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## What is unique about an MTA education?

### Rigor, Respect, Relevance, Reality and...ROBOTS!

**Rigor:** For MTA, the term “rigorous academics” refers to attaining a deep, meaningful understanding ...an ability to retain the academic knowledge and apply it to reality beyond simple test-taking. That’s why our high-level classes are different than those offered by most high schools today.

Better than advanced placement courses, MTA collaborates with Northwestern Michigan College (NMC) to offer “College Calculus I and II” (through NMC) followed by “College Calculus III” and “Differential Equations” for college or university credit for students who qualify for the classes.



MTA’s Advanced Physics course consists of an introduction to optics and laser technology. Advanced Physics students learn about photonics, an evolving enabling technology with applications in engineering, defense & security, medicine, information technology, environmental monitoring and other industries in “Fundamentals of Light and Lasers” and “Elements of Photonics” classes.

MTA’s high school calculus, pre-calculus, Algebra II, honors chemistry, honors physics, advanced physics, English and honors economics classes are taught by dedicated academic instructors who are highly-qualified in their course content areas. The instructors continually work with area engineers, college professors, managers and technicians to find meaningful applications of their academic subjects for the classroom. For all its classes, the MTA curriculum meets or exceeds state standards, and most of MTA’s classes are honors or college level.

**Respect:** MTA’s student culture values intellect, effort, ingenuity and integrity, and MTA students respect and support each other’s endeavors, whether they are struggling to understand a difficult academic concept or overcoming a technical barrier on a project. Many of the technical projects the students take on are simply too big, or too broad in scope for a single individual, no matter how smart or motivated, to do alone, so teamwork, communication and mutual respect are essential. Students who are strong academically learn to appreciate the more technical, hands on skills of their teammates and vice-versa.

Each senior at MTA leads and manages a team of students with diverse skills as they design and build a complicated competition robot, and then travel to one of the FIRST Robotics Competition (FRC) District Events in Michigan or to the National Robotics Challenge in Marion, Ohio to compete. Leading such a team requires that the student learns to motivate and respect their teammates.

**Relevance:** MTA's rigorous academics are integrated with a hands-on technical understanding of electronic logic and circuits, motor control, quality assurance, pneumatics, manufacturing processes, automation and robotics, and design processes. Our CAD capabilities include SolidWorks 3-D design software and MasterCAM, which work in conjunction with our Computer Numerical Control



Mill and Rapid Prototype Machines. In MTA's physics and chemistry classes, students investigate concepts like stress, strain and modulus of elasticity using the tensile tester from our Engineering Technology Lab.

**Reality:** Internships, mentors, industry-based projects and engineering and robotics competitions introduce students to workplace expectations, real-world deadlines, and issues in teamwork and leadership. These experiences also add motivation, meaning and depth of learning to MTA's challenging academic topics. Concepts from chemistry, physics and mathematics are enlisted as students encounter, then solve problems about the structure, electrical system, pneumatics system, etc. of their technical projects. When they get stuck, the MTA staff, its mentors and its business partners are available to help students break the barriers. MTA students build their self confidence and self esteem the old fashioned way... by taking on difficult challenges and completing them successfully.



**Robots!** MTA's engineering and manufacturing lab features training robots and other automation equipment, pneumatics, electronics, electronic logic and motor control training equipment, Computer Assisted Design stations, quality assurance and precision measurement equipment as well as a Computer Numerical Control mill and Rapid Prototype Machines that integrate state-of-the-art, SolidWorks 3-D design with Computer Assisted Manufacturing (MasterCAM) to allow the student to take an idea from the design stage (in 3 dimensions with virtual kinematics and dynamic analysis) to physical fruition with the CNC mill or Rapid Prototype Machine. The robots and other "Tech Toys" in the lab and classroom help make learning fun again!

