

Course Outline

COURSE: BIOT 103 **DIVISION:** 10 **ALSO LISTED AS:**

TERM EFFECTIVE: Spring 2014

CURRICULUM APPROVAL DATE: 04/22/2013

SHORT TITLE: BIOTECH LAB SKILLS

LONG TITLE: Biotechnology Lab Skills and Instrumentation

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
4	18	Lecture:	2	36
		Lab:	6	108
		Other:	0	0
		Total:	8	144

COURSE DESCRIPTION:

Introduction to biotechnology laboratory skills. Techniques will include DNA isolation, DNA fingerprinting, cloning, restriction mapping, and Southern blotting. Includes the use and care of instruments such as centrifuges, mechanical and micropipettes, and electronic balances. Will also include keeping of a notebook, report writing, and calculations. **ADVISORY:** Eligible for English 250. **PREREQUISITE:** Completion of BIO 1 with a grade of C or better; may be taken concurrently.

PREREQUISITES:

Completion of BIO 1, as UG, with a grade of C or better., Concurrent OK

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

03 - Lecture/Laboratory

04 - Laboratory/Studio/Activity

STUDENT LEARNING OUTCOMES:

1. Develop laboratory skills required for use in a biotechnology lab.

Measure: written exam, demonstration

PLO: 1,2,7

ILO: 2, 3,7

GE-LO: B4, B8

Year assessed or anticipated year of assessment: 2011

2. Improve ability to write a report and keep a notebook in correct scientific format

Measure: project (notebook and report)

PLO: 1,3

ILO: 1, 7

GE-LO: A3,A4,B1

Year assessed or anticipated year of assessment:

3. Apply the scientific method to determine use of appropriate equipment and techniques

Measure: written exam, project

PLO: 1,2

ILO: 2

GE-LO: B1,B7,

Year assessed or anticipated year of assessment:

4. Apply safety rules when using equipment and working with microorganisms.

Measure: written exam

PLO: 5,6,7

ILO: 2

GE-LO: B4

Year assessed or anticipated year of assessment:

5. Demonstrate the ability to perform cooperatively in a working environment by conducting lab activities in teams.

Measure: project, demonstration

PLO: 3,6,7

ILO: 4

GE-LO: B4,B8

Year assessed or anticipated year of assessment:

6. Apply basic biological principles and principles of aseptic technique to growth of microbial cultures.

Measure: project, written exam

PLO: 6,7

ILO: 7

GE-LO: B1,B2

Year assessed or anticipated year of assessment:

7. Perform calculations needed to prepare media, buffers and dilutions

Measure: project, written exam

PLO: 7

ILO: 2

GE-LO: B3,B4

Year assessed or anticipated year of assessment:

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 04/22/2013

8 lec, 3 lab Hours **Biological Concepts:** Students will be able to discuss basic concepts of biology, including the scientific method and its applications, levels of organization in biology, cell theory and cell structure, and chemistry of biology. (Note: Weekly assignments for all lectures will include reading of text and completion of text study guide materials including self quizzes and text web site activities.)

4 lec, 3 lab Hours **Scientific Writing:** Students will be able to write a report and keep a notebook in the correct format required for documentation in a lab. Students will also become familiar with peer reviewed publications and communication via scientific writing. (Note: Notebook will be maintained and reviewed throughout the semester.)

3 lab Hours

Lab Safety: Students will be able to identify location of all safety equipment and other safety features. Students will be able to discuss general rules for safe use of all lab equipment, and apply those rules. (Note: Safety will be emphasized throughout the semester in both lab and lecture.)

6 lab Hours

Metric System and Techniques of Measurement: Students will be able to describe the units of measurement in the metric system, and solve problems converting between the metric system and the non metric system. Students will be able to accurately weigh and measure volumes using an electronic balance, pipettes and micropipettes and other standard lab equipment.

6 lab Hours

DNA Analysis: Students will be able to discuss the structure of DNA and relate DNA migration in a gel to molecular weight, and will analyze DNA using electrophoresis.

2 lec 3 lab Hours **Concentration of Solutions:** Students will be able to define terms relating to concentration, including molarity, molality, percent solution. Students will be able to discuss and calculate dilutions of solutions

2 lec, 6 lab Hours **Restriction Analysis:** Students will be able to discuss the principles of restriction endonuclease mapping, and will utilize restriction enzymes to map several fragments of DNA.

2 lec Hours

Principles of Microbial Growth: Students will be able to describe requirements for growth of microorganisms.

3 lab Hours

Molecular Cloning: Students will be able to discuss the principles of molecular cloning, and will clone multiple DNA fragments in competent cells.

2 lec Hours

Principles of Sterilization and Aseptic Technique: Students will be able to explain the principles and practice of sterilization and aseptic technique.

3 lab Hours

PCR: Students will be able to discuss the principles of the polymerase chain reaction (PCR) and will use the technique to amplify given regions of DNA.

6 lab Hours

Culture Techniques: Students will practice aseptic techniques to isolate, transfer and culture bacteria.

2 lec, 6 lab Hours **Southern Blotting:** Students will be able to discuss the principles of the Southern blot technique, and will use the technique to analyze multiple DNA samples.

2 lec, 6 lab Hours **DNA Extraction:** Students will be able to discuss principles of DNA isolation and extraction, and will extract DNA from multiple sources.

2 lec, 6 lab Hours **Electrophoresis:** Students will be able to describe the principles of electrophoresis, prepare an agarose gel and conduct electrophoresis to analyze DNA and protein. Students will also conduct electrophoresis using polyacrylamide gels.

2 lec, 9 lab Hours **Experimental Design:** Students will be able to explain principles of experimental design and apply those principles to design an experiment. Students will design, prepare all materials for and conduct an experiment using techniques learned during the semester. Students will work in teams. Students will write a report of their experiment using correct scientific format.

2 lec, 6 lab Hours Students will present their reports to the class.

METHODS OF INSTRUCTION:

Methods of instruction will include lecture with use of power point, video and other audio and visual aids and laboratory instruction. Students will work individually and in groups in lab.

METHODS OF EVALUATION:

The types of writing assignments required:

- Lab reports
- Term papers
- Other: Notebook

The problem-solving assignments required:

- Lab reports
- Quizzes
- Exams

The types of skill demonstrations required:

- None

The types of objective examinations used in the course:

- Multiple choice
- True/false
- Matching items
- Other category:
- None

The basis for assigning students grades in the course:

- Writing assignments: 30% - 40%
- Problem-solving demonstrations: 30% - 35%
- Skill demonstrations: 0% - 0%
- Objective examinations: 25% - 40%
- Other methods of evaluation: 0% - 0%

REPRESENTATIVE TEXTBOOKS:

Required:

Barnum, Susan R, Biotechnology: An Introduction, Brooks Cole, 2006 This text is standard use in the BIOT field, or other appropriate college level text.

Reading level of text, Grade: 13 Verified by: RMorales

Other textbooks or materials to be purchased by the student: Lab composition notebook quad college ruled

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 200670

UC TRANSFER:

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: I

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department: BIOT

CSU Crosswalk Course Number: 103

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: D

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000435822

Sports/Physical Education Course: N

Taxonomy of Program: 043000