C-ID Descriptor
Introductory Biotechnology

Descriptor Details

- **Descriptor Title**: Introductory Biotechnology
- **C-ID Number**: 101
- **Suffix**:
  - Community College Use Only (X)
- **Units**: 3.0
- **Hours**: 0000
- **Date of Last Revision**: 10/12/2017 11:44:14 PM GMT+0000

General Description

This course is a general examination of biology as it relates to the field of biotechnology. Topics include the fundamental chemical processes common in prokaryotic and eukaryotic biology, chemistry of bio-molecules (proteins, enzymes, nucleic acids and lipids), cellular and molecular biology, basic immunology, and classical and molecular genetics with an emphasis on gene expression and genetic engineering. This course is intended for students majoring in applied biology and as a general education option for all students.

Prerequisites

No information provided

Corequisites

None

Advisories

English (C-ID ENGL 100)

Content

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

1. Overview of biotechnology
    A. Applications
        i. Medicine
        ii. Agriculture
        iii. Diagnostics
        iv. Environment/Energy
        v. Fuels
    B. Careers
2. Cell biology (prokaryotic/eukaryotic)
    A. Morphologic differences
    B. Differences in DNA
    C. Differences in gene expression.
3. Bio-molecules and atomic structure
    A. Atoms
    B. Molecules
    C. Compounds
    D. Mechanisms of chemical bond formation
    E. Bio-molecule structures and features
4. Double-stranded DNA molecule
    A. Alpha-helix
    B. DNA replication
    C. Meiosis and mitosis.
5. Gene expression and the genetic code
    A. Transcription from DNA to mRNA
    B. Translation from mRNA to a protein.
6. Basic Mendelian genetics including inheritance of traits
7. Evolution from the genetic perspective
8. Ethical aspects of biotechnology

9. Basic physiology such as
    A. Homeostasis
    B. The immune system
10. Introduction to Energy/Metabolism
    A. Photosynthesis
    B. Cellular respiration

Lab Activities

No information provided

Objectives

At the conclusion of this course, the student should be able to:

1. List the morphologic and chemical differences between prokaryotic and eukaryotic cells
2. Define and distinguish among atoms, molecules, compounds, chemical bonds, mechanisms of chemical bond formation, and components of biological molecules
3. Construct the flow diagram of gene expression from DNA to protein
4. Transcribe and translate the triplet code of DNA into primary protein structure
5. Explain the basic inheritance of genetic traits
6. Compare and contrast current applications of biotechnology to the areas of medicine, agriculture, diagnostics, and the environment
7. Explain evolution from a genetic perspective
8. Evaluate a recent development in the field of biotechnology from an ethical perspective
9. Explain the importance of Good Laboratory Practices and record keeping
10. Analyze and interpret graphs
11. Explain how an antibody based assay works

Evaluation Methods

A variety of assessment techniques that may include midterm exam, term paper, projects, homework problems, lab reports, lab practical, and lab projects. Below are some specific examples:

I. In class objective examinations and quizzes that test for definitions and major biological concepts
II. Performance on out of class assignments
III. Writing assignments that assess the ability to apply theory of Good Laboratory Practices to reports
IV. Class participation in discussions on biotechnology
V. Regular class participation in discussion related to course topics

Textbooks

Lecture

Introduction to Biotechnology (3rd Edition) by William J. Thieman and Michael A. Palladino (Jan 23, 2012) ISBN 978-0321766113

Campbell Essential Biology (5th Edition) by Eric J. Simon, Jean L. Dickey and Jane B. Reece (Feb 19, 2012) ISBN 978-0321772596

Campbell Essential Biology with Physiology, Simon, Eric J., Reese, Jane B. and Dickey, Jean L. Campbell Essential Biology with Physiology, 3rd ed. Benjamin Cummings, 2010, ISBN: 0321602072

Biology by Sylvia Mader and Michael Windelspecht (Jan 3, 2012) ISBN 978-0073525501

Nature Publishing Group's "Priniciples of Biology" (online text with lifetime access): www.nature.com/principles