Safety	Clothing Protection	Sharp Object Safety
Chemical Safety	Hygienic Care	Heating Safety	Glassware Safety
Safety with Gases	Microbe safety	Equipment Hazards	Waste Disposal

### **Very Important things to remember:**

1. Never work alone in the laboratory.
2. Never perform any experiment not specifically assigned by your teacher
3. Never eat, drink, or apply cosmetics in the laboratory.
4. NEVER taste chemicals. NEVER touch chemicals.
5. 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.
6. Know the location of all safety and emergency equipment used in the laboratory.
7. Before beginning work: tie back long hair, roll up loose sleeves and put on any personal protective equipment required by your teacher.
8. Report any accidents, incidents, or hazards to the teacher immediately.
9. Keep your work area neat and uncluttered.
10. Clean your work area at the conclusion of a lab activity, disinfect your station with bleach solution.
11. Wash your hands with antibacterial soap and water.
12. 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 the consequences of abusing the laboratory.

Student's printed name \_\_\_\_\_

Student's Signature \_\_\_\_\_

Date \_\_\_\_\_

My student has discussed with me the disclosure and safety statement and the importance of safety in the laboratory and I understand that the microbes that will be used in the laboratory are not harmful.

Parent/Guardian's Signature \_\_\_\_\_