Upper Merion Area School District
Middle School Technology and Engineering Education
Curriculum Revision/Update
Matt Cullen
Technology and Engineering Education Teacher

Philosophy –
The Technology and Engineering Education program focuses on developing technology problem solving skills, technological literacy, and 21st century skills through hands-on activities integrating Science, Technology, Engineering, and Mathematics (STEM).

Mission
Technology and Engineering Education is committed to preparing students for post secondary success, citizenship, and life long learning by teaching technological literacy.

Goals
All students will be able to successfully contribute and function in a technological society.
All students will have basic skills in technological problem solving.
All students will develop technological literacy to be successful in life.
Create the innovative thinkers and doers of the 21st century.

Core Values
Be Honest
Be Fair
Keep our Commitments
Respect Individuals
Encourage Intellectual Integrity
Community of Character – Character Education

Grade 5 – Introduction to Technology –
Introduction to Technology is an activity-based course that introduces students to technology by examining Design and Engineering Technology. Students will study and apply the problem solving procedures, 21st century computer skills, technical drawing, simple machines and mechanisms, robotics and system control, aerospace engineering, structural engineering, and the engineering design process. Students will have a variety of projects and activities in the Design and Engineering Tech Lab. Students will work in teams and individually to complete required classroom and lab assignments. A STEM approach is used to integrate Science, Technology, Engineering, and Mathematics concepts in a digital classroom environment.

Instructional Time
22 cycles, 2 periods/4 day cycle, 44 – 43-minute classes, 31.5 hours of instruction

1 semester in Design and Engineering Tech Lab – problem solving, technical drawing, computer aided design, simple machines and mechanisms, robotics and system control, aerospace engineering, and 21st century skills

Enrollment
• Curriculum Extension students are pulled from class for additional instruction in Reading and Math
• Approximately 2/3 of the 5th grade class is enrolled in this course
Grade 6 – Exploring Technology –  
Exploring Technology is an activity-based course that introduces students to technology by examining basic systems of Energy, Power and Transportation Technology and Design and Engineering Technology. Students will study the technological problem solving method, design and engineering, energy, power, and transportation, aerospace engineering, system control, and robotics. Students will work in teams and individually to complete required classroom and lab assignments.

Instructional Time
22 cycles, 1 period/4 day cycle, 22- 43 minute classes, 16 hours of instruction, 22 days out of 90
1 semester in Production/Materials Lab – technology systems, - rocketry, electrical circuits, internal combustion engine, electronics
1 semester in Design and Engineering Lab/Tech Lab – problem solving, tech drawing, computer aided design, robotics, system control, design and engineering, and 21st century skills

Grade 7 – Applying Technology
Applying Technology is an activity-based course that exposes students to technology by examining Physical Technology, Communication Technology, and Bio-related Technology systems. Students will study tools and processes in production systems, impacts of technology, the systems approach, computer aided design, aerospace technology, robotics systems, and various problem solving methods. Students will have a variety of projects using problem solving, measuring, technical drawing, computer aided design, communication, manufacturing, production systems, computer control, jigs and fixtures, and production tools for separating, forming, and combining processes. A central theme will be used for the integration of technology and core subjects during instruction and lab activities. Students will work in teams and individually to complete required classroom and lab assignments.

Instructional Time
22 cycles, 1 period/4 day cycle, 22- 43 minute classes, 16 hours of instruction, 22 days out of 90
1 semester in Production/Materials Lab – measurement systems, following directions, safety, material production, design and engineering
1 semester in Design and Engineering Lab/Tech Lab – problem solving, tech drawing, computer aided design, Aerospace Technology, robotics, 21st century skills

Grade 8 - Creating Technology
Creating Technology is an activity-based course that focuses on the application of tools, materials, and processes of Physical Technology, Communication Technology, and Engineering by Design. Students will study the way resources are processed to engineer and design systems and products. Students will study invention and innovation while designing products using technological systems. Students will experience a wide variety of tools, systems, and technology to solve specific design problems during group and individual assignments. A central theme will be used for the integration of technology and core subjects during instruction and lab activities. Students will work in teams and individually to complete required classroom and lab assignments.

Instructional Time
22 cycles, 1 period/4 day cycle, 22- 43 minute classes, 16 hours of instruction, 22 days out of 90
1 semester in Production/Materials Lab – measurement systems, following directions, safety, material production, design and engineering
1 semester in Design and Engineering Lab – problem solving, computer aided design, Graphic Design, Digital Photography, Architectural Design, 21st century skills
Extra Curricular Technology and Engineering STEM Program

Technology Student Association –

The Technology Student Association fosters personal growth, leadership, and opportunities in technology, innovation, design, and engineering. Members apply and integrate science, technology, engineering and mathematics concepts through co-curricular activities, competitive events and related programs.

Advisor – Mr. Cullen

School Wide Affiliation – all MS students can participate

Open Lab Times – Tuesday and Thursdays – 7:00 am, Wednesdays – 3:00 pm- 4:30 pm

Cost – School District – affiliation fees - $450, transportation to events, advisor position

Student – lab fees for project materials -$5-$50, registration fees for events - $15 for regional, $300 for states, $500-$1,500 for nationals depending on event location

Benefits – MS Students have an opportunity to participate in national technology student organization, Tech Ed program development, public relations, business and industry partnerships, technology curriculum materials and activities, core subject integration, STEM Intregration

First Future Lego League Robotics Program

Introduces students to real-world engineering challenges by building LEGO-based robots to complete tasks on a thematic playing surface. FLL teams, guided by their imaginations and adult coaches, discover exciting career possibilities and, through the process, learn to make positive contributions to society. Students get to:

- Design, build and program robots using LEGO MINDSTORMS® technology
- Apply real-world math and science concepts
- Research challenges facing today’s scientists
- Learn critical thinking, team-building and presentation skills
- Participate in tournaments and celebrations

Advisor – Mr. Cullen

Team Affiliation – 20 students – grades 5,6,7,8

Open Lab Times – Mondays and Wednesdays – 7:00 am, Wednesdays – 3:00 pm- 4:30 pm

Cost – School District – affiliation fees, robotics kit, field set-up, event registration fees, team supplies - $1000, transportation to events, approved advisor position, 6 units

Student – spending money for lunch and misc. at events

Benefits – MS Students have an opportunity to participate in an international science, technology, and engineering program, Tech Ed program development, public relations, business and industry partnerships, technology curriculum materials and activities, core subject integration, STEM Intregration

Sea Perch Robotics Program

The Greater Philadelphia Sea Perch Challenge is open to middle schools and high schools in the Pennsylvania, New Jersey, and Delaware region. The goal is to increase student interest in robotics, science, mathematics, engineering and technology and to introduce students to naval engineering. The event is structured to give students an overall experience in the engineering process. Students get to:

- Design, build, and test robots using Sea Perch Design Kit
- Apply Science, Technology, Engineering, and Mathematics - STEM
- Learn critical thinking, team-building, and presentation skills
- Participate in tournament at Drexel University
Advisors – Mr. Cullen, Mr. Bueche
Team Affiliation – 20 students – grades 5,6,7,8
Open Lab Times – Mondays and Wednesdays – 7:00 am, Wednesdays – 3:00 pm- 4:30 pm
Cost – School District – transportation for tournament competition
  Student – spending money for lunch and misc. at events
Benefits – MS Students have an opportunity to participate in a greater Philadelphia science, technology, and engineering program, Tech Ed program development, public relations, career exploration, core subject integration, STEM Integration