

Explore Biotech/Biofuels, Gr. 6-12

Nourish Future Ag Biotech

EDUC 2000, 1 professional development credit

INSTRUCTOR:

Jane Hunt, M.Ed.
Director of Education - Education Projects
Columbus, Ohio
614-406-5548
jane@educationprojects.org

GUEST LECTURER(S):

- Stephanie Sinner, North Dakota Soybean, Fargo, ND
- Zack Bateson, PhD., National Agricultural Genotyping Center, Fargo, ND
- Rachel Sanders, MA, Global Impact STEM Academy, Springfield, OH

TEXT: N/A

DESCRIPTION:

The Exploring Biotech and Biofuels workshop introduces teachers to the ways biotech skills are incorporated into agriculture through bioscience and biofuels labs. For teachers of Biology, Chemistry, and Environmental Science. Explore the scientific basis for consumer acceptance of biotechnology. Understand the impact of biotechnology on environmental issues and sustainability and nutrition around the world.

Due to the topics covered, this workshop is for middle and high school teachers and is specifically designed for teachers from MN and ND. This workshop is generously sponsored by the North Dakota Soybean Council with support from the Minnesota Corn Growers Association. Participants will receive \$350 worth of supplies for classroom use. Hotel room and meals will be provided. The hotel accommodations that are being provided are single rooms in an effort to provide the safest environment for you.

NATIONAL BOARD FOR PROFESSIONAL TEACHING STANDARDS:

The National Board for Professional Teaching Standards seeks to identify and recognize teachers who effectively enhance student learning and demonstrate the high level of knowledge, skills, abilities and commitments. This course aligns with 2 & 5 of those standards.

2. *Teachers know the subjects they teach and how to teach those subjects to students.*
5. *Teachers are members of learning communities.*

OBJECTIVES/OUTCOME:

Participants will:

- create and test biofuels;
- learn about plant science and pollination;
- examine GMO facts, myths, and modern methods;
- perform DNA extraction and PCR;
- work through a water quality bioinformatics case study.

TOPICAL OUTLINE:

Day 1 – June 16 (8:30 a.m. – 8:30 p.m.) = 10 hrs.

- 8:30 a.m. Welcome from MN Corn and ND Soybean
- 9:00 a.m. Making Biofuel - biodiesel from soybean and corn oil
- 10:00 a.m. Plant Science - What's the difference between corn and soy?
- Growth and pollination basics
 - Phylogeny – how are plants related
 - Bioinformatics activity
- 11:15 a.m. Macromolecule testing
- Carbohydrate testing
 - Protein testing
 - Comparison between findings
- 11:45 a.m. Lunch
- 12:30 p.m. Genetics - from scientist to consumer
- DNA extraction protocol
- 1:15 p.m. What is DNA?
- Human DNA model
- 1:30 p.m. How do scientists manipulate DNA?
- Make a GMO (paper model)
- 2:00 p.m. What do you know about GMOs?
- GMOs myths and facts
- 2:30 p.m. Break
- 2:45 p.m. What do you know about GMOs?
- GMO speed dating
- 3:15 p.m. Developing biotech skills
- Pipetting skills
- 4:00 p.m. Check-in to hotel and travel to dinner

5:30 - 8:30 p.m. Industry dinner - Day 1 will conclude with a dinner where participants can interact with industry experts to learn more about modern agriculture and its connections to biotech and biofuels.

Virtual participants instead of the industry dinner will complete this poster and activity from <https://grownnextgen.org/curriculum/gel-electrophoresis-basics>, and <https://grownnextgen.org/media/pages/curriculum/gel-electrophoresis-basics/gel-electrophoresis-basics/21989390-1614108146/gel-electrophoresis-terms-cards.pdf> - return a photo of it completed.

Explore the biotechnology collection here: (<https://grownnextgen.org/collections/biotechnology>) to see which activities they would like to try to learn more about.

Day 2 – June 17 (8:30 a.m. – 4:00 p.m.) = 7½ hrs.

8:30 a.m. Biofuels wash
8:45 a.m. Ethanol introduction: Fermentation factories
9:30 a.m. Virtual visit to National Agricultural Genotyping Center
10:15 a.m. Biofuels testing
11:00 a.m. Bioinformatics: Weed case study
12:00 Noon Lunch
12:30 p.m. Field trip (transportation provided); will be live streamed for virtual audience
Arrive at 1:00 (2 hours)
Tharaldson Ethanol
3549 153rd Avenue SE
Casselton, ND 58012
3:30 p.m. Return to NDSU; reflection and supplies
4:00 p.m. Adjourn

Day 2 includes field trips to National Ag Genotyping Center and Tharaldson Ethanol.

COURSE REQUIREMENTS:

1. Completion of the pre- and post-test evaluation.
2. Attendance at workshop and industry dinner the evening of June 16, 2022, if in person. Virtual participants will complete poster and activities.
3. Completion of a proposal for how at least one lesson will be used from the workshop with a date during the school year for completion **June 24, 2022.**

REQUIRED STUDENT RESOURCES:

Participants will need to bring a laptop and writing utensils.

EVALUATION PLAN: Letter grades

A - full participation and attendance; completion of evaluation; complete proposal.

C – full attendance; incomplete evaluation OR incomplete proposal.

F – partial participation; missing the industry dinner; incomplete evaluation; no proposal.

STUDENTS WITH DISABILITIES:

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible.

ACADEMIC HONESTY STATEMENT:

All work in this course must be completed in a manner consistent with [NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct.](#)