Are you ready for an adventure?

Purify water.
Program a robot.
Design and test bridges.
Develop a business model.
Analyze mock crime scenes.
Build a sensor circuit.
Insert foreign DNA into bacteria.
Code a video game.

Summer Youth Programs (SYP) at Michigan Technological University is not your ordinary summer camp. Experience the excitement of science, technology, engineering, and mathematics (STEM) through firsthand explorations that include getting into the field and working inside labs for a full college-readiness experience. With more than 50 classes to choose from, you’re sure to find a course that sparks your imagination and may even define your future.

We’re ready—are you?
YOUR next adventure Awaits—Just Look INSIDE:

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and UP Summer Theater Institute ..................... 10
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WHAT IS SUMMER YOUTH PROGRAMS?

Since 1972, Summer Youth Programs at Michigan Tech has been offering students in grades 6-11 a variety of hands-on explorations. SYP explorations provide engaging introductions to academic subjects, encouraging students to explore and give thought to college and career interests.

Explorations are offered in engineering, science, technology, computer science, business, design, and the humanities. Participants get the chance to fully participate in explorations at an age-appropriate level, keeping them interested and encouraging them to continue learning.

Students can also apply for the competitive scholarship programs, which focus on specific areas of study. Whatever the program, SYP is a fantastic mini-college experience on the Keweenaw Peninsula that packs a ton of learning, exploring, and fun into each day.

How much do programs cost?

Program fees vary depending on lab fees, arrival, and live-in or commuter status. The cost for a live-in, week-long program begins at $950, including room and board. Commuter programs begin at $525 and include lunch. For costs associated with specific explorations, visit mtu.edu/syp

How do I register?

For a complete list of programs and extended course descriptions, visit mtu.edu/syp/discover/courses, you can register online by following the prompts detailed below.

1. Complete registration forms online.
2. Select a payment method and pay the course deposit. A deposit of $100 per exploration is required (pay online or by US mail). Deposits must be received to secure a spot in the desired exploration. Once the registration process is complete, you will receive a confirmation email. As long as there is space in the class and you have paid your deposit, your registration will be processed.
3. Once your registration is processed, you will receive a final confirmation email.

More detailed instructions can be found at mtu.edu/syp/application-process/how-to-apply
# COMPETITIVE SCHOLARSHIP PROGRAMS

Students are selected for scholarship programs on a competitive basis. To apply, visit [mtu.edu/syp/discover/competitive-scholarships](mtu.edu/syp/discover/competitive-scholarships) and complete the application form for the program you are interested in. Submit your application along with a teacher recommendation, an unofficial transcript, and responses to short essay questions. Applications will be reviewed by our selection committee in April, with notifications sent in mid-May. Some programs have early acceptance and varying deadlines. Registration fees may vary for each program. Please refer to the proper program application for full details.

## Engineering Scholars Program (ESP) and Women in Engineering (WIE)

**Grades 9-11**

The Engineering Scholars Program and the Women in Engineering Program both provide students an opportunity to explore nine fields of engineering through hands-on projects and investigations. Students will also learn about the college application process and succeeding in university engineering programs.

<table>
<thead>
<tr>
<th>Program</th>
<th>Capacity</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Scholars</td>
<td>150</td>
<td>9-11</td>
</tr>
<tr>
<td>Women in Engineering</td>
<td>150</td>
<td>9-11</td>
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</tbody>
</table>

## Junior Women in Engineering (JWIE)

**Grades 6-8**

Junior Women in Engineering provides an opportunity to discover mechanical, electrical, chemical, civil, and environmental engineering through projects and trips throughout the Keweenaw Peninsula. Sponsored by ITC Holdings Corp.

<table>
<thead>
<tr>
<th>Program</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Women in Engineering</td>
<td>40</td>
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</tbody>
</table>

## National Summer Transportation Institute (NSTI)*

**Grades 9-11**

The National Summer Transportation Institute is a two-week exploration of modern transportation, fields, including air, rail, road, and water. Tour the Mackinac Bridge Authority and look behind the scenes at the Mighty Mac and the Soo Locks shipping canal.

<table>
<thead>
<tr>
<th>Program</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>National Summer</td>
<td>20</td>
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</table>

## Rail and Intermodal Transportation (RIT)*

**Grades 9-11**

Learn how communications, control systems, connected transportation systems, and alternative fuel technologies reduce carbon emissions making rail transportation cleaner and better than ever. Students will enjoy demos, field visits, and industry tours.

<table>
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<tr>
<th>Program</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Rail and Intermodal</td>
<td>20</td>
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</table>

## GenCyber

**Grades 8-11**

Explore the many aspects of the cyber world, including cyber ethics, email phishing, computer architecture, Linux, wireless network, and the use of the Raspberry Pi system. GenCyber offers full scholarship awards (contingent on grant funding) for this week-long residential program. The scholarship application can be found at [mtu.edu/gencyber](mtu.edu/gencyber)

<table>
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<th>Program</th>
<th>Capacity</th>
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<tr>
<td>GenCyber</td>
<td>30</td>
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</table>

## Women in Computer Science (WICS)

**Grades 9-11**

Women in Computer Science is a discovery of computing, including programming, artificial intelligence, robotics, virtual reality, visualization, networks, and security. Participants also meet industry role models and hear about real-life experiences and challenges in the field.

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<th>Program</th>
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<tbody>
<tr>
<td>Women in Computer Science</td>
<td>20</td>
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</tbody>
</table>

## Women in Automotive Engineering (WIAE)

**Grades 9-11**

Women in Automotive Engineering provides students an opportunity to explore the fields of mechanical and electrical engineering within the automotive industry. Through hands-on projects and classroom investigations you will learn the basics of engines, how vehicles operate, infotainment, cabin comfort, electrified vehicles, chassis and suspension systems, and how engineers approach designing vehicles. Sponsored by Dana Inc.

<table>
<thead>
<tr>
<th>Program</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Women in Automotive</td>
<td>20</td>
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</table>

*NSTI and RIT are both live-in only; these explorations travel to various locations.*

To apply for one of our Competitive Scholarship Programs, please visit [mtu.edu/syp/discover/competitive-scholarships](mtu.edu/syp/discover/competitive-scholarships) to download the application.
SUMMER YOUTH PROGRAMS

**Building a Better World: Civil Engineering**
Grades 6-8
Grades 9-11

15
20

How do civil engineers do everything they do? Discover the answers through hands-on projects and site visits to see civil engineering in action.

**Chemical Engineering**
Grades 9-11

25

Learn about the challenging and exciting field of chemical engineering and explore alternative energy, chemical reactions, and separation processes through lab activities.

**Electrical and Computer Engineering**
Grades 9-11

20

Explore computer and electrical engineering through simple circuits and digital logic while performing experiments and designing your own printed circuit board.

**Engineering 101**
Grades 6-8
Grades 9-11

15
20

Explore mechanical, electrical, chemical, civil, and environmental engineering, and more! Work in teams to design, build, and test solutions to engineering problems.

**Transforming Light into Energy**
Grades 9-11

10

Get into Michigan Tech’s microfabrication facility where you can make and take home your own solar cell. Also, learn how this tech is being used in smartphones, computers, labs-on-a-chip, and optical devices.

**Intro to Machine Learning and Data Science**
Grades 9-11

15

Get a glimpse of the problems computer engineers and data scientists solve, as well as an idea of the career opportunities available to those who choose this field.

**Note:** This exploration assumes participants have some prior experience with basic computer programming.

**Geohazards and Resource Engineering**
Grades 6-8
Grades 9-11

15
20

Discover how rocks and minerals are formed, and learn the scientific method to identify them. Sharpen your skills through mapping, exploring, and collecting samples.

**Materials Science and Engineering**
Grades 9-11

15

Create your own specialized materials, learn about atoms, and take a swing at blacksmithing, all while discovering the principles of material science and engineering.

**Mechanical Engineering: Automotive Engineering**
Grades 9-11

30

Learn the basics of engines and vehicle technology through hands-on activities, and tour facilities where students research, design, test, and build Michigan Tech’s competition vehicles.

**Mechanical Engineering: Design the Future**
Grades 6-8
Grades 9-11

20
20

Explore mechanical and machine design, manufacturing, and energy systems. Plus, visit labs and discover opportunities in mechanical engineering at Michigan Tech.

**Mechanical Engineering: Engineering the Human Body**
Grades 9-11

20

Look at the human body from a mechanical engineering perspective. Test, experiment, and explore the anatomy of tech.

**Mobile Robotics**
Grades 6-8
Grades 9-11

15
20

Jump into the world of autonomous and mobile robotics. From concept to construction to computation, students solder, build, and program their way through mini competitions.
### Aquatic Ecology
**Grades 9-11**
Start with different types of plant life and work your way up the food chain to invertebrates and fish. Build your own model ecosystems and participate in science labs inside and outdoors.

| Capacity | 12 |

### Biotechnology
**Grades 6-8**
Learn about microbiology, genetics, and molecular biology to understand how microorganisms can be used to solve problems. Make bacteria glow in the dark.

<table>
<thead>
<tr>
<th>Grades 9-11</th>
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### Forensic Science and CSI
**Grades 6-8**
Learn how forensic scientists solve crimes through evidence collection, autopsy, DNA, and the analysis of hair, blood, and fingerprints. Then use your skills to solve a mock crime.

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<tr>
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</table>

### Medical Laboratory Science
**Grades 9-11**
Perform lab procedures in clinical chemistry, immunology, parasitology, microbiology, hematology, urinalysis, and more. Tour hospital labs as you explore this in-demand profession.

| Capacity | 20 |

### Medical Physiology
**Grades 6-8**
Learn how bodies function by exploring anatomy and physiology and the cardiovascular and nervous systems. Conduct tests, do a dissection, and take measurements to draw your own conclusions.

<table>
<thead>
<tr>
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</table>
SCIENCE AND TECHNOLOGY PROGRAMS

Aviation and Aerospace
Grades 9-11
Learn the aerodynamics of flight and how to read aeronautical charts and plot a course using a computer-based flight simulator. Explore a variety of career possibilities and even take a flight.

Wild World of Chemistry
Grades 6-8
Grades 9-11
Discover the weird and wild properties of the structure of matter through demos, experiments, simulations, and tours of research facilities where scientists think and work.

Wildlife Ecology
Grades 6-8
Search for indicators of quality animal habitats. Track animals using telemetry, make castings of animal tracks, and learn how to set noninvasive hidden camera and hair traps.

Introduction to Renewable Energy
Grades 9-11
Explore the world of renewable energy, from batteries to hydroelectric dams. Learn about the future of renewables through hands-on activities, including model builds, design, and site visits.
## COMPUTING PROGRAMS

### 3D Models and Virtual Reality
**Grades 9-11**
Create your own 3D model and view it in Michigan Tech’s Virtual Reality Lab. Learn about virtual reality technologies, 3D photography, and basic computer programming.

| Capacity | 20 |

### App and Web Development: Designing for Humans
**Grades 9-11**
Develop your own website and apps by learning the elements of interface design, including spatial ordering, color scheme, navigation, and interaction.

| Capacity | 20 |

### Coding for the Internet of Things
**Grades 9-11**
More and more everyday objects have network connectivity. Learn the fundamentals of programming while learning about the Internet of Things.

| Capacity | 20 |

### Introductory Video Game Programming
**Grades 6-8**
Explore basic game design through mini games that illustrate concepts like collision, animation, basic Artificial Intelligence techniques, and state machines. Create, experiment, and work up to coding in Java. No previous computer programming experience required.

| Capacity | 20 |

### Video Game Programming
**Grades 9-11**
A crash course in programming; cover the fundamentals of game design through a series of increasingly complex mini games. Create, experiment, and work up to coding in Java.

| Capacity | 20 |

**Note:** This course requires some prior experience with computer programming.
BUSINESS, DESIGN, AND HUMANITIES PROGRAMS

Blacksmithing
Grades 9-11
Draw out metal, punch holes, and split steel with a chisel. Bend, rivet, twist bars, and make scrolls. Build your own forge and anvil to begin smithing on your own.

Calling all Writers
Grades 9-11
Explore types of writing and the different writing careers. Meet working writers, workshop with peers and professionals, and submit a piece for publication.

Engineering
Psychology and Human Factors
Grades 9-11
Can psychology improve technology, consumer products, and decision making? Learn methods to analyze humans, systems, and tasks to design a safer, more efficient, and dependable future.

UP Summer Theater Institute
This three-week, live-in program offers two concentrations, one in performance and one in technical design. Visit www.upsummertheater.com for more information.

Note: Full tuition rates differ from standard base costs.

Performance Theater Emphasis
Grades 7-11
Dream of singing and dancing on Broadway? This program culminates in a full-scale musical on the stage of Michigan Tech’s Rozsa Center for the Performing Arts. Led by Broadway performers, the program is suitable for all levels of experience.

Technical/Design Theater Emphasis
Grades 7-11
Tech/design-focused students dive in with a professional design team to produce a full-scale musical at Michigan Tech’s Rozsa Center for the Performing Arts. Collaborate with performers and explore lighting, sound design, set, and costume design.
NEED A RIDE? WE CAN HELP!

Summer Youth Programs offers chaperoned charter bus service to Houghton, Michigan, for hundreds of students from four select locations in Michigan. Students are picked up on Saturday evening and arrive on campus Sunday morning. Space is limited and available on a first-come, first-served basis.

- Gaylord
  $225 round trip | $125 one way

- Bay City
- Lansing
- Novi
  $275 round trip | $175 one way

Call (906) 487-2219 to reserve your spot!

Due in full within 10 days of purchase; cost includes a non-refundable $25 processing fee.
FREQUENTLY ASKED QUESTIONS

Where is Michigan Tech?
Michigan Tech is located in Houghton, Michigan, near the shores of Lake Superior in the beautiful Upper Peninsula.

Who can attend Michigan Tech Summer Youth Programs?
Students completing grades 6-11 are eligible to attend. Middle school explorations are open to students completing grades 6-8 and focus on providing an engaging introduction to the subject. High school explorations, open to those completing grades 9-11, encourage students to explore a field of study they are interested in pursuing in college.

How do I apply?
Visit mtu.edu/syp for all of the information you need to sign up.

How many participants are in each exploration?
Most explorations are limited to 20 or fewer students so instructors can give one-on-one instruction. Some explorations—like blacksmithing and ecology courses—are smaller for safety reasons. We intentionally keep our student-to-staff ratio low.

What will I be doing in the evenings?
Lots of things! Our full-time counselors plan and lead a variety of evening and weekend activities. You won’t have a minute to be bored. A few activities, like going for ice cream or to the movies, have a small fee, but most are offered at no cost. Previous activities include bowling, movies, pick-up sports games, variety shows, swimming in a pool/lake, indoor games/crafts, food runs, and hiking in the Keweenaw.

Where will I stay?
Our live-in participants enjoy campus life in Wadsworth Hall, Michigan Tech’s largest residence hall. Staff and participants are housed in self-contained, secure areas. Participants have access to residence hall laundry facilities (minimal fee), recreation areas, and lounges. Full-time, live-in counselors provide supervision, interact with participants, and help keep students safe.

Who will I room with?
Our residence halls are organized by gender. We take great care to match each participant with a roommate who is close in age. We encourage participants to broaden their horizons and room with someone new. However, some students prefer rooming with someone they already know, like a sibling or friend. These requests are honored whenever possible; both friends must request each other on the appropriate form in their Confirmation Packets.

If I stay for more than one exploration, do I have to leave campus during the weekend?
We offer weekend activities in the area for participants who come for two or more consecutive weeks of Summer Youth Programs. Stayover fees are $125 per weekend and include meals, lodging, and supervised excursions.

Where can my family stay?
Many people make a family vacation out of their trip to Michigan Tech. The area is known for its beaches and waterfalls, shopping, historic downtowns, and tourist attractions. Cottages, hotels, bed and breakfasts, and camping facilities are available. Visit keweenaw.info to plan your trip.

Visit mtu.edu/syp for extended course descriptions, more information, and to register.
What are my options for traveling to Michigan Tech?
Travel options to Michigan Tech include the Summer Youth Programs charter bus, car, or plane. Make your transportation arrangements early to help ensure smooth travels. Michigan Tech offers chaperoned charter bus service from select locations in Michigan—tentatively Bay City, Gaylord, Lansing, and Novi. For more information about travel options and what to expect, please visit mtu.edu/syp and check out “Planning for SYP.”

Can I commute?
Commuters stay with parents at home, family friends, or relatives. Explorations are available at a reduced fee for commuter students who do not live in the residence hall. Lunch is included and commuters are eligible to attend evening recreational activities. Summer Youth Programs will verify where the student is residing, and the participant must agree to follow live-in student rules while on campus.

Note: Some explorations involve travel or late-evening activities and are not available to commuters. See descriptions for details.

How much do Summer Youth Programs cost?
We remain one of the most affordable programs in the country, and we work to keep our costs low so our programs are accessible to as many as possible. The cost for a live-in week-long program begins at $950, including room and board, and commuter programs begin at $525 including lunch. Fees may vary; see mtu.edu/syp for more detailed descriptions of each exploration and specific costs.

Various Competitive Scholarship Programs are also offered to students in both middle school and high school. These programs offer scholarships valued up to $1,000 and require a separate application and additional information. For more on competitive scholarship programs, see page 5 or visit mtu.edu/syp

Do you offer financial awards or discounts?
Yes! We have several discounts available, including a multi-week discount and a discount for children and grandchildren of alumni.

Can I cancel my enrollment?
If you cancel your exploration before June 1, 2020, you are eligible for a refund of enrollment fees minus the $100 non-refundable deposit for each exploration. There are no refunds after June 1.

What happens if my exploration is canceled?
In the unlikely event that your exploration is canceled, we will assist you in selecting another exploration or refund your entire payment, at your discretion.

How can I contact Summer Youth Programs?
Summer Youth Programs
1400 Townsend Drive
Houghton, MI 49931-1295
mtu.edu/syp
syp@mtu.edu
906-487-2219
1-888-773-2655 (toll-free)
MIDDLE SCHOOL PROGRAMS (GRADES 6-8)

Competitive Scholarship Programs
Junior Women in Engineering (JWIE)
GenCyber

Engineering Programs
Building a Better World: Civil Engineering
Engineering 101
Geohazards and Resource Engineering
Mechanical Engineering: Design the Future
Mobile Robotics

Science and Technology Programs
Biotechnology
Forensic Science and CSI
Medical Physiology
Wild World of Chemistry
Wildlife Ecology

Computing Programs
Introductory Video Game Programming

UP Summer Theater Institute
Performance Theater Emphasis
Technical/Design Theater Emphasis

2019 STORY CONTEST WINNER: MIDDLE SCHOOL LEVEL

My name is Haily and I was extremely excited to go to Junior Women in Engineering (JWIE), sponsored by ITC Holdings, because I didn’t know what field of engineering I want to pursue a career in.

JWIE showed me insight into my future career options. This experience let me meet other girls with the same interests. Getting to design prosthetic legs, build gliders, and make ice cream taught me about just a few of the many fields of engineering. I even got to learn about engineering off campus when we toured Quincy Mine, the wastewater treatment plant, and more.

JWIE also allowed me to experience college life: staying in the dorms, eating in the dining hall, and having class in actual classrooms and touring labs. Making fast food runs, attending the variety show, partying at the block party, and going to Walmart were just a few of the many evening college life experiences.

Spending time with other like-minded girls, and with what I learned at JWIE, I am now more certain about my future and want to be either an electrical or computer engineer. I think that everyone should experience SYP before college. SYP is an excellent opportunity to be able to experience MTU and see some of the amazing opportunities that Tech has to offer. Experiencing what life has to offer after completing high school as a middle schooler will help me make smarter decisions about my future higher education. I really hope I can attend SYP next year!

—HAILY G.

Haily G. during a public tour inside the Quincy Mine hoist building.
## Competitive Scholarship Programs
- Engineering Scholars Program (ESP)
- Women in Engineering (WIE)
- National Summer Transportation Institute (NSTI)
- Rail and Intermodal Transportation (RIT)
- Women in Automotive Engineering (WIAE)
- GenCyber
- Women in Computer Science (WICS)

## Science and Technology Programs
- Aquatic Ecology
- Biotechnology
- Engineering Technology 101
- Forensic Science and CSI
- Medical Laboratory Science
- Medical Physiology
- Aviation and Aerospace
- Introduction to Renewable Energy
- Wild World of Chemistry

## Computing Programs
- 3D Models and Virtual Reality
- App and Web Development: Designing for Humans
- Video Game Programming

## Business, Design, and Humanities
- Blacksmithing
- Calling All Writers
- Engineering Psychology and Human Factors

## UP Summer Theater Institute
- Performance Theater Emphasis
- Technical/Design Theater Emphasis

### 2019 STORY CONTEST WINNER: HIGH SCHOOL LEVEL

There was just something about the whole experience I can hardly describe with words. I met so many wonderful, intelligent people, I got a glimpse of the incredible opportunities the Michigan Tech campus has to offer, and I feel that I finally know what I want to do with my life. I want to go out and explore every corner of the world, like we did on all the excursions every evening; I now know that I have the capability to do just that during my time at college with study abroad programs. I want to work with my hands, just like we did blacksmithing and casting metal; I can easily get a grip on some hands-on work by majoring in mechanical engineering technologies, a major that dabbles in a bit of everything I love. I want to keep improving, to get better at being myself, so that I can be more prepared for the future. I think this experience was one of the first steps in that process. I had more fun in two weeks than I would have spending my summer at home. If I had to just pick one favorite part, I’d choose the whole thing! So for anyone even considering a program like this, do it! No one will experience it the same, but it's guaranteed to be a great time.

—SARAH H.