

## Biotechnology Course Outline

**Name of Course:** Biotechnology  
**Level of Course:** Academic  
**Prerequisites:** None  
**Grades Levels Offered to:** 9 through 12  
**Course Number:** 778.01  
**Number of Credits:** 5  
**Date:** August 2005  
**D. Muller**

### Course Description:

Biotechnology is a distinct technological area of human adaptive behavior. Biotechnology involves the design of techniques and systems utilizing living organisms, or their parts, to accomplish some purposeful goal. Biotechnology is utilized within food production, medical procedures, environmental restoration, and many other aspects of our lives. Biotechnology uses living cells and materials produced by cells to create pharmaceutical, diagnostic, agricultural, environmental and other products to benefit society. This first of a three -year program of study, will be an introduction to biotechnology systems. Areas touched on may include: bioengineering, healthcare, cultivation of plants and animals, fuel and chemical production, waste management and treatment, biotechnological materials and application.

### Standards Targeted Throughout the Curriculum:

New Jersey Core Curriculum Content Standards and Cumulative Progress Indicators

- Demonstrate skills needed to effectively access and use technology-based materials through keyboarding, troubleshooting, retrieving, and managing information. (NJ CCCS 2.0, #3)
- Use technology and other tools to solve problems, collect data, and make decisions. (NJ CCCS 2.0, #7)
- Use technology and other tools, including word processing, spreadsheet and presentation programs, and print or graphic utilities to produce products. (NJ CCCS 2.0, #8)
- Use technology to present designs and results of investigations. (NJ CCCS 2.0, #9)
- Organize, synthesize, and evaluate information for appropriateness and completeness. (NJ CCCS 3.0, #8)
- Identify and evaluate the validity of alternative solutions. (NJ CCCS 3.0, #11)
- Apply problem solving skills to original and creative/design projects. (NJ CCCS 3.0, #15)
- Use time efficiently and effectively. (NJ CCCS 4.0, #10)
- All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment. (NJ CCCS 8.0, #2)
- All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results. (NJ CCCS 5.0, #1)
- All students will develop an understanding of how people of various cultures have contributed to the advancement of science and technology, and how major discoveries and events have advanced science and technology. (NJ CCCS 5.0, #2)

- All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories. (NJ CCCS 5.0, #3)
- All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology. (NJ CCCS 5.0, #4)
- All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations. (NJ CCCS 5.0, #7)
- All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. (NJ CCCS 5.0, #10)

Source: New Jersey Department of Education Standards <http://www.nj.gov/njded/stass/>

### **Proficiencies:**

At the conclusion of this course, the students will be able to:

1. Define biotechnology and technology.
2. Describe biotechnology and technology as a system.
3. List, describe, and implement the steps in the design process.
4. Identify how different systems operate.
5. Utilize a variety of different forms of presentation techniques.
6. Work in teams for learning, problem solving, design and presentation.
7. Prepare for life-long learning by using self-management and self-assessment strategies in terms of knowledge and skills.
8. Develop careful and precise writing.
9. Explore career-specific areas.
10. Develop skills in critical thinking, analytical reasoning and logic, and the ability to establish and recognize the validity of information.
11. Understand the complex relationship of scientific, technological, social, business, legal, historical, and artistic issues in design.
12. Carry out engineering/design/problem solving projects by using established scientific principles in the creation of functional and appealing products.
13. Become an independent leader, recognize when to follow, and know how to be a good team member.
14. Develop and apply cross-disciplinary cognitive knowledge to new problems.

|                              |                                   |
|------------------------------|-----------------------------------|
| Lecture/Discussion           | Objectives 1, 2, 4                |
| Class Projects/ Lab Sessions | Objectives 3, 6, 7, 9, 12, 13, 14 |
| Problem-Based learning       | Objectives 4, 8, 10, 11, 15       |
| Computer-Base instruction    | Objectives 5                      |
| Homework                     | Objectives 4                      |

**Measurement of success (evaluation)** in meeting these general objectives will be carried out through the following methods of assessment:

Classwork/Homework  
 Quizzes/Tests Mid Term Exam and Final Exam  
 Projects/Labs  
 Class Participation  
 Quantified by credit points on projects and labs