

CENTER FOR PRE-COLLEGE OUTREACH

2017 Annual Report

mtu.edu/precollege



**Michigan
Technological
University**



2017 ANNUAL REPORT

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What Problem Do You Want To Solve?

Young people are often asked by educators what careers interest them: What do you like and dislike? What gets you excited?
What do you want to DO when you grow up?

But we have another, perhaps more critically important question:
What problem do you want to solve?

Most middle and high school students want to do more than study and graduate. **They want to contribute.** They want to propel society forward. Securing cyberspace, engineering better medicines, improving infrastructure and modernizing systems in communities, or providing equal access to clean water—they want to make this world better. They just might not have a full toolbox to tackle those challenges yet.

That's where we come in.

At Michigan Technological University, inside the Center for Pre-College Outreach, there is a deep understanding that students of all ages are eager to start solving the grand challenges facing civilization. They want to tinker. They seek to inquire. To "give it a try." We know how important it is to not only excite young people about science and engineering, but also to show them the **why and how of STEM.** We align ourselves with other problem-solvers—Michigan Tech faculty and graduate students, industry partners, and STEM-centric institutions and organizations—because together we are innovative and bold. We create unique opportunities students have never seen before. And we're continually refining our craft to deploy experiences that enhance and elevate their capacity to solve.

Local to regional, national to international. Our programs energize more than 75,000 students each year. Whether we're welcoming students into labs during Summer Youth Programs or bringing hands-on science to their backyard with Mind Trekkers, we make sure students know **these fields are for them.**

This report highlights the programs and outcomes we are most proud of in 2017. We are driven by our mission to create the future—to try and be the solution to the challenge of boosting students to reach their highest potential. Each new day is an opportunity to impact lives. We look forward to new faces and places in 2018.

Thank you for your support.

—Center for Pre-College Outreach Staff,
Michigan Technological University





Our Impact

14

MIND TREKKERS EVENTS

.....

53

**SUMMER YOUTH
PROGRAM COURSES**

.....

416,905*

**OUTREACH
PARTICIPANTS IN 2017**

.....

*Summer Youth Programs, Mind Trekkers, and
College Access participants

Government, industry, the non-profit community, and educational institutions agree—our country must develop a sustainable system for human capital equipped with expertise in science, technology, engineering, and mathematics (STEM).

How?

Spark a sense of wonder. Our programs invite students from across the United States and abroad to dive into STEM intentionally and purposefully.

Our College Access programs offer experiences for local youth—in schools and on campus. Summer Youth Programs (SYP) provide a platform for more than 1,000 students from around the world to immerse themselves in future career paths. Mind Trekkers, our mobile roadshow, showcases STEM in action for thousands of educators and families.

These programs inspire students to become scientists, mathematicians, and engineers. Many SYP alumni go on to attend Michigan Tech where they continue their STEM education.

SYP ALUMNI
ON CAMPUS:

686
students

9%
of the student body

59%
increase over five years

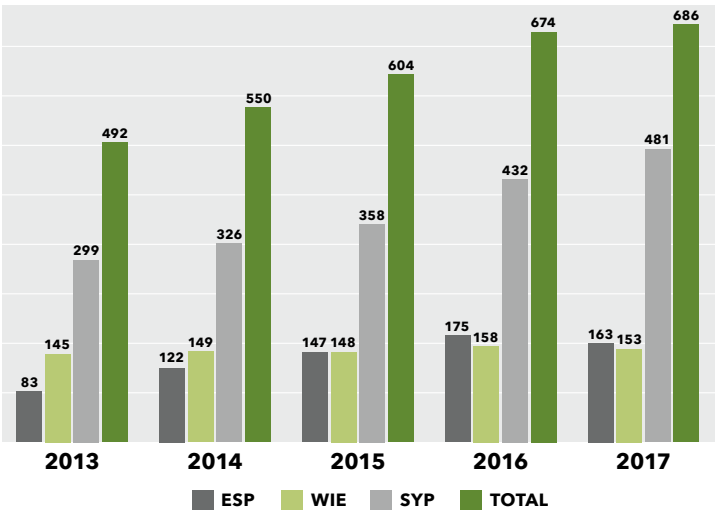
95%
majoring in STEM fields

270
identify as female

81%
call Michigan home

24%
enrolled in
Mechanical Engineering-
Engineering Mechanics

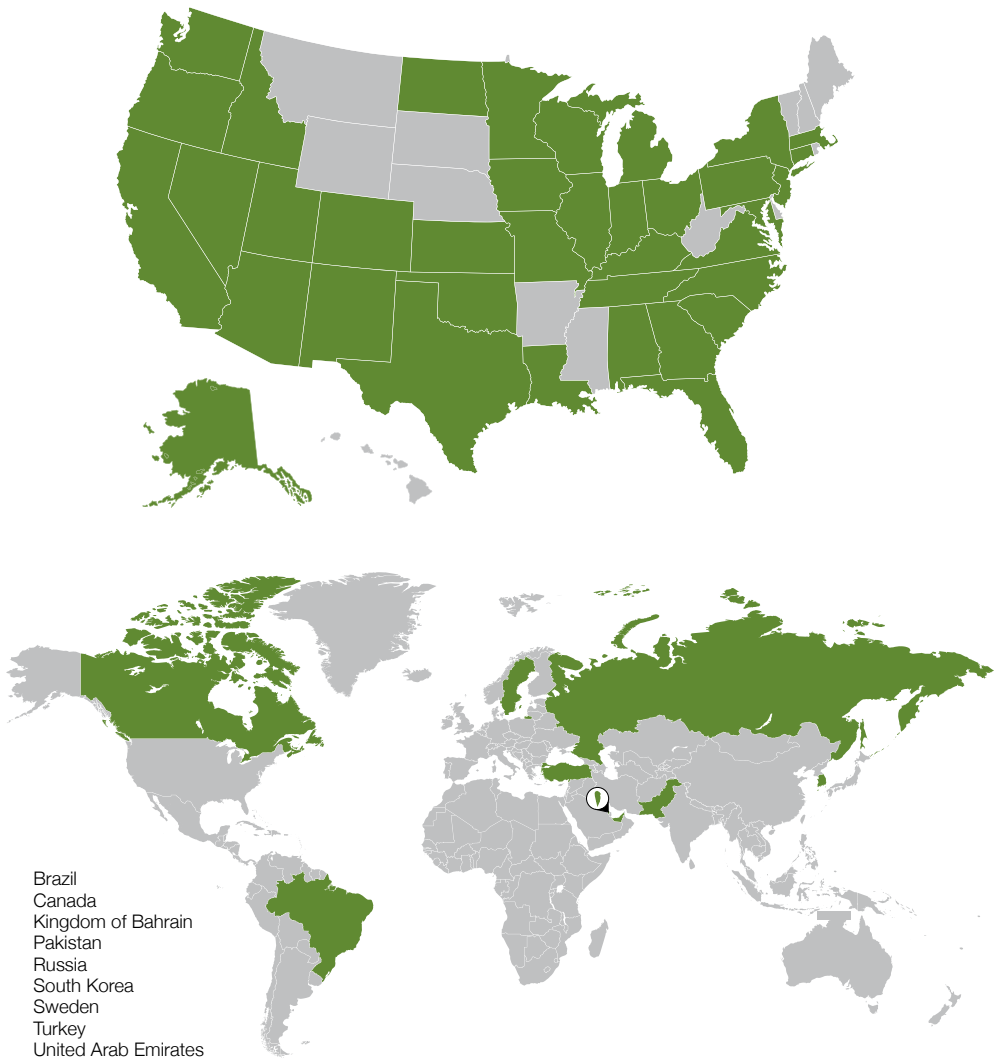
SYP ALUMNI: FIVE-YEAR SCOPE*



*Five-year overview of matriculated students at Michigan Tech

2017 ATTENDEES

37 states and 9 countries represented





Summer Youth Programs



1,230

TOTAL PARTICIPANTS



syp.mtu.edu



FACEBOOK

facebook.com/MichiganTechSYP



TWITTER

twitter.com/mtusyp



FLICKR

flickr.com/photos/michigantechyp



YOUTUBE

youtube.com/c/MichiganTechCPCO

Summer Youth Programs (SYP) encourages participants to be bold. Choose adventure. Push limits.

Our mission is quality, innovative teaching and learning experiences that promote academic studies, college life, and career awareness to a diverse group of pre-college students. Through hands-on, discovery-based programs, students break out of their comfort zone and stretch their imaginations—without the pressure of grades, exams, or assignments.

Michigan Tech prepares its students to create the future, and SYP provides a bridge to pre-college students. They get valuable insight into what their

future could look like. SYP strives to prepare students so that college is a viable option in their future.

Our facilities, along with our research and teaching faculty, deans, and advisors, help students develop college and career goals. Current Michigan Tech students serve as role models, providing inspiration, encouragement, and guidance.

92%

felt their exploration differed from their classrooms back home

66%

felt more likely to attend college

86%

showed interest in coming back for another summer

88%

gained confidence in their ability to be successful in a college atmosphere

96%

would recommend their exploration to others

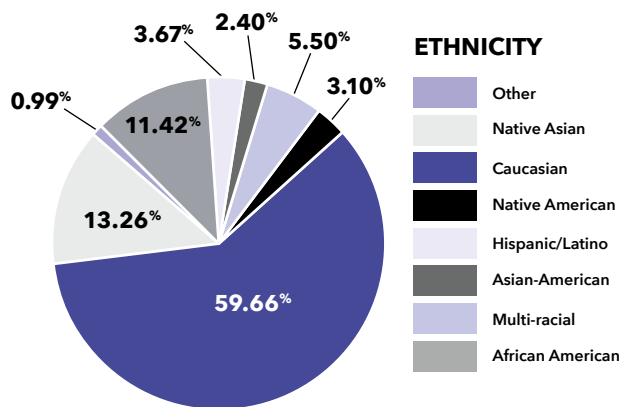
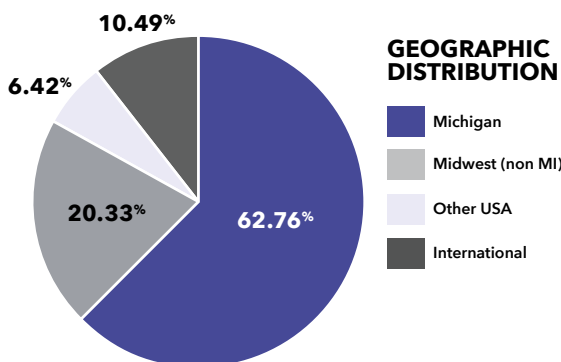
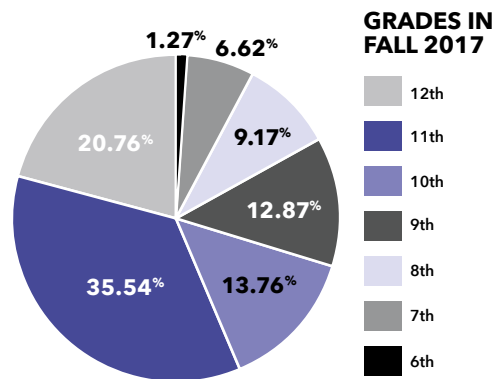
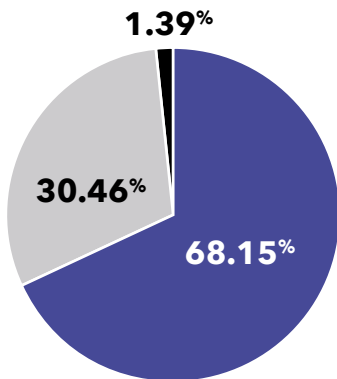
17%

could not have attended without a scholarship

53 courses offered, including:

Aviation and Aerospace
Blacksmithing
Chemical Engineering
Computer and Electrical Engineering
Forensic Science and CSI
Outdoor Leadership
Video Game Programming

DEMOGRAPHICS



"Everyone should experience a camp like this before college."



Women in Engineering



118

PARTICIPANTS



Through Women in Engineering (WIE), 118 young women explored different areas of engineering and their applications. They learned about engineering careers, investigated the many ways engineers impact the quality of our lives, and developed team skills through Destination Imagination simulations. Participants met female role models who work in engineering

fields and discussed strategies for success in undergraduate engineering programs.

The young women also got a taste of campus life. They met other students and built networks and friendships while enjoying the recreation and natural setting of Michigan's Upper Peninsula.



Sponsored by Ford Motor Company and 3M



FACEBOOK

facebook.com/MichiganTechWIE

"I found my passion. Thank you for the best experience of my life!"

3.89
average GPA

95%
would recommend
Women in Engineering
to others

86%
felt more likely to
pursue a career in
engineering

86%
considered themselves
very informed
regarding the variety of
career options available
in engineering

88%
rated the hands-on
activities as above
average

Group engineering projects included:

Bath Bombs: The Stoichiometric Chemical Processes

Building Strong Structures

Drawdio: A Pencil That Lets You Draw Music

From Imagination to Creation with Computer-Aided Design

Go With the Flow: Cast Metals

Heat it and Hammer it: Blacksmithing

Human-Computer Interaction

Let's Design Materials with Architecture Inside

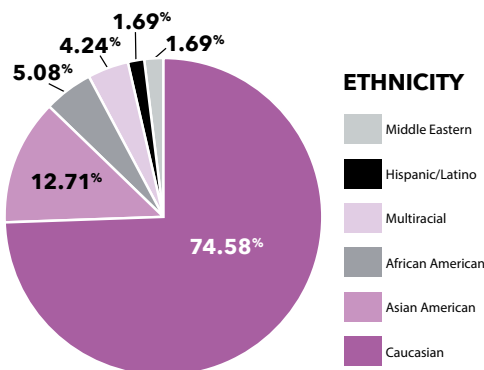
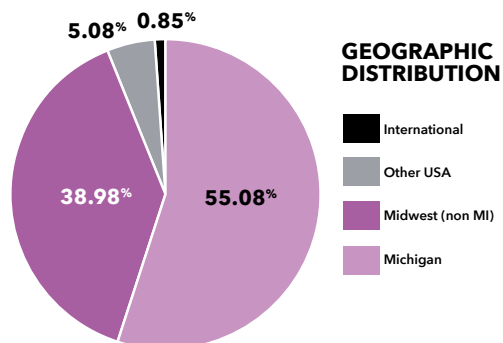
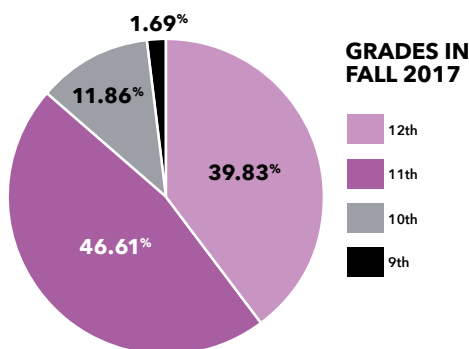
Mud and Fire! Intro to Landslides and Volcanoes

Online Game Development

Saponification: Good Clean Fun

Take Control of an i-Robot

DEMOGRAPHICS



NOT YOUR TYPICAL CLASSROOM EXPERIMENTS

Students participated in projects during nine different engineering sessions, including:

Deconstructing a hair dryer to learn how its mechanical and electrical components interact

Designing a bridge and testing its strength

Hiking in local wetlands to discover the importance of environmental engineering

Operating a continuous chemical reactor

Recreating natural disasters and studying how natural components affect their severity

Thermo-mechanical processing of shape-memory wire



Engineering Scholars Program



129

**TOTAL
PARTICIPANTS**



FACEBOOK

facebook.com/MichiganTechESP

During the Engineering Scholars Program (ESP), 129 participants explored careers in mechanical, computer, environmental, electrical, chemical, biomedical, civil, geological, and materials engineering, and investigated the many ways an engineer can impact quality of life.

Students got insider information from role models working in engineering fields. They developed team skills

through Destination Imagination challenges, learned about the college application process, and received tips for succeeding in university engineering programs. They experienced college life by staying in a residence hall, exploring campus, and meeting people with similar interests.

Students enjoyed team competitions, a variety show, and outdoor activities in Michigan's Upper Peninsula.



Sponsored by Ford Motor Company and Hemlock Semiconductor

"This program made me a better student."

3.8
average GPA

98%
would recommend the
Engineering Scholars
Program to others

85%
felt more likely to
pursue a future career
in engineering

81%
felt more informed
of the wide variety
of career options in
engineering

91%
rated the hands-on
activities as above
average

Engineering Group Projects

Bath Bombs: The Stoichiometric Chemical Processes

Building Strong Structures

Drawdio: A Pencil That Lets You Draw Music

From Imagination to Creation with Computer-Aided Design

Go With the Flow: Cast Metals

Heat it and Hammer it: Blacksmithing

Human-Computer Interaction

Let's Design Materials with Architecture Inside

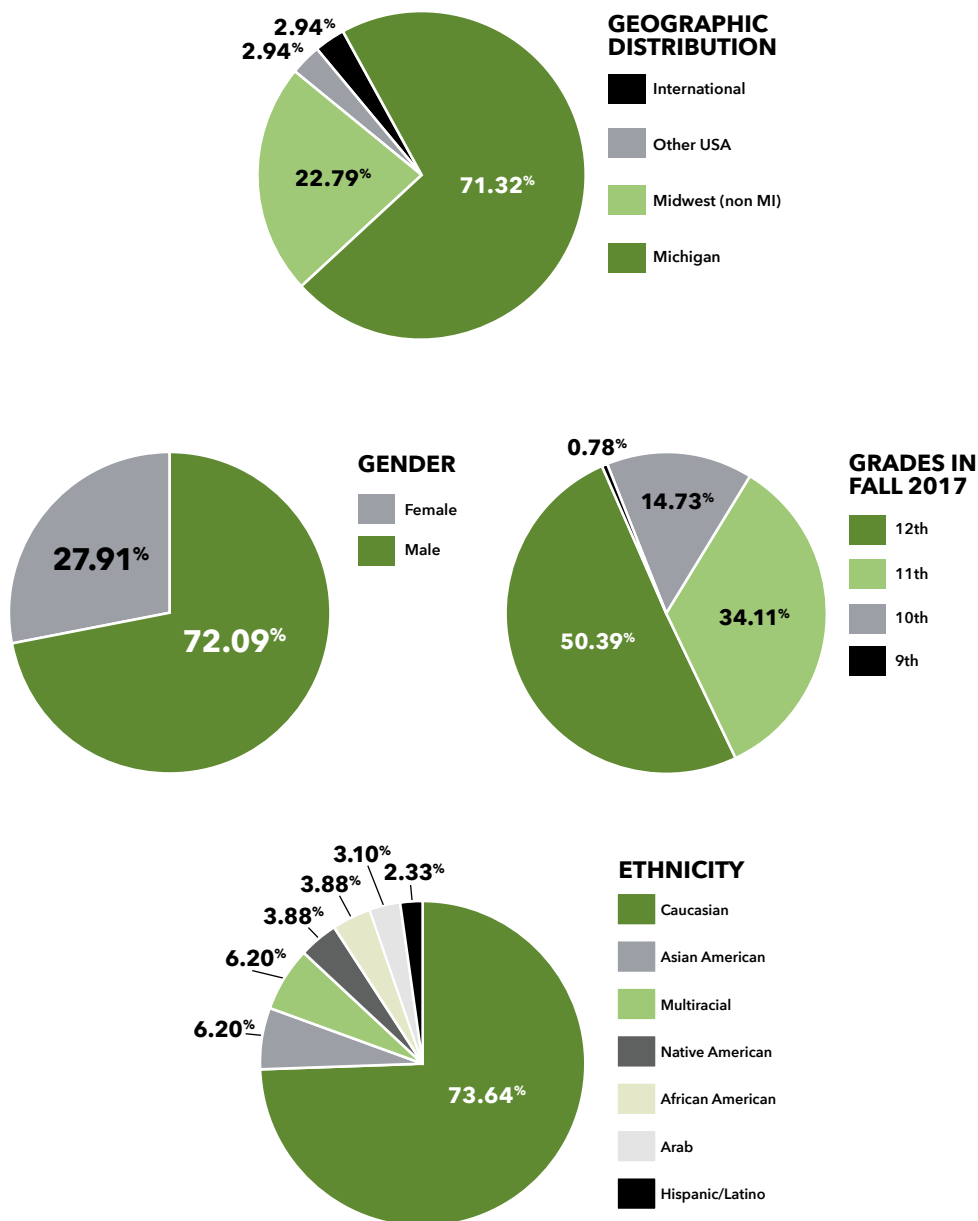
Mud and Fire! Intro to Landslides and Volcanoes

Online Game Development

Saponification: Good Clean Fun

Take Control of an i-Robot

DEMOGRAPHICS



OUT-OF-THE-BOX CLASSROOM CHALLENGES

Students participated in projects during a series of nine engineering sessions, including:

Disassembling and reassembling a hair dryer to understand its mechanical components

Designing a bridge and testing its strength

Hiking in local wetlands to discover the importance of environmental engineering

Operating a continuous chemical reactor

Recreating natural disasters and studying the part that natural components play in their severity

Thermo-mechanical processing of shape-memory wire



27

**TOTAL
PARTICIPANTS**



Women in Computer Science

In partnership with Ford Motor Company, Jackson National Life Insurance Company, Target, and 24G, the Women in Computer Science (WICS) program provided 27 high school females an opportunity to explore careers and areas in the computing industry. Students developed team- and problem-solving skills while they created an application using the MIT App Inventor.

Participants met guest speakers and industry role models who broadened their perspective of women in this field.

At Jackson, participants toured the facility and learned about computing opportunities and projects.

The group got acquainted with college life while connecting with other young women with similar interests.



Sponsored by Ford Motor Company, Jackson National Life Insurance Company, Target and 24G

Computing Explorations

Artificial Intelligence
Cybersecurity
Data Mining
Networks
Programming
Virtual Reality
Visualization

Average Weighted GPA of Women in Computer Science Program

3.87

Weighted GPAs give additional points for advanced courses such as Advanced Placement courses

Participating Industry Role Models

Google
Microsoft
Netflix
Pivotal

"I've always been interested in computer science, but this week made me sure this is a field worth pursuing."

DEMOGRAPHICS

Grade Level Fall 2017

11% 10th
33% 11th
56% 12th

Geographic Distribution

1 Other USA
8 Midwest (non Michigan)
19 Michigan

Ethnicity

89% Caucasian
7% Asian American
4% African American



19

**TOTAL
PARTICIPANTS**

.....

Women in Automotive Engineering

The women in Automotive Engineering (WIAE) scholarship program offered a discovery of disciplines, knowledge, and careers in automotive engineering for 19 young women. Students explored areas of automotive engineering and its application, learned about careers, and developed new skills in automotive labs.

Participants also met female role models working in the automotive engineering industry and other students with similar backgrounds and interests.

They got a taste of campus life while enjoying recreation in the natural setting of Michigan's Upper Peninsula.

84%

of participants would recommend WIAE to others

100%

of participants considered themselves "very informed" regarding the variety of career options available in engineering

100%

of participants indicated having an interest in engineering after attending WIAE

84%

of participants felt more likely to have a career in engineering after attending WIAE

**Average Weighted
GPA of WIAE**

3.8

Weighted GPAs give additional points for advanced courses such as Advanced Placement courses

"My high school doesn't have many opportunities for engineering, so this camp was vital for my introduction to automotive engineering."

DEMOGRAPHICS

Grade Level Fall 2017

16% 10th
31% 11th
53% 12th

Geographic Distribution

1 Other USA
3 Midwest (non Michigan)
14 Michigan
1 Pakistan

Ethnicity

90% Caucasian
5% Multiracial
5% Pakistani



28

**TOTAL
PARTICIPANTS**



National Summer Transportation Institute

During the National Summer Transportation Institute (NSTI), 28 participants explored different areas of transportation, including planes, trains, automobiles, and ships. Students learned about bridge design, airport construction, and snow roads in Antarctica from role models working in transportation fields.

Field trips gave students an opportunity to explore real-world projects. They visited the all-wood Eagle River Bridge, the Portage Lake Lift Bridge, and Isle Royale National Park.

The group also went on a weekend excursion to Sault Ste. Marie and St. Ignace to tour the Soo Locks, International Bridge, and Mackinac Bridge.

In addition to travel, NSTI students became acquainted with college life and extracurricular activities on campus while meeting other talented teens with similar backgrounds and interests.



Sponsored by MDOT and Federal Highway Administration

100%

of participants felt the transportation industry has greatly contributed to solving world problems

93%

of participants rated the hands-on activities as above average—many said this was their favorite part of NSTI

89%

of participants felt more informed about their career options in the transportation field

82%

of participants felt more motivated to learn about the transportation industry after NSTI

After completing NSTI, participants plan to take the following transportation or related classes during high school or college:

96% Math
86% Science
89% Technology
61% Transportation
86% Design
43% Shop

"This experience sparked my interest in the field and inspired me to do great things."

DEMOGRAPHICS

Grade Level Fall 2017

7% 9th
14% 10th
29% 11th
50% 12th

Gender

43% Female
57% Male

Geographic Distribution

1 Other USA
7 Midwest (non Michigan)
20 Michigan

Ethnicity

54% Caucasian
14% Asian American
14% African American
18% Multiracial



20

**TOTAL
PARTICIPANTS**



Junior Women in Engineering

Modeled on our high school competitive scholarship programs, Junior Women in Engineering (JWIE) offered an introduction to many engineering disciplines. Twenty students explored engineering through hands-on activities like testing water quality, working with an i-Robot, building balsa wood gliders, and designing model prosthetic legs. They explored how engineers impact the world around them.

JWIE students also got a taste of college life by living in a residence hall throughout the week. Evening activities enhanced the experience which, for some, was the first time living away from home.



Sponsored by Ford Motor Company

100%

of participants felt more likely to have a career in engineering after attending JWIE

95%

of participants would recommend JWIE to others

95%

of participants indicated having an interest in engineering after attending JWIE

75%

of participants consider themselves "very informed" or "extremely informed" regarding the variety of career options available in engineering

"It's hard to fit in at my school, but everyone here was just like me!"

"This program taught me how to see things in a different way, how to collaborate, and the importance of asking questions. It changed my life."

DEMOGRAPHICS

Grade Level Fall 2017

40% 7th
60% 8th

Geographic Distribution

4 Other USA
7 Midwest (non Michigan)
9 Michigan

Ethnicity

85% Caucasian
5% Asian American
5% Native American
5% Hispanic/Latino



Mind Trekkers



mindtrekkers.mtu.edu



FACEBOOK

facebook.com/MindTrekKers



TWITTER

twitter.com/mindtrekkers



FLICKR

flickr.com/photos/michigantechyp



YOUTUBE

youtube.com/c/MichiganTechCPCO

Mind Trekkers is Michigan Tech's K-12 outreach initiative. With its traveling roadshow, the group brings the excitement of science, technology, engineering, and mathematics (STEM) directly to young students. Mind Trekkers attends expos and events throughout the nation to showcase engaging, hands-on experiments and activities.

Undergraduate and graduate student volunteers serve as a pipeline, connecting thousands of prospective

students to the Michigan Tech family while enjoying one-of-a-kind opportunities and experiences.

Mind Trekkers inspires our next generation of leaders to seek answers, get excited, and question the traditional boundaries of STEM education.

"Mind Trekkers inspired me to go to college and pursue a career in STEM. I want to make a difference in the world."

2017 RECAP

14

events

8

states including
Michigan,
Wisconsin, Texas,
Tennessee, South
Carolina, Maryland,
Pennsylvania, and
California

11,162

miles

166,600

people reached

151

traveling Mind Trekker
volunteers

30

different majors

2017 Events

NWTC Science & Engineering
Festival—Green Bay, WI

Adventures in STEM Science &
Engineering Festival—Houston, TX

iMAGINE Upstate STEAM Fest—
Greenville, SC

FIRST Robotics Global Finals—
Houston, TX

Lockheed Martin Family Day—
Bethesda, MD

Cirque Mechanics—
Houghton, MI

Philadelphia Science & Engineering
Festival—Philadelphia, PA

Northeast Wisconsin Blitz—
Green Bay, WI

Boy Scouts' 50th Anniversary—
Munising, MI

Destination Imagination Global
Finals—Knoxville, TN

Beijing Science and Engineering
Festival with USA Science and
Engineering Festival—Beijing, China

Southeast Michigan Science &
Engineering Festival—Livonia, MI

Great Lakes Bay STEM Festival—
Midland, MI

Bay Area Science Festival—
San Francisco, CA



"The volunteers were so genuinely happy and excited about the future. They shared that enthusiasm with everyone in the room."



"As a young woman, seeing other women in STEM really inspired me."

LIGHT THE SPARK. KEEP IT BURNING.

88% are likely to repeat a demonstration and share demos with others

94% agree this event offered activities/resources not normally provided in their classrooms

97% felt the event format supported learning and engagement

93% intend to do a Mind Trekkers demonstration in their classroom and share a demo with another teacher

67% of students think differently about what scientists and engineers do

76% of students are more interested in attending college

College Access programs expose students from our community to the university world, promoting college attendance among students in the Keweenaw and across the Upper Peninsula.

Initiatives include visiting a small group of students at their school, discussing financial aid, and bringing 240 middle school students to campus for a day.



College Access



FACEBOOK

facebook.com/michigantechgearup

GEAR UP

In 2017, the Michigan Tech GEAR UP (GU) cohort completed their sixth year of the program. Most of them graduated from high school and are now in their first year of post-secondary education. Some are engaged in a fifth-year Early College program, and will enter college or university next year. The MI GEAR UP grant will continue to serve students through 2017-18 (their first year of college).

GEAR UP services now include first-year student success seminars, study breaks, and access to events centered on diversity, inclusion, and access to education. There are approximately 100 students attending Michigan Tech who were part of a MI GEAR UP program. Those students are now considered the GEAR UP cohort.

87% of GU students feel they now know more about how to pursue future educational goals.

Women in Science and Engineering

On February 21, more than 240 seventh- and eighth-grade girls from the Western Upper Peninsula spent the day at Michigan Tech exploring the world of science and engineering. Participants completed STEM-themed activities, like creating a wood cell model, designing a pinball machine, and participating in an epidemic simulation. The students also heard from college student role models both in small groups and a panel discussion. The event was made possible by the Western Upper Peninsula Center for Science, Mathematics, and Environmental Education, the College of Engineering, and the College of Sciences and Arts.



Get WISE
WOMEN IN SCIENCE & ENGINEERING

85% said the event made them think about math and science differently
88% said they feel more confident they could succeed in a STEM field after Get WISE
98% say they now have a better understanding of how science and engineering are applied to everyday life



Blizzard Bowl

On February 25 and October 28, the Michigan Tech Quiz Bowl Club once again partnered with the Center for Pre-College Outreach to offer quiz bowl tournaments for UP high school teams. Between the two tournaments, Blizzard Bowl welcomed more than 100 students from eight different school districts. Playing in teams of four, the students faced off over questions about history, literature, science, and pop culture. The round-robin tournament was moderated by Quiz Bowl Club members, some of whom played at a Blizzard Bowl tournament prior to attending Michigan Tech!

Family U

New this year, the Center for Pre-College Outreach partnered with Alumni Engagement to host Family U on August 2. Family U provided an opportunity for Michigan Tech alumni to bring their middle and high school students to campus for a day of family STEM activities. Together, families built miniature wind turbines with the Department of Mechanical Engineering-Engineering Mechanics, conducted fingerprint analysis with the Biological Sciences Department, metal-detected minerals with the A. E. Seaman Mineral Museum, and took on an "instant challenge" in The Alley Makerspace.



Hidden Figures

On April 4, campus departments came together to host a screening of the film *Hidden Figures* for more than 100 area high schoolers. Students participated in small-group discussions with Michigan Tech students, faculty, and staff before the film. The event was powered by Michigan Tech Film Board, the National Society of Black Engineers, the Center for Diversity and Inclusion, the Department of Mathematical Sciences, the Department of Humanities, Pavlis Honors College, the Center for Pre-College Outreach, and the Panhellenic Council.

Lighthouse Learners

Lighthouse Learners is hosted at the Public Schools of Calumet, Laurium, and Keweenaw. Founded by Barbara and Paul Horton '69, the program aims to make college a reality for its cohort of seven participants. Now entering their senior year, the Lighthouse Learners experience sessions centered on service learning, study skills, spirit life, and a connection to Michigan Tech. In 2016-17, the students began taking in-depth tours of campus departments of interest to them, took their SAT/ACT, and began exploring the college application process.

A Look Ahead:

2018 Mind Trekkers



FEBRUARY

- Charleston STEM Festival, **Charleston, SC**
- NWTC Science and Engineering Festival, **Green Bay, WI**

MARCH

- Passport to STEM! **Charlotte, NC**

APRIL

- Mind Trekkers at The Independence School, **Newark, DE**
- USA Science and Engineering Festival, **Washington DC**
- First Robotics World Championship, **Detroit, MI**
- iMAGINE Upstate STEAM Fest, **Greenville, SC**

SEPTEMBER

- NTC Wausau Science and Engineering Festival, **Wausau, WI**

OCTOBER

- DOW Great Lakes Bay STEM Festival, **University Center, MI**
- Southeast Michigan Science and Engineering Festival, **Livonia, MI**

NOVEMBER

- Bay Area Science Festival, **San Francisco, CA**

mindtrekkers.mtu.edu

A Look Ahead:

2018 Summer Youth Programs



Competitive Scholarship Programs

Offered to middle or high school students, depending on the program, from across the United States and around the World.

• Rail and Intermodal Transportation	Student Capacity: 20
• Women in Automotive Engineering	Student Capacity: 24
• Junior Women in Engineering	Student Capacity: 20
• National Summer Transportation Institute	Student Capacity: 30
• Women in Computer Science	Student Capacity: 20
• Engineering Scholars Program	Student Capacity: 150
• Women in Engineering	Student Capacity: 150

Join Us!

Want to make a difference in the lives of students?



- Sponsor scholarships
- Fund an exploration
- Guest speak during a program



Rachel Kloc
2012 Hemlock sponsored attendee of ESP and 2017 graduate of Michigan Tech.

"At Hemlock Semiconductor (HSC), we recognize the need to increase K-12 student interest in pursuing STEM related careers. To accomplish this goal, HSC needed a partner and chose Michigan Tech because of its outreach programs, professional staff, and engaged students. By participating in the 2017 Mind Trekkers event in Saginaw, Michigan, and providing Summer Youth Programs scholarships to Great Lakes Bay Region high school students, HSC helped increase the knowledge of STEM to more than 3,000 area students!"

–Terence D Robinson
S30/S130 OE Team Leader
Hemlock Semiconductor



- Sponsor a festival nationally or near you
- Fund a new demonstration
- Provide in-kind donation of equipment or supplies



"Bosch is committed to improving the community and preparing future leaders. Mind Trekkers is doing that through exciting STEM events and programming and we are proud to be a partner."

–Brad McKenna
Robert Bosch LLC
Corporate Citizenship (RBNA/ADM-CS)
North America



For more information on sponsorship and engagement opportunities, please contact:

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906-487-2219 • cody@mtu.edu

A group of about eight people are sitting on a grassy bank, viewed from behind, looking out at a large, calm body of water. The sky is a clear blue with a white dot pattern overlay. The text "ARE YOU READY?" is centered in the middle of the image.

ARE YOU READY?

Thank you to our 2016-17 Industry Partners



BOSCH
Invented for life



DENSO



HED



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