



# CHELMSFORD HIGH SCHOOL

## Biotechnology I CP SYLLABUS

2023-2024

### **COURSE DESCRIPTION**

This second year Biology elective provides students with basic biotechnology laboratory skills in order to introduce them to biotechnology concepts, in addition to the business aspect of the industry. A “hands-on” laboratory course, it focuses on widely used biotechnological techniques and theoretical application in biotech industry standards including biological molecule manipulation, transformation and identification. Students will learn techniques that apply to biological drug applications, bioinformatics, and Good Lab Practices (GLP), such as sterile technique and maintaining a lab notebook.

*Prerequisite: Completion of a Biology course.*

### **REQUIRED TEXTS & RESOURCES**

Academic articles to supplement learning will be provided when needed during class

Amgen Biotechnology Lab Manual for procedures

An account for LabXchange will be established.

### **COURSE GOALS and STUDENT LEARNING OUTCOMES:**

By the end of the course, students will receive...

- A multidisciplinary introduction to biotechnology including analysis of research and careers, financial aspect, and ethics into the field.
- Introduction to Good Laboratory Practices
- Introduction to specialized lab techniques
- Creation of a transgenic organism

### **COURSE STANDARDS**

[DESE STANDARDS LINK](#)

### **PERSONS WITH DISABILITIES**

Chelmsford High School is committed to supporting the success and well-being of all students, regardless of varying abilities and levels of adaptive skills. The Special Education office provides services and resources to empower each student to attain their highest level of academic success and learning independence.

### **ACADEMIC INTEGRITY**

At Chelmsford High School, students are expected to maintain high moral and ethical standards, as exemplified by the final sentence of our mission statement: “*A spirit of respect is fostered, as members take responsibility for their actions and acknowledge the rights and differences of others.*” (CHS Mission Statement)

Students should respect themselves, other students, staff members and the school. The acts of cheating and plagiarism violate expectations that students will exhibit respectful, ethical behavior.

[The Academic Honor Code](#) exists to address the issues of cheating and plagiarism.

## **GRADING POLICIES**

Please connect with individual teachers for specific information regarding grading. Students will be able to monitor academic progress biweekly through X2/ASPEN.

Students are strongly encouraged to take advantage of the academic support programs and services (such as PRIDE Block, after-school help, etc.) available to them to help ensure and support success. Information about these services can be provided by your teacher, guidance counselor, or administration.

## **COURSE SKILLS**

The following skills are addressed in this course:

- Use tools standard to the industry, such as: micropipettes, centrifuge, gel electrophoresis, cell culture, polymerase chain reactions, genetic recombination,
- Apply proper aseptic technique following Good Laboratory Practices.

## **COURSE OUTLINE**

Biotechnology I CP is divided into 7 units:

1. Areas of research and careers into biotechnology
2. Financial aspects/investments in biotechnology
3. Ethics and research
4. Disease transmission, vaccination, and treatments
  - a. Immunity
  - b. HIV case study
  - c. Bacterial Growth
  - d. Antibiotic resistance
  - e. Monoclonal antibodies: structure and uses
5. Good Laboratory Practices (GLP)
  - a. Keeping a lab notebook
  - b. Reading and writing a standard operating procedure (SOP)
  - c. Sterility and cross-contamination
  - d. Bioinformatics
6. Lab Skills
  - a. Pipetting Techniques
  - b. Pouring and running a gel
  - c. PCR
7. Amgen's Biotechnology Experience (ABE)
  - a. Building a recombinant plasmid
    - i. Using restriction enzymes to cut plasmids
    - ii. Identifying components needed to form the recombinant plasmid of interest
    - iii. ligating fragments together
    - iv. Confirming product
    - v. Transformation of plasmid
    - vi. Scaling up and purification of protein of interest
      1. Purification by RFP by liquid chromatography
      2. SDS-PAGE gels to analyze purity of protein

3. Completing Bradford Assay to analyze concentration of proteins

*This syllabus and course outline are subject to change as Chelmsford High School seeks to continually improve the learning experiences for all students.*

***“We foster PRIDE\* in our pursuit of excellence.”***

**PRIDE refers to our five core values – Perseverance, Respect, Integrity, Dedication, and Empathy. These five pillars represent our points of emphasis in supporting the development of quality students and quality citizens.**