TPHS Course Profile

Introduction To Biotechnology

[10-12] (10 Credits)

- ***Meets high school graduation requirement for (Subject)***
- ***Meets the UC/CSU subject area "(A-G)" requirement***

General Information

Description

What is Biotechnology?

Biotechnology is the manipulation of biological processes, living organisms and/or their components to produce useful products for industrial or other purposes. Most often the manipulation involves genetic (or genetically derived) materials such as DNA, RNA and proteins.
Microorganisms, such as bacteria, are commonly manipulated for numerous products such as:
antibiotics, hormones, pest resistant crops new bacterial strains novel pharmaceuticals, and novel materials.

This is a sample of the skills and topics students will learn in the class:

• How to properly use a variety of micropipettes, vortexers, centrifuges, gel electrophoresis apparatus, pcr machine, transilluminator, incubator, vertical protein gel apparatus, column chromotography, and more.
• Collect your own DNA to take home in a tube
• Collect cheek cells or hair root cells and make copies of a section of your own DNA (PCR, polymerase chain reaction)
• Work with online gene databases
• conduct a few beginner bioinformatics activities
• Grow a variety of bacteria under various conditions, temperatures, and antibiotic treatments
• Run a gel of your own amplified DNA sample (gel electrophoresis) to see the VNTR DNA fingerprint of your own DNA
• Do PCR and gel electrophoresis with foods you bring in from home to determine if they are genetically modified organisms (GMO) or not
• Work with bacteria, yeast, fruit flies (*Drosophila melanogaster*), nematodes (*C. elegans)*, plants and seeds of various species
• Induce bacteria to take up a gene that will allow them to be fluorescent and resistant to an antibiotic
• Purify the green fluorescent protein made from live bacteria and conduct protein chromatography
• Plant and compare a variety of species with GMO and non GMO seeds
• Conduct a simulated AIDS detection. This is a technique called enzyme-linked immunosorbent assay (ELISA), or enzyme immunoassay (EIA)
• And more!

Expectations and Goals

Course difficulty: moderate
Attendance: perfect or nearly perfect attendance is expected due to the lab nature of the daily work
Course classification: lab science, life science (full year)
Suggested Prerequisites: one full year of High School Biology (with a passing grade)

Estimated Homework

Homework requirements: minimal (0-20 minutes)

This Class Is Best For…

students that are interested in expanding their knowledge of biology and biological lab techniques. Biotechnology is a class that is very hands on and inquiry based that allows students to develop and apply skills learned in class to real world applications of biotechnology techniques. This a good class for students that are looking for an additional lab science course to complement the traditional pathway of science courses such as biology, chemistry, and physics.

Required Materials and Textbook

all materials will be provided and supplemental reading will vary daily

Additional Information and Resources

Class website

- http://maryannrall.wixsite.com/introbiotech

This course exists at Torrey Pines High School thanks to the TPHS Foundation's generous monetary support. They fund 100% of the supplies and technical equipment necessary for learning modern lab skills in biotechnology at TPHS every year!