



## What is the Manufacturing Technology Academy?

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**What is MTA?** The Manufacturing Technology Academy is an award-winning program for high school juniors and seniors that integrates courses in science, mathematics, economics and English around the themes of technology, robotics, manufacturing and engineering. MTA is in session between 7:30 and 11:30 a.m. Monday through Friday at Northwestern Michigan College's Parsons-Stulen building at NMC's technical campus on Aero Park Drive in Traverse City. Unless they are taking our college classes, students earn four credits their junior year (**mathematics, science, English and technology**) and 4 ½ credits their senior year by adding ½ credit of **economics** to their mathematics, science, English and technology core. See below for MTA's college classes taken via Ferris State University and Northwestern Michigan College.

**Who can attend?** Current sophomores from the 5-county area may apply to the Academy to attend for their junior and senior years. They will be interviewed by members of the MTA Manufacturer's Council. Students are accepted on the basis of attitude, enthusiasm and grades. Potential Academy students should have an interest in engineering, robotics, technology, math, science, problem solving and hands on learning. Applicants should have good attendance and a strong work ethic. A limited number of selected juniors are accepted to attend as seniors.

**What's it like there?** Students learn real-world technical skills along with their rigorous academic curriculum. Consequently, their comprehension of high-level academic subjects is grounded in an understanding of and appreciation for the utility of that knowledge. MTA students complete an internship with a local manufacturing company and participate in company tours, job shadowing, special projects at manufacturing facilities and industry-led seminars. Each student is also matched with a mentor from industry, and mentor communications are integrated into the students' English classes, along with a strong dose of technical writing and public speaking. The student culture is achievement-oriented but friendly and supportive. Interested students, parents, teachers, counselors and administrators are invited to visit on a drop-in basis and observe the staff and students at work. MTA may be contacted at **231-995-1304**, or [twheatley@nmc.edu](mailto:twheatley@nmc.edu) .

**What will I learn there?** MTA's academic curriculum meets and exceeds the new standards required by the Michigan Department of Education. MTA combines rigorous academic coursework with engineering and manufacturing laboratory applications of academic content, integration of work place and interpersonal skills, a dedicated and helpful staff and a positive, student culture that values intellect. Selected students will take **college calculus classes** through Ferris State University and Northwestern Michigan College (NMC). Advanced physics students have the opportunity to earn 4 college credits by taking **Fundamentals of Light and Lasers** 1<sup>st</sup> semester and **Elements of Photonics** 2<sup>nd</sup> semester through NMC. (See the other side of this sheet for details.) Students may apply to the National Technical Honors Society, and most classes carry an "Honors" designation. MTA students also participate in regional and national **engineering and design competitions** such as the **FIRST Robotics Competition**, the **Northern Michigan Math, Engineering and Science Symposium** and the Society of Manufacturing Engineers' (SME) **National Robotics Challenge**, where they have repeatedly won top honors. MTA plays a leadership role in this area, piloting the first SME high school student chapter, hosting two FIRST Robotics scrimmages for Northern Michigan FIRST teams as well as the first-ever Northern Michigan FIRST Robotics Kickoff event. **The curriculum consists of the academic and technological content listed below.**

**Junior Year:** *3 academic credits (1 math, 1 science, 1 English) + 1 technology credit*

- **Mathematics (Algebra II, trigonometry/precalculus\*, calculus or College Calculus I and II through Ferris State University)**
- **English Language Arts 11 (technical writing/public speaking)**
- **Chemistry\* (or physics in specific cases)**
- **Manufacturing Technology**  
(Asterix\* denotes honors class)

*At right, MTA students working with a materials engineer on the Brinell Hardness Tester for a chemistry research project.*



**Senior Year:** 3½ academic credits (1 math, 1 science, 1 English, ½ economics) + 1 technology credit

- Mathematics (trigonometry/precalculus\*, calculus, College Calculus I & II via Ferris State University, or College Calculus III and Differential Equations via Northwestern Michigan College.)
- Physics\* (or Fundamentals of Light and Lasers and Elements of Photonics for Advanced Physics)
- English Language Arts 12 (technical writing/public speaking)
- Economics\*
- Manufacturing Technology

**Manufacturing Technology (both years):**

- Automation and Robotics
- Electrical Systems
- Fluid Power/Pneumatics
- CAD, Design Processes & MasterCAM
- Manufacturing Processes/CNC
- Quality Assurance



Grant funding from the National Science Foundation helped instructors and manufacturing industry professionals develop the curriculum that integrates technology with academics while meeting or exceeding academic benchmarks. Academic sciences like **physics** and **chemistry** are taught around the themes of engineering and manufacturing, using, for example, the MTA manufacturing lab's tensile tester to truly understand how stress, strain and Young's Modulus are derived by scientists, performing optics labs with lasers, or touring a nearby heat treating facility as part of a chemistry research project that uses alloys as a means to gain a deeper understanding of solutions and properties of materials. Strong math students who meet our criteria are given the opportunity to have most of their tuition paid for **College Calculus I and II from Ferris State University** and/or **College Calculus III and Differential Equations from Northwestern Michigan College** during MTA hours. Advanced physics students earn NMC credit by taking **Fundamentals of Light and Lasers** and **Elements of Photonics**.

MTA's manufacturing laboratory uses equipment that includes table-top training robots, a small Computer Numeric Control mill, materials testers, MasterCAM, SolidWorks and other design software, precision measurement equipment and trainers for electronic logic and pneumatics. The lab also serves as the workshop for projects being constructed for robotics and automation competitions at the national level. Problem solving methodologies and project management are included.

### **Where can I go after MTA?**

**MTA grads have attended the following post-secondary institutions:** Kettering University, Michigan Tech, Massachusetts Institute of Technology (MIT), Cornell, Rensselaer Polytechnic, Penn State, the University of Michigan, Michigan State, US Naval Academy, US Coast Guard Academy, NMC, and others.

### **How can I find out more about the program?**

Contact Tim Wheatley at 231-995-1304 or [twheatley@nmc.edu](mailto:twheatley@nmc.edu) , or visit our Web site at [www.mta.tc](http://www.mta.tc) .

#### ***MTA Alumni Profiles***

##### ***Reese Gallagher – Product Development Engineer, Cone Drive Operations***

An alumnus of MTA and Traverse City Central High School, Reese earned a B.S. in Mechanical Engineering from the University of Michigan. He currently works at Cone Drive here in Traverse City, where his responsibilities include the designing, building, and testing of double enveloping worm gearboxes for use in applications such as the Seattle Space Needle, NASA Space Shuttle transportation vehicle, 15-ton rock crushers, and solar panel array systems. Reese also serves as a mentor for a current MTA student and helps guide teams with their technical projects.

##### ***Nels Fredeickson – Prototype Engineer, Gentex***

After completing the MTA program, class of 1998 with Aaron, Northport graduate Nels Frederickson earned an Electronic Engineering Technology degree. Nels currently works in the electrical engineering prototype lab at Gentex Corporation on circuit design and layout and functionality of auto-dimming mirrors, SmartBeam headlamp control and Aerospace dimming windows. He has been deeply involved in the development of Gentex's Rear Camera Display (RCD) on Ford vehicles. The RCD has been spotlighted on a Lincoln Navigator in an advertisement on YouTube.