

**Mission Valley ROP – Mission San Jose High School  
Syllabus – Biotechnology (2009-2010)**

**Course Title: Biotechnology**

**Course Code/Section #:**

**Units of Credit: 10**

**Meeting Times/Dates: M-F: 3<sup>rd</sup>/4<sup>th</sup> period**

**Instructor Name: Anu Suresh**

**Location/Room #: C14**

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**Course Description:**

This course is designed to teach students basic principles and techniques that are used in the biotech industry. This lab-intensive course prepares students for jobs in the field, and incorporates hands-on work into the course curriculum by teaching students how to use different instruments used in the field of biotechnology.

**Prerequisites:**

Pre-requisite: Biology

Co-Requisite: Algebra 1 AB

**Course Objectives:**

This 180 hour UC-approved (D Lab Credit) biotechnology course uses hands-on lab activities and assignments to prepare students for post-secondary education and employment in the biotechnology industry. Additionally, students will be trained on documentation practices, employment skills (resume development and interviewing skills), and career preparation (team work, effective communication, time management, punctuality, etc.).

**Course Outline:**

Upon successful completion of the course, students will be able to demonstrate the following skills necessary for entry level jobs as well as undergrad programs in the field of biotechnology:

- PPE (personal protective equipment): safety glasses, gloves, safety shoes, lab coats
- Volumetric Measurements- Serological, micropipettes, multi channel pipettes, Graduated cylinders, volumetric flasks
- Mass Measurements- scales and balances
- Making Solutions (Molarity, Dilutions) - pH meters, UV Spectrophotometer
- Preparation of Buffer Solutions
- DNA Isolation Techniques- Centrifuge
- Polymerase Chain Reaction (PCR)

- Separation and Purification Techniques- Dialysis/Diafiltration, chromatography (Size Exclusion, Ion Exchange, Affinity, Paper/Thin Layer)
- Gel Electrophoresis: Agarose and PAGE
- Assay Development- ELISA
- Autoclaving, sterilization, making nutrient agar, pouring plates
- Gram stain, microscopy, Shakers, incubators, Stir plates, water baths
- Bacterial Transformation
- Yeast Fermentation: Biofuel/Green Technology

### **Required Text, Material, Tools, and Resources:**

- Biotechnology: Science for the New Millennium, Ellyn Daugherty, 2006.

- Biotechnology- Lab Manual – Ellyn Daugherty

#### **Supplemental Texts/Materials- Available with the Instructor**

- DNA Science: A First Course in Recombinant DNA Technology, Micklos and Freyer, Colds Springs Harbor Laboratory Press, 1990, ISBN# 0-89278-411-3
- Biotechnology: An Introduction, Barnum, Wadsworth Publishing, 1998, ISBN# 0-5342-34364
- Short Protocols in Molecular Biology, Ausubel, Wiley ISBN# 0-471-25092-9

### **Supplies :**

- Pens - Blue, Black and Red
- 3-ringed binder
- Lined paper
- Notebook
- Safety glasses or goggles
- Lab coat
- Latex gloves
- Waterproof fine-point black or blue marker
- Scientific calculator
- Lab notebook

Additionally, each student will need a one-inch, three-ring binder and five sheet protectors for his/her student portfolio project, which will be assigned at the beginning of second semester. The portfolio will include a resume, completed job application, and one outstanding work sample/project

### **Grading Policy/Evaluation:**

This course is based on a point system. At any point during the grading period, the total number of points that have been achieved divided by the total number of points possible will be the student's grade at that time.

- Class participation/Attendance: 10 points per day (If you do not attend class, you forfeit your participation points for the day. Disruptive behavior will result in a loss of points as well.)
- Homework: 20 points each.

- Lab experiments/Reports/Presentation: 50 points each.
- Quizzes: 50 points each.
- Tests: 100 points each.
- Unit test: 200 points each.

### **Weekly Assignment Schedule:**

Handouts with daily assignments and lessons will be provided. This will include homework, lab assignments, and group/individual projects as well as their due dates. Points will be deducted for late submissions. Students who are late for quizzes and tests will not be permitted to take the examination.

### **Attendance and Participation**

Attendance is an absolute must for this class. Both attendance and participation are extremely important and account for 100 points for final grade. If a student is tardy or misses a Mission Valley ROP classes multiple times, they will lose units of credit and his/her grade will be affected adversely. **Be advised that credits are earned by attendance only and cannot be made up.** Points can also be lost for inappropriate behavior.

Make-up exams and assignments will only be given for excused absences. Additionally, it will be very difficult to schedule make-up tests and quizzes for students who are absent on the day of an exam. It is the student's responsibility to follow up an absence with the teacher upon the day of their return to class. Failure to do so in a timely will result in an F on the exam/missed assignments.

### **Attendance Policy:**

Mission Valley ROP's mission is to prepare students for employment, and career preparation via post-secondary educational opportunities. Mission Valley ROP students are expected to be on time for classes every day, as if they were showing up for their job. If events at home, high school vacations, minimum days, or optional student events conflict with the Mission Valley ROP class, students are still expected to attend their Mission Valley ROP class. Perfect attendance certificates will only be issued to students who have no absences or tardies.

### **Activity and Assignments:**

Lab experiments and presentations will be done in pairs/groups and will be graded. These projects will teach students the importance of a balance between teamwork and individual responsibility.

### **Instrument Care:**

Every student/team will be assigned a set of instruments (such as the pH meters or spectrophotometers). The student/team will be required to write an SOP (Standard Operating Procedure) and maintain an instrument logbook detailing all operations. This will help ensure that the students use the instruments properly and that the instruments are maintained throughout the course.

### **Laboratory Safety:**

Please review the safety procedures described in Chapter 1 of the Biotechnology Laboratory Manual (Ellyn Daugherty). Students are responsible for learning and observing safety procedures, and must sign a laboratory safety agreement before they are beginning lab work. Be sure to check the MSDS (copy in the lab) before using any of the chemicals.

- **All students must wear a lab coat and safety goggles in the laboratory at all times**, unless told to do otherwise. Students who fail to bring their lab coat and goggles (glasses) will be asked to leave the lab.

### **Homework:**

Students are responsible for completing the assigned the reading and homework and keeping up with the class. Handouts will contain information regarding the due dates of the assignments. Any late submissions will have points deducted. If the assignment is turned in within 24 hours after the due date, ¼ of the points will be deducted.

Assignments will be accepted for up to a week for half-credit. No assignment will be accepted beyond one week of the scheduled date.

### **Dress Code:**

Students shall dress in a manner that shows respect for the educational environment and is consistent with the School District policies.

No open-toed shoes are permitted during laboratory exercises. Please bring an extra pair of shoes if necessary.

Failure to dress appropriately will result in dismissal from the class for the day and a loss of points.

### **Classroom Behavior:**

Students who are disruptive during class will be dismissed from class for the day. If multiple offenses occur, the student will be dropped from the class and will receive a failing grade.

### **Academic Honesty:**

Students are expected to adhere to the school district's academic honesty policy. Any violation of this policy will result in a zero for the assignment and may lead to dismissal from the course with a failing grade.

### **Cheating and Plagiarism**

Mission Valley ROP is committed to preparing students for the workforce. This preparation includes technical skills as well as business ethics. Mission Valley ROP does not condone cheating. Any student caught cheating on an exam, copying work from another student, or engaging in plagiarism will be given one warning and a failing grade on that assignment. Subsequent incidents will result in termination from his/her Mission Valley ROP program, a failing grade, and loss of credits.

**Cell phones and other electronic devices:**

Misuse of cell-phones ( iphones, ipods etc) by a student may lead to forfeiture of such a privilege. Use of cellular phone during classroom time, instructional activities or field trips is prohibited. Cellular phones must be switched off during these times.

. Blatant disregard for cell phone policy will result in, forfeiture of the cell phone for the duration of the class, dismissal from class for the day, and deduction of 5 points from a student’s grade for each violation.

No food or drinks (with the exception of water in clear plastic bottles) will be allowed in MVROP buildings, including classroom, lobby, hallway, and restrooms. The Student Lounge is the only room where food or drinks should be consumed (with the exception of water, which is permitted always). **No food or drink allowed in the laboratory.** Students violating this policy may receive a first warning. Any subsequent incident will result in termination from his/her entire program.

Students completing this course with a grade of “C” or better will receive a Mission Valley ROP Certificate of Completion listing competencies achieved in the course.

Student Agreement

As a student in this course, I have read and I understand the policies for the Biotechnology course and agree to abide by the concepts outlined in the syllabus and disclosure statement.

Student’s printed name \_\_\_\_\_

Student’s phone/ email \_\_\_\_\_

Student’s Signature \_\_\_\_\_ Date \_\_\_\_\_

My son/daughter has discussed with me the syllabus and the disclosure statement for the Biotechnology Course and I agree with the documents and support my student in abiding by their precepts.

Parent/Guardian’s printed name \_\_\_\_\_

Parent/Guardian’s phone/ email \_\_\_\_\_

Parent/Guardian’s Signature \_\_\_\_\_

Date \_\_\_\_\_