

*Center for Pre-College Outreach*

# Annual Report.2011



**Michigan Tech**

Michigan Technological University

[www.mtu.edu/precollege](http://www.mtu.edu/precollege)



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## We are proud to present to you the 2011 Michigan Technological University Center for Pre-College Outreach Annual Report.

A recent report by the National Research Council, "Successful K-12 Outreach Education," states: "The primary driver of the future economy and concomitant creation of jobs will be innovation, largely derived from advances in sciences and engineering. Four percent of the national workforce is composed of scientists and engineers; this group disproportionately creates jobs for the other 96 percent." Research concludes that sixteen of twenty occupations targeted with the largest projected growth by 2018 are related to science, technology, engineering, and mathematics (STEM). Only four of these occupations will require advanced degrees.

Michigan Tech's Center for Pre-College Outreach is answering this call by developing and executing programming that will serve as a pipeline for all students to achieve success in their academic, professional, and personal lives.

Our innovative Mind Trekkers program brings the excitement of discovery-based learning to students across the country. Once hooked on STEM through this dynamic learning experience, students can attend a more in-depth residential program on Michigan Tech's campus. Using world-class research facilities and conducted by students, faculty, and staff, our summer programs allow students to further explore their talents and interests, develop role models and lifelong friends from around the world, and gain the confidence necessary to be successful in their post-secondary endeavors.

This report will provide you with detailed information regarding our successes and opportunities in our core programs: Summer Youth Programs; summer scholarship programs: Women in Engineering, Engineering Scholars Program, and National Summer Transportation Institute; and Mind Trekkers STEM Road Show.

We hope you'll take this opportunity to learn more about our evolving STEM outreach efforts and the positive, inspirational impact our programs are having on this exciting generation. If you have any questions or suggestions, please don't hesitate to contact us at 906-487-2219.

Sincerely,

A handwritten signature in black ink, appearing to read "S. Patchin", with a stylized, looping flourish at the end.

Stephen Patchin  
Director, Center for Pre-College Outreach  
Michigan Technological University

# Summer Youth Programs

## YOUTH PROGRAMS EVALUATION HIGHLIGHTS

In 2011, participants had the opportunity to choose from more than fifty different explorations. Our most popular courses included forensic science and CSI, general engineering, chemical engineering, video game programming, and backpacking on Isle Royale. Other explorations, such as blacksmithing, remain popular year to year.

### BY THE NUMBERS

**55%** of program participants were from groups traditionally underrepresented in STEM fields.

**51%** of participants were female.

**96%** of participants said they would recommend their exploration to others.

**92%** of participants rated their hands-on activities experience as good or excellent.

**76%** of participants were inspired to learn more about the subject covered.

**12%** of participants had attended a Youth Programs academic program in a previous year.

**90%** of participants stated they would be interested in returning to a Michigan Tech Summer Youth Program next year.

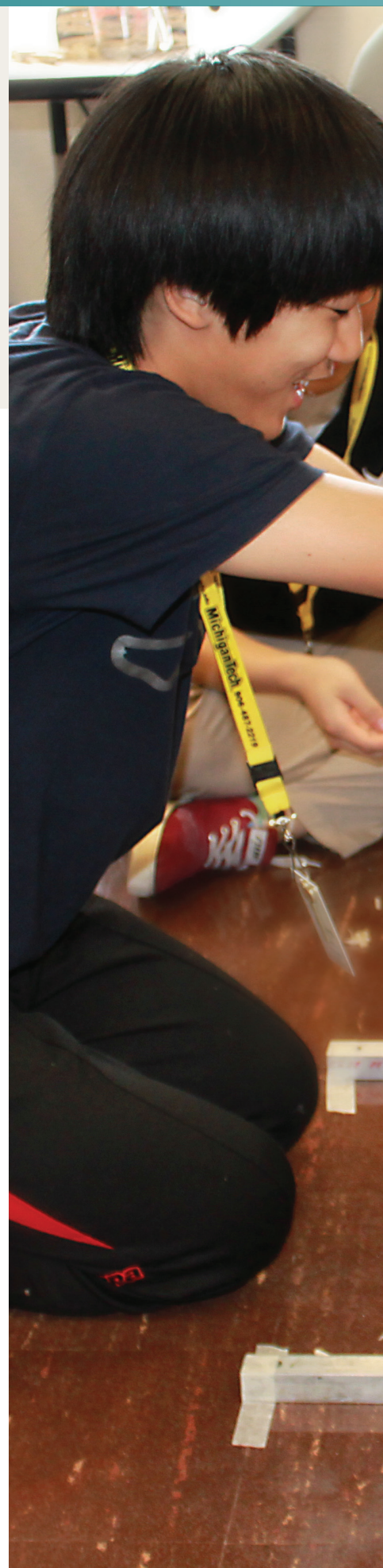
**80%** of participants stated they would consider Michigan Tech as an option during their college search.

“The experiences that I’ve had over the last two weeks are memories that I will cherish for years to come. My favorite part of this program is the ability to work in a group with people from different corners of the world. Overall, this experience will definitely help me choose the perfect college for me.”

*Antoine, Detroit, Michigan*

“I have learned so much throughout this whole week—it’s unbelievable. When I was here, I was able to talk to professors of different fields and listen to a thesis being presented. The professors I talked to guided me and showed me what I should expect from college and how to get scholarships.”

*Rachel, Iron River, Michigan*



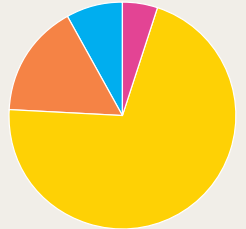
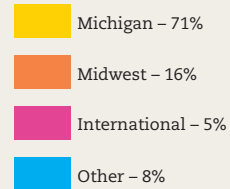




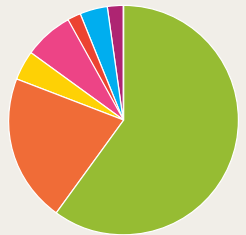
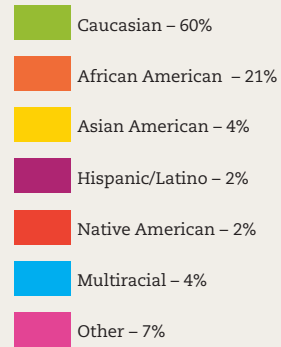
## DEMOGRAPHIC INFORMATION

Total participants: 1068

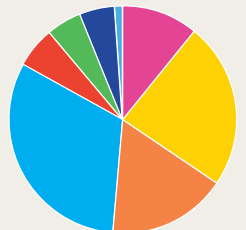
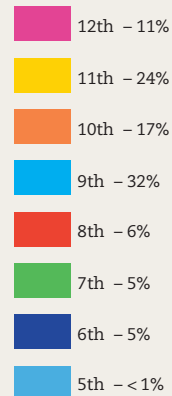
### GEOGRAPHIC DISTRIBUTION



### ETHNICITY



### GRADE, FALL 2011



# Women in Engineering and Engineering Scholars Program

2011 Summer Programming

## PROGRAM CONTENT

During Women in Engineering (WIE) and the Engineering Scholars Program (ESP) at Michigan Tech, a total of **265** participants:

- Explored different areas and applications of engineering.
- Learned about a wide array of careers in engineering through focused presentations.
- Honed and developed team skills and applied their knowledge about engineering.
- Investigated the many ways engineers can directly impact the quality of people's lives.
- Learned how to be successful in undergraduate engineering programs.
- Became acquainted with college life and extracurricular activities on campus.
- Built networks and friendships while enjoying a variety of recreational activities in the natural setting of Michigan's Upper Peninsula.
- Met role models working in engineering fields.
- Met other students with similar backgrounds and interests.



## EVALUATION HIGHLIGHTS

Based on participant evaluations, students especially enjoyed the hands-on group projects and activity portions of their engineering sessions. Favorite projects included processing hot metal into objects, sand-casting a name plate, learning about sports engineering, making soap from raw materials, exploring renewable energy with wind turbines, and designing a building to withstand an earthquake.

- Percentage of participants who could not have attended without a scholarship  
**89% WIE | 90% ESP**
- Percentage of participants who would recommend their program to others  
**100% WIE | 94% ESP**
- Percentage of participants who rated their hands-on activities as good or excellent  
**95% WIE | 88% ESP**
- Percentage of participants who felt more likely to have a future career in engineering after participating in the program  
**88% WIE | 84% ESP**
- Percentage of participants who felt more encouraged to attend college after completing the program  
**93% WIE | 94% ESP**
- Percentage of participants who felt more likely to attend Michigan Tech after completing the program  
**78% WIE | 75% ESP**

Students' most memorable experiences included meeting new friends, participating in engineering projects, swimming in Lake Superior and other evening activities, learning about the various kinds of engineering, learning about college life, casting metals, and going on field trips to area sights and locations.

## ENGINEERING GROUP PROJECTS

Engineering group projects included:

- Drawdio: a pencil that lets you draw music
- Creating your own Artificial Intelligence (AI) army
- Creating 3-D models for virtual reality
- Saponification (making soap)
- 3-D printing with cast metals
- Blacksmithing



## ENGINEERING SESSIONS

Students participated in projects during their ten different engineering sessions, including:

- Building a motor
- Designing a bridge and testing its strength
- Operating a continuous chemical reactor
- Designing a computer-controlled reaction
- Recreating natural disasters and studying the part that natural components play in their severity
- Thermo mechanical processing of shape memory wire
- Using an atomic force microscope to explore the strength of nanoparticles



"I learned a lot from this wonderful experience about the various fields in engineering and I also learned it is important to have a passion for the career I will one day choose. Every aspect of the program was satisfying, from the combination of hands-on activities to the helpful information. I especially enjoyed the environmental engineering session; I hope to change the world starting with the natural environment."

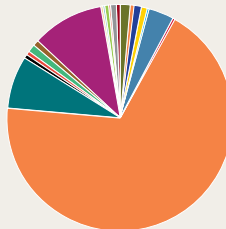
**Jennifer, Citrus Springs, Florida**

"It was a great way to explore the different fields and it gave me an idea of what I might want to do with my life. My favorite part of it was all the interesting hands-on experiences; from these experiences, I now have a better idea of what the engineering world is all about."

**Nick, Almont, Michigan**

## GEOGRAPHIC DISTRIBUTION

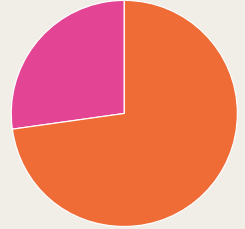
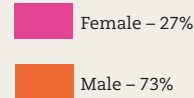
California – 4	Ohio – 1
Colorado – 1	Pennsylvania – 3
Florida – 3	Washington – 2
Georgia – 2	Wisconsin – 26
Iowa – 1	Nevada – 1
Illinois – 9	Massachusetts – 1
Indiana – 1	Texas – 1
Michigan – 174	Virginia – 1
Minnesota – 19	New Jersey – 2
North Carolina – 2	Japan – 1



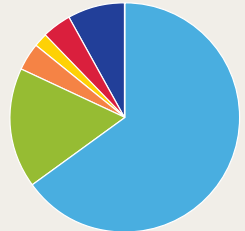
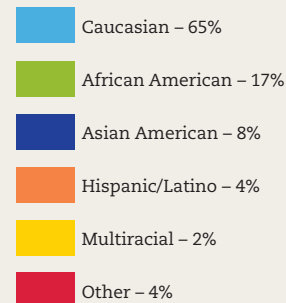
## DEMOGRAPHIC INFORMATION

Total participants: 121 WIE | 140 ESP

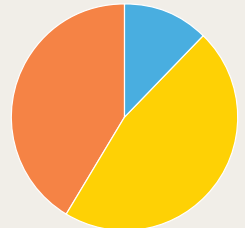
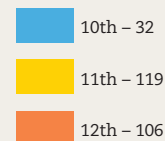
### GENDER (ESP)



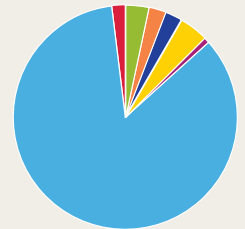
### ETHNICITY (ESP)



### GRADE, FALL 2011 (ESP, WIE)



### ETHNICITY (WIE)



# National Summer Transportation Institute

2011 Summer Programming

## PROGRAM CONTENT

During the National Summer Transportation Institute (NSTI) at Michigan Tech, **30** participants:

- Used hands-on activities to explore different modes of transportation, including planes, trains, automobiles, and ships.
- Learned from role models working in transportation fields about topics such as bridge design, airport construction, and snow roads across Antarctica.
- Discovered team skills and applied the knowledge learned about transportation during group projects.
- Went on field trips to local attractions, such as Eagle River, Portage Canal Lift Bridge, and Isle Royale.
- Went on a weekend excursion to Sault Ste. Marie and St. Ignace, Michigan, to tour the Soo Locks, the International Bridge, and the Mackinac Bridge.
- Became acquainted with college life and extracurricular activities on campus.
- Met other talented teens with similar backgrounds and interests.



## EVALUATION HIGHLIGHTS

Based on participant surveys, students especially enjoyed the hands-on group projects and field trip portion of the program. Highlights of the program included making new and diverse friends, going to the Mackinac Bridge and Isle Royale, and getting to experience college life firsthand.

- **72%** of participants felt more likely to have a future career in the transportation industry after participating in the program.
- **97%** of participants felt more encouraged to attend college after completing this program.
- **83%** of participants agreed that the transportation industry has contributed greatly to solving problems found in the world.
- **93%** of participants were more interested in attending Michigan Tech after completing the program.

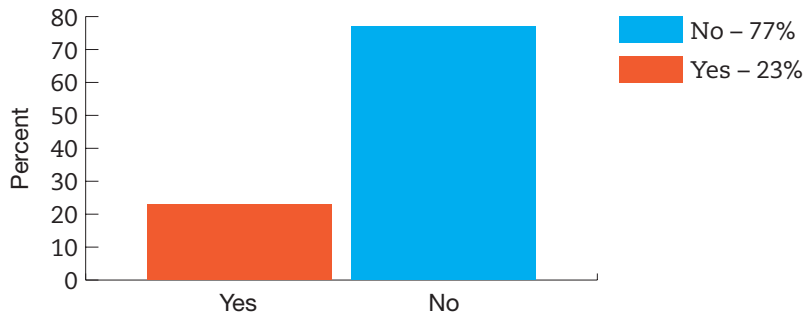
After completing the program, the participants planned to take the following transportation-related courses in high school or college:

- **60%** transportation courses
- **92%** science courses
- **92%** math courses
- **58%** design courses
- **86%** technology-based courses
- **46%** industrial arts/woodworking ("shop" class)



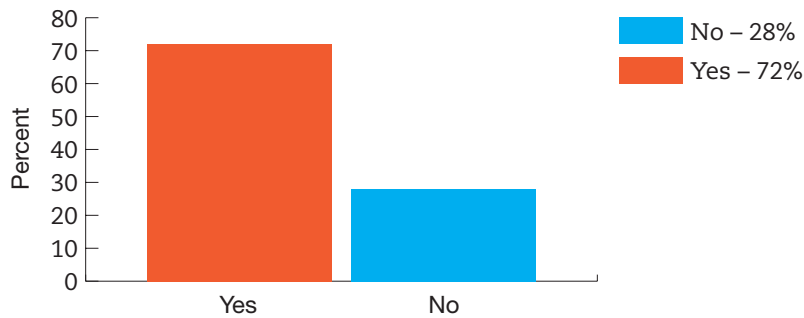
## PRE TEST

Do you currently plan on making the transportation industry your career field?



## POST TEST

After completing NSTI, are you more interested in a future career in this field?



"My favorite part of the whole trip was the Mackinac Bridge. It was the coolest thing I have ever seen. I learned so much about transportation and I now have my mind set on attending Michigan Tech!"

*Logan, Grand Blanc, Michigan*

"I now know I definitely want to pursue engineering as a future career. NSTI has been amazing. Thank you so much for making this the best two weeks of my life."

*Carmen, San Francisco, California*

## THIS PROGRAM WAS MADE POSSIBLE BY:



**University Transportation Center**

Materials in Sustainable Transportation Infrastructure

Michigan Tech Transportation Institute • Michigan Technological University

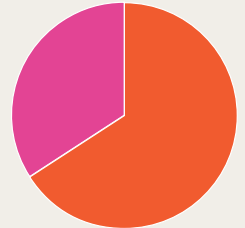


## DEMOGRAPHIC INFORMATION

Total participants: 30

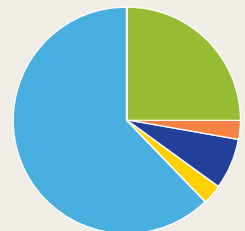
### GENDER

Male – 66%  
Female – 34%



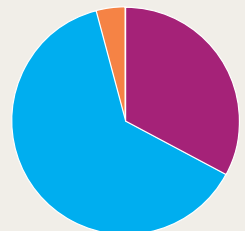
### ETHNICITY

Caucasian – 62%  
African American – 25%  
Asian American – 7%  
Hispanic/Latino – 3%  
Multiracial – 3%



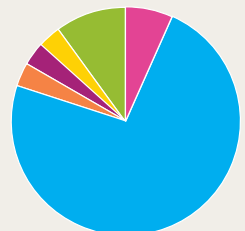
### GRADE, FALL 2011

10th – 33%  
11th – 63%  
12th – 4%



### STATE

Illinois – 1  
Virginia – 1  
New York – 1  
California – 2  
Wisconsin – 3  
Michigan – 22



# Mind Trekkers

The Mind Trekkers road show is Michigan Tech's newest K-12 outreach initiative. With the goal of bringing the excitement of STEM directly to young students, Mind Trekkers attends expos and events throughout the region and across the nation to showcase engaging, hands-on experiments and activities. Mind Trekkers serves as an active pipeline, connecting thousands of prospective students to the Michigan Tech family while engaging in one-of-a-kind opportunities and experiences. Mind Trekkers is inspiring our next generation of leaders to seek answers, get excited, and question the traditional boundaries of a STEM education.

## ON THE HORIZON FOR 2011–2012

### Einstein Project Science Expo

Sponsored by Michigan Tech  
January 14, 2012  
Green Bay, Wisconsin  
Anticipated participants: 4,000+

### Southwestern Michigan College Festival

Sponsored by Southwestern Michigan College  
February 22–24, 2012  
Dowagiac, Michigan  
Anticipated participants: 7,000+

### Mind Trekkers at Oak Ridge Associated Universities

Sponsored by Oak Ridge Associated Universities  
March 13–15, 2012  
Oak Ridge, Tennessee  
Anticipated participants: 5,000+

### Sheboygan Science and Engineering Festival

Sponsored by Kohler and regional donors  
April 13–14, 2012  
Sheboygan, Wisconsin  
Anticipated participants: 10,000+

### USA Science and Engineering Festival

Sponsored by Michigan Tech  
April 27–29, 2012  
Washington, D.C.  
Anticipated participants: 1,000,000+

### Mind Trekkers at Lake Superior State University

Sponsored by Michigan Campus Compact and KCP Initiative  
May 4–5, 2012  
Sault St. Marie, Michigan  
Anticipated participants: 2,000+

### 2012 Destination Imagination

Sponsored by Michigan Tech  
May 23–26, 2012  
Knoxville, Tennessee  
Anticipated participants: 14,000+

### Girl Scout Jamboree

Sponsored by Girl Scouts of America  
June 18–19, 2012  
Green Bay, Wisconsin  
Anticipated participants: 8,000+

"This event was extremely educational! All of the stations were well prepared and offered the kids the opportunity for hands-on learning. As a teacher, I actually took notes so I could use some activities in my classroom."

*AT&T Roadshow Teacher*

"Large numbers of enthusiastic Michigan Tech students created a clear impression that being in STEM includes room for fun and friends. I observed teens slumping and shuffling into the activity spaces and leaving animated."

*AT&T Roadshow Teacher*







## IN 2011, MIND TREKKERS VISITED...

### **Einstein Project Science Expo, January 15**

Shopko Hall, Green Bay, Wisconsin  
3,000+ K–8th students

### **Detroit Science Center, February 24–25**

Detroit, Michigan  
1,000 K–12 students

### **Jackson Girl Scouts, February 26**

Westwood Mall, Jackson, Michigan  
1,000 K–8 students

### **AT&T Roadshow, May 3–6**

Traverse City, Sault Ste. Marie, Escanaba,  
and Iron Mountain, Michigan  
5,000 K–12 students

### **Destination Imagination Global Finals, May 26–28**

Knoxville, Tennessee  
14,000 K–12 students

### **Houghton County Fair, August 25**

Sponsored by Michigan Space Grant Consortium  
Houghton County Fairgrounds  
3,000 K–12 students



The Mind Trekkers student organization, founded in 2011, brings together current Michigan Tech students who are interested in sharing the excitement of STEM fields with middle- and high-school students across the country. The group—nearly 500 members strong—volunteers their time for road show demonstrations and performs at on-campus events, drawing attention to the group's unique hands-on science lessons. Mind Trekkers meets weekly to brainstorm, discuss, test new demonstrations, and prepare for upcoming events.

**[MINDTREKKERS.MTU.EDU](http://MINDTREKKERS.MTU.EDU)**

## Center for Pre-College Outreach

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