Credit Hours: 3  
Lecture Hours: 32  
Laboratory Hours: 64

**Prerequisites:** Acceptance into the Biotechnology and/or Medical Laboratory Technology Program, and completion of BITC 1311.

A student of El Centro College is not under any obligation to purchase a textbook from a university-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer. **THECB TAC Rule 4.218 (c)**

**Course Description:** Presentation of theory applications, and operations of various analytical instruments. Practice of separation and identification techniques including electrophoresis, spectrophotometry, chromatography, and centrifugation.

**THECB Information:**  
Technical/Workforce; WECM: WECM: End of Course outcomes  
THECB WECM LINK [http://www.thecb.state.tx.us/AAR/UndergraduateEd/WorkforceEd/wecm](http://www.thecb.state.tx.us/AAR/UndergraduateEd/WorkforceEd/wecm)

**General Learning Objectives for BITC 2311: Biotechnology Laboratory Instrumentation**

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>EVALUATIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will:</td>
<td>Performance will be measured by:</td>
</tr>
<tr>
<td>1. Properly use equipment in the cell culture laboratory (glassware, pipettes,</td>
<td>1. Completion of assigned laboratory procedures according to instructions.</td>
</tr>
<tr>
<td>centrifuges, and spectrophotometer). (PL 1)</td>
<td>2. Completion of assigned laboratory procedures according to instructions.</td>
</tr>
<tr>
<td>2. Perform maintenance and calibration on laboratory instrumentation, and evaluate</td>
<td>3. Completion of written assignments and</td>
</tr>
<tr>
<td>equipment for acceptability of use. (PL 2)</td>
<td></td>
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<tr>
<td>3. Describe the basic principles of propagating and maintaining transformed</td>
<td></td>
</tr>
</tbody>
</table>
bacteria in the laboratory (PL 4)

4. Preparation of competent cells for transformation (PL 4)

5. Transform competent cells prepared in the laboratory.

6. Isolate plasmid DNA and protein from bacteria cells.

7. Record and interpret data utilizing standard laboratory procedures.

8. Purify proteins using chromatographic techniques.

9. Analyze DNA and proteins using standard laboratory procedure.

10. Read an original research article and write the protocol for propagating the cell lines.

topical exams with 70% accuracy.

4. Perform procedures by following instruction; identifying growth characteristics with a minimum of 70% accuracy.

5. Completion of written assignments, laboratory assignments and examinations with 70% accuracy.

6. Completion of written assignments and laboratory work.

7. Correct evaluation of laboratory studies assigned with 70% accuracy.

8. Completion of written assignments, laboratory procedures, and exams with 70% accuracy.

9. Completions of laboratory exercises, written assignments, and examinations with 70% accuracy.

10. Completion of written assignments and examinations.

**Course Information:**
The mission of the biotechnology program is to answer the needs of the health care industry and communities at large by providing highly competent and skilled entry level biological technicians whose capabilities include accurate and precise preparation of laboratory solutions, performance of basic laboratory procedures, and knowledge of the reasons behind the basic protocols. El Centro’s biotechnology program offers a diverse population of skilled graduates to meet the needs.

**Course Goals**
This course is an introduction to different laboratory instruments used in the laboratory. At the end of the course the students will be able to correctly use spectrophotometer, centrifuge, pH meter, autoclave, and chromatographic columns. Content of lectures and laboratory sessions are coordinated, so the student who successfully completes the course should possess an entry-level understanding of working with the various instruments in a research laboratory.
Students are responsible for all of the course objective and assignments given each week.
To the student: **If you require additional help, please do not hesitate to email or call the instructor (214) 860-2320.**

**METHODS OF INSTRUCTION:**

1. Classroom presentations
2. Audio-visual and electronic media.
3. Laboratory demonstrations
4. Selected laboratory experiences
5. Class discussion

**METHOD OF EVALUATION:**
Evaluation of your performance is based upon lecture examinations, laboratory exercises, written assignments and the correct operation of the instruments in the laboratory. The grades received from the lecture and laboratory portions of this course will be combined so that the student will receive one grade for the course. The student must achieve a **minimum of a 70% (“C”)** in all of the biotechnology courses.

The final course grade will be determined by the following:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Points</th>
<th>Evaluation</th>
<th>Course Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 – 100%</td>
<td>Exams</td>
<td>40%</td>
</tr>
<tr>
<td>B</td>
<td>80 – 89%</td>
<td>Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>C</td>
<td>70 – 79%</td>
<td>Laboratories</td>
<td>20%</td>
</tr>
<tr>
<td>D</td>
<td>60 – 69%</td>
<td>Research paper</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>100%</td>
</tr>
<tr>
<td>F</td>
<td>0 – 59%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Evaluations**

**Exams (40%)**
There will be **four exams**. The content of each exam will include new course content as well as the content from previous exams. There is a comprehensive final exam.

**Assignments (30%)**
There will be written assignments which will be submitted to the instructor at the designated time. Assignments submitted after the due date will have points deducted from the total points.

**Laboratory Exercises (20%)**
This is a course with great emphasis on laboratory techniques. Students are expected to read the laboratory procedure prior to coming to the lab and using the text as needed for a reference. Lab exercise and report sheets are to be kept in a laboratory notebook. The instructor will grade the lab notebook. Neatness, legibility and proper corrections will be part of the lab grade.
Research paper (10%)  
A research paper will be written on the use of flow cytometry in a clinical laboratory for the purposes of diagnosis. The paper will be submitted on the assigned date. Points will be deducted for the paper which is late.

Attendance and Punctuality
- Lecture and laboratory attendance is mandatory. If you are late to class do not disrupt the class or laboratory by your arrival. Tardiness on a regular basis is disruptive and disrespectful to the class and instructors.
- Doctor and other appointments should not be scheduled during scheduled class hours.
- Lab exercises cannot be rescheduled since the laboratory space is in use everyday of the week.
- Absences due to illness, accident, or death in your family may cause you to be absent. In such cases please notify the instructor by email or phone before class or as soon as possible.
- *If you are ill, please do not come to school and make everyone else sick.*

Academic Dishonesty
Cheating or plagiarism will not be tolerated in any form. This covers the testing center and cheating that involves collaboration between students. If an incident is reported to the instructor by testing center staff, students may receive a zero (0%) for the exam, and the instructor will notify the dean for health professions of the incident.

Withdrawal/Drop
The dropping procedure follows the rules of the college. The drop date for this semester is in the catalogue. If you are unable to successfully complete this course, you must withdraw from it by the end of the drop day. The student must initiate this procedure. Officials that can assist in withdrawals are the Admissions Office of the counseling Center. If you stop attending class and do not withdraw, you will receive a grade for your performance up to that point in the course, usually an F.

Rules and Expectations for the Classroom and the Laboratory
All students should practice courteous, respectful, cooperative behavior at all times, as this would be the norm in any higher education or in a research laboratory. The following rules apply to the class:
1. **Arrive on time** and stay until class is dismissed;
2. **Be prepared** and stay on task;
3. **Listen** courteously to the speaker, without interruptions or side conversations.
4. **Cell phones** should not be used in class or lab, and should be switched to vibrate or off.
5. **There is no eating or drinking** on or near the laboratory benches during lab sessions.
6. **All students must remove lab coats and gloves and properly wash their hands before leaving the lab. No open-toed shoes allowed during the laboratory.**
7. **All students are expected to help in cleaning the lab and placing the equipment and reagents to the designated areas.**
ADA Statement
Any student who needs accommodations due to a disability should contact the Disability Services Office, Room A110 (214-860-2411).

BITC Program: Learning Outcomes

1. Given a certain volume to be measured the students will use the proper micro-pipets. Given a certain weight to be measured the students will use the proper balance for measuring the correct quantity.
2. Students will be able to utilize laboratory calculations for making the solutions at the correct concentrations and pH.
3. Students will be able to work safely at the bench. The students will know the proper procedure for storing, disposing and following the MSDS for the chemicals.
4. The students will be able to use the aseptic technique for maintaining and working with cells in the laboratory.
5. Using molecular biology techniques the students will be able to manipulate DNA using plasmids, restriction enzymes, agarose gel electrophoresis.
6. Students will be able to quantify proteins and analyze proteins using SDS-PAGE.
7. The students will recognize the ethical issues involved in the application of biotechnology in health care, pharmaceuticals, and molecular diagnostics.
8. The students will be able to use data bases for the retrieval of articles in primary research journals, read the articles and write the procedures presented in the paper.

BITC 2311: Biotechnology Laboratory Instrumentation

Weeks 1-8 Level one and two (PL1, 2, 3, 4, 5)
1. Review use of eCampus and Blackboard, and as part of course content delivery.
2. Describe safe laboratory practices. Demonstrate good laboratory practice by the proper operation and maintenance of the instruments.
3. Demonstrate the correct method for using the different centrifuges.
4. Demonstrate the correct method for using the spectrophotometer.
5. Prepare SDS-PAGE and agarose gel electrophoresis.
6. Set up and use column chromatography.
7. Prepare bacteria culture media and sterilize the media.
8. Isolate recombinant protein and characterize the protein using SDS-PAGE.

Week 9-10 Level two and three (PL 3, 4, 5)
1. Demonstrate the correct method for using the different centrifuges.
2. Demonstrate the correct method for using the spectrophotometer
3. Correctly program a thermal cycler.

Week 11-13 Level two and three (PL1, 2, 3, 4, 5)
1. Isolate proteins from cells.
2. Analyze proteins from purified from bacteria cells.

Week 14-16 Level one and two (PL3, 4, 5)
1. Identify common techniques used for purification of protein.
2. Analyze purified proteins.

DISCLAIMER

The provisions contained in this syllabus do not constitute a contract between the student and El Centro College. These provisions may be changed at the discretion of the Coordinator/Instructor. When necessary, appropriate notice of such changes will be given to the student.

The instructor-of-record may provide additional information to enhance the course to meet the needs of the enrolled students, provided that the enhancements do not conflict with the official course syllabus.

General Institutional Policies

Course related institutional policies
http://www.elcentrocollege.edu/admissions/schedule/syllabus/Course-Related-Policies.pdf