Sample Survey Course Outline

Biotechnology: The Applications and Implications

This overview class will cover current topics in Biotechnology. It will include basic elements of the science, current and expected capabilities and products, the structure of the industry, impact on society and the health care field and ethical and social questions.

Prerequisites: High School Biology, Chemistry and English Suggested

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Specific Course Outcomes

- Understand the major historical events in Biotechnology.
- Understand the major trends and current developments in Biotechnology.
- Understand the science and its applications. This will include the basics of gene expression, manipulation, DNA cloning and present technological capabilities.
- Discuss Biotechnology as an industry including its present and its future.
- Discuss ethics issues and the impact on society of Biotechnology research and its application.
- Understand and use basic biotechnology terminology.
- Familiarity with careers in this field, career paths and skill requirements.

Course Content / Major Topics

Biotechnology: Past and present

What are the milestones that led us to where we are today?
What were the past applications?

The science underlying biotechnology

Basic chemistry and biology adequate to understand cell structure and function, DNA, proteins and the applications at the level to be discussed in this class.
How is this work accomplished: basic laboratory procedures, tools, equipment and safety?

The application of this science; the concepts and the processes:

Cloning genes
Gene therapy
Cloning organisms

Pharmaceuticals
Agricultural Applications
Environmental Clean-Up Applications
Forensics

Biotechnology as an industry

Who are the players?
What are the goals?
How is the industry structured and financed?
What is the process for getting a product to market?

Ethical Issues and the Impact on Society

What are the implications and the questions?
What are the checks and balances?
How is the industry regulated, how should it be?
What is the international picture?
Patents: what protections do they offer?
What does the future hold?

Careers in Biotechnology and related areas

What types of jobs are available?
What is it like to work in this industry?
What skills are needed?

General Education Outcomes

I. SKILLS: Competence in communication, quantitative reasoning, critical thinking and social functioning skills.
   A. Communication
      1. Read, listen and interpret, and communicate information regarding the Biotechnology industry, its history and future trends, and the impact of the technology on business and society. Develop and present brief summaries to the class. Write laboratory procedures and reports. Participate in class discussions. Participate in group work to discuss assigned questions or topics.
   B. Quantitative Reasoning
      1. Use logic to analyze and understand issues basic to Biotechnology.
   C. Critical Thinking
      1. Acquire and understand biological information using research and observation.
      2. Understand, analyze and draw conclusions about concepts and experimentation in science in general and Biotechnology specifically as presented by texts, published papers, popular literature, information found on the internet and other sources. Learn to assess the scientific validity of information found on the Internet.
      3. Understand the application of the scientific method. Recognize when this method is appropriately or inappropriately applied.
      4. Learn basic elements of chemistry and biology.
      5. Learn to assess the arguments pro and con regarding the use of genetic engineering using logic and valid scientific information.
      6. Understand the basic functioning of this industry. Who are the players, what are the rules and what are the motivating forces?
   D. Social Functioning

1. Work cooperatively with instructor and other students in learning about this industry and its underlying fact base. Work individually and in groups; participate in discussions.
2. Work cooperatively in a group setting to perform experiments and solve problems.

II. KNOWLEDGE
- A. Natural Environment
  1. Understand the impact of Biotechnology on society and business. Understand and apply the methods and principles of scientific inquiry as it applies to biology.
- B. Social and Cultural Environment
  1. Understand the ethical implications of this work and this industry.
- C. Wellness
  1. Understand and use safe practices when working with hazardous materials. Understand the regulation of this industry and the purpose and need for this regulation.

III. ATTITUDES AND VALUES
- A. Attitudes
  1. Work in group settings where interactions and outcomes are uncertain and changing. Deal appropriately with conflict between team members and between assumptions and experimental data.
- B. Values
  1. Discuss the value systems involved in this work and how they are applied in relationship to personal and group value systems.