



8135 W. Florist Avenue  
Milwaukee, WI. 53218-1745  
Phone: (414) 393-6100  
Fax: (414) 393-6222  
Web: [www.mpsmke.com/madison](http://www.mpsmke.com/madison)  
Mr. Gregory Y. Ogunbowale-Principal

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## AOHS Biotechnology

Biotechnology is a lab course designed to introduce students to the scope of biotech research and product development across many fields. Students learn proper lab techniques and recordkeeping with a scientific notebook. They learn the methods of gel electrophoresis and restriction enzyme digestion. Students explore the ethical issues in applied biotech, as well as the rights and responsibilities of the stakeholders involved in the development, production, and use of biotechnology products. For the culminating project, students research and analyze the feasibility of developing a new biotechnology product.

### KEY LEARNING OBJECTIVES FOR THE COURSE

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1. Describe the historical development of biotechnology
2. Identify modern technologies that fall within the realm of biotechnology
3. Characterize how and where biotechnology is used in various fields, including medicine, agriculture, environmental protection, forensic science, and basic science
4. Identify the rights, interests, and responsibilities of the stakeholders involved in the development, production, and use of biotechnology products
5. Develop and maintain a scientific notebook that includes an account of all laboratory procedures and data that models college-level documentation and industry standards
6. Demonstrate the ability to use the scientific method to conduct a valid experiment, including hypothesis formation, data collection, and data analysis
7. Describe the uses of model organisms
8. Identify examples of model organisms specific to the biotechnology industry
9. Interpret the results of an experiment using a model organism
10. Explain the basic principle of gel electrophoresis
11. Describe how plasmids, restriction enzymes, and ligases are used in genetic engineering
12. Summarize the steps in a bacterial transformation, including competency, recovery, and selection
13. Identify the major centers that are developing and using biotechnology
14. Categorize the biotech-related regulatory functions of government agencies
15. Summarize the steps in clinical testing for new biotechnology products
16. Display understanding of potential employment opportunities in biotechnology

### CULMINATING PROJECT DESCRIPTION

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In this project, students work collaboratively in teams to research and evaluate the possibility of making a naturally carbonated soda that fluoresces. Students use what they have learned about biotechnology to determine if creating this exciting new biotechnology product is reasonable. The driving question for the project is: What is the feasibility of adapting and applying established biotechnology procedures to produce a new consumer product?

## **Project Components:**

The project includes these components, which are assessed using assessment criteria or a rubric:

- A planning document in which students consider some preliminary questions and lay out the steps they will take to complete their project
- Research notes with which to develop the content of a feasibility report
- An organizer to help with planning and allocating responsibilities for different sections of the feasibility report
- A feasibility report
- A presentation that summarizes the feasibility report

## **CULUMINATING PROJECT ASSESSMENT**

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Students submit the feasibility report to Super Soda Company, the company interested in developing the new fluorescent soda. Their multimedia presentations are made to the Research and Development department of Super Soda Company. It explains their analysis of the fluorescent soda product and gives their professional opinion on whether the company should pursue developing this product. The brief presentation (approximately six to eight minutes in length) focuses on the highlights of the team's analysis and key recommendations in their feasibility report.