

Session Presenters

School of Forest Resources & Environmental Science

- Dr. Ann Maclean & Anthony Landon, M.S. — Geographic Information Systems (GIS)
- Dr. David Flaspohler - biodiversity and conservation biology
- Dr. Chris Webster - quantitative and forest ecology

Department of Mechanical Engineering

- Tim Jenkins, Ph.D. Candidate - tree biomass from forest to processing facility

Department of Chemical Engineering

- Dr. David Shonnard and Michael Brodeur, Ph.D. Candidate - technology for processing tree biomass to energy

Northern Institute of Applied Carbon Science

- Kristen Schmitt, M.S. - terrestrial carbon sequestration

Tentative Daily Schedule

- 8:45 am *Biofuels in the Gas Tank? What Does It Take?*
- 9:30 am *Using GIS to Map the Wood Supply*
- 11:00 am *Forest Management & Impacts on Biodiversity & Forest Productivity*
- Noon LUNCH at Wadsworth Hall
- 1:00 pm *Getting Trees from Forest to Processing Plant*
- 2:00 pm *Ethanol Production in Lab: Cellulosic Biomass to Liquid Fuel*
- 2:50 pm Questions & Summary
- 3:00 pm Students depart

Dates Available (first-come basis)

- ◇ Tuesday, Feb. 23
- ◇ Thursday, Feb. 25
- ◇ Tuesday, March 16
- ◇ Thursday, March 18

Class Size— up to 24 students.

Is it Really FREE?

Roundtrip mileage up to \$500, and a one-day teacher sub fee will be reimbursed to participating schools by Michigan Tech with a grant from the National Science Foundation. Students may enjoy lunch in a residence hall, compliments of the Michigan Tech Admissions Office. **After the fieldtrip, schools should submit an itemized invoice to Joan Chadde at the address listed below.**

To Register, Contact:

Joan Chadde, Education Program Coordinator
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& Environmental Education
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Michigan Tech
Michigan Technological University

Michigan Tech

Michigan Technological University

Investigate... *Future Fuels from Forests*

FREE High School Field Trips
Feb. 23 & 25 and March 16 & 18

... to learn about forest biofuels from scientists engaged in cutting edge research. An excellent opportunity for:

- Physics classes
- Chemistry classes
- Biology classes
- Career exploration



National Science Foundation
WHERE DISCOVERIES BEGIN

Future Fuels from Forests— High School Field Trip Opportunity

Michigan Tech
Michigan Technological University

How Will High School Students Benefit?

These field trips will provide a framework for high school students to examine the multiple issues associated with the development of liquid biofuels from forests in the Upper Peninsula. This hands-on program will foster greater understanding of complex scientific and societal issues and engage students (and teachers) in scientific discovery and problem-solving in ways not possible in typical classroom instruction.

Students will participate in lecture, data analysis, laboratory experiences, and discussions with research scientists, gaining new knowledge and skills.



(1) *Biofuels in the Gas Tank? What Does It Take to Develop a Forest-based Fuel?*

Cheap, plentiful gas—what are our choices?? What is needed for us to transition to a biofuel-based economy?

(2) *Using GIS to Map Forest Locations & Inventory*

Students will see an application of Geographic Information Systems to forest resource management. Students will participate in a hands-on query as to where and how much biomass is available within a 50 miles radius of the future biomass facility at Kinross.

(3) *Forest Management: Evaluate Impacts of Biofuel Production on Biodiversity*

To survive and reproduce successfully, all wildlife species have specific habitat requirements. Students will gain an overview of the key resources needed by birds, mammals, amphibians, reptiles, and arthropods and how those features can be retained or lost depending on the forest management practices used for ethanol production.

(4) *Impacts on Forest Productivity*

Students will consider the structure of woody plants, how they build woody tissue, and some key requirements that need to be met in order to maintain tree and ecosystem productivity. Next, students will analyze tree rings to determine how much biomass a tree gains during a student's life time.

All High School Students will Participate in these Sessions with MTU Scientists

(5) *From Forest to Processing Plant*

Students will use a computer simulation program to interactively coordinate the flows of materials between the points of supply and demand with the objective of minimizing system-wide costs. The model will be run several times under varying conditions in order to see visually and through simple analysis how system changes affect overall performance.

(6) *Ethanol Production: From Cellulosic Biomass to Liquid Fuel*

Introduces students to laboratory processes for converting woody biomass to ethanol, a transportation biofuel. Students will inspect different types of wood chips under the microscope and view fermenting micro-organisms at work. Purified ethanol will be recovered from the fermentation broth using a small batch distillation column.

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Sustainable Futures Institute

