COMPUTER SCIENCE & STEM EDUCATION

EXAMINING CURRICULAR, CO-CURRICULAR, & EXTRA-CURRICULAR PROGRAMMING

MONROE TOWNSHIP SCHOOL DISTRICT

OFFICE OF THE ASSISTANT SUPERINTENDENT

CURRICULUM COMMITTEE | APRIL 21, 2021

MONROE TOWNSHIP SCHOOL DISTRICT

NJSLS | 2020 Computer Science & Design Thinking

Mission | Computer Science & Design Thinking

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

(New Jersey Department of Education)

MONROE TOWNSHIP SCHOOL DISTRICT

NJSLS | 2020 Computer Science & Design Thinking

Vision | Computer Science & Design Thinking

- All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:
  - Develop and apply computational and design thinking to address real-world problems and design creative solutions;
  - Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
  - Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
  - Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

(New Jersey Department of Education)

MONROE TOWNSHIP SCHOOL DISTRICT

NJSLS | 2020 Computer Science & Design Thinking

Elementary (K-5)

- Coding units
- Coding hardware / software in school makerspaces
- Computer education embedded in interdisciplinary content areas

Middle School (6-8)

- Computer Literacy (6th Grade cycle course)
- Multimedia* (7th Grade elective)
- Transportation Technology* (7th Grade elective)
- Computer Science & Coding* (8th Grade elective)
- Fundamentals of Engineering* (8th Grade elective)
- Computer education embedded in interdisciplinary content areas
- Technology Student Association (TSA)
- Computer Club

High School (9-12)

- **Mathematics Department |** Computer Programming & Computer Science courses
- **AACT Department |** Engineering & Design*, Fabrication, Electronics*, & Robotics* courses
- MTHS STEM Academy
- Computer Education embedded in interdisciplinary content areas
- Computer Science Club
- Technology Student Association (TSA)
- Robotics Team

MONROE TOWNSHIP SCHOOL DISTRICT

Mathematics Department | Computer Sciences

Computer Programming

Designed to introduce the fundamental concepts of computer programming. The course emphasizes problem-solving, design skills and program analysis and testing. To explore programming concepts such as sequential, selection, iteration, functions / procedures / methods, and arrays.

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Mathematics Department | Computer Sciences

Advanced Placement Computer Science Principles

Students learn to design and evaluate solutions and to apply computer science to solve problems through the development of algorithms and programs. Topics include, but are not limited to:

- incorporating abstraction into programs and use data to discover new knowledge
- explaining how computing innovations and computing systems work;
- exploring their potential impacts, and contribute to a computing culture that is collaborative and ethical.

Advanced Placement Computer Science A

This course reflects what computer science teachers, professors, and researchers have indicated are the main goals of an introductory college-level computer science programming course. Topics include, but are not limited to:

- **Program Design** & **Algorithm Development** – determine required code segments to produce a given output.
- **Code Logic** – determine the output, value, or result of given program code, given initial values.
- **Code Implementation** – write and implement program code.
- **Code Testing** – analyze program code for correctness, equivalence, and errors.
- **Documentation** – describe the behavior and conditions that produce the specified results in a program.

CollegeBoard AP

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Mathematics Department | Computer Sciences

Honors Application Development

Explore and design mobile applications for iOS, Android and / or other mobile operating systems. The course relies heavily on prior knowledge (Java) in order to work at an accelerated and independent pace to develop applications for mobile devices. Independent, hands-on development and research are strongly emphasized.

Honors Web Design

Explore advanced website design using HTML, CSS, PHP, MySQL and more. The course concludes with students designing a professional, interactive website. Topics include, but not limited to:

- Designing a web page with the HTML basics
- Controlling the style and layout of multiple web pages using CSS
- Designing dynamic and interactive web pages using PHP in coordination with the MySQL database.
- Adding functionality to web pages using JavaScript.

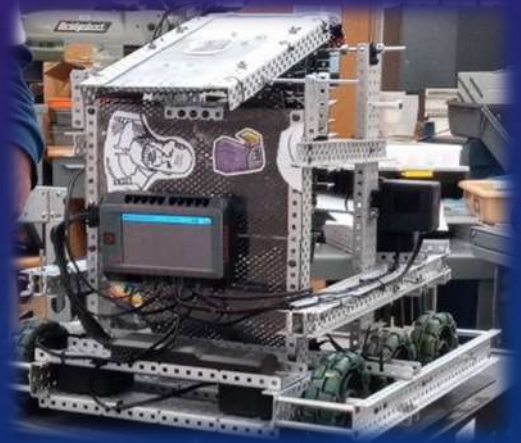
MONROE TOWNSHIP SCHOOL DISTRICT

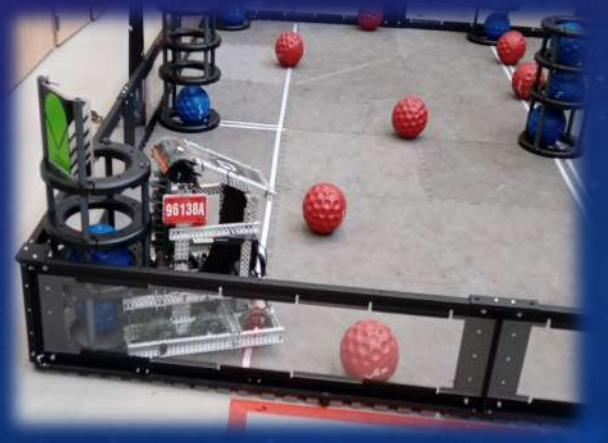
Applied Arts & Careers Technology | Computer Science & Careers

Practical Arts (21st-century Life & Careers) | courses offered and designed to empower students to make connections between their learning and personal career choices.

Project Lead the Way | an American nonprofit organization that develops STEM curricula for use by U.S. elementary, middle, and high schools.

Technology Student Association (TSA) | NJDOE Career Technical Student Organization, TSA provides students with practical and competitive applications of STEM, robotics, and programming.





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Applied Arts & Careers Technology | Computer Science & Careers

Curricular Philosophy | curricula features standards driven units that are are founded on exploration, skill applicability / transferability, and career ready practices. All students have access to programming.

- Courses of study available for all learners
- Assessments are project / performance based
- Industry certifications available
- College credit available
- Co-curricular and extracurricular experiences available to all students (competitive and noncompetitive)

MONROE TOWNSHIP SCHOOL DISTRICT

Applied Arts & Careers Technology | Computer Science & Careers

Honors – PLTW Engineering Design & Development

PLTW Digital Electronics II

PLTW Principles of Engineering

PLTW Civil Engineering & Architecture

PLTW Digital Electronics I

PLTW Introduction to Engineering Design

Computer Aided Drafting

Computers & Coding

Fundamentals of Engineering

Transportation Technology

Multimedia

PROJECT LEAD THE WAY PLTW

MONROE TOWNSHIP TSA TECHNOLOGY STUDENT ASSOCIATION ®

PLTW

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Applied Arts & Careers Technology | Computer Science & Careers

Engineering, Digital Electronics, Applications & Capstone

- Arduino IDE
- C, C++
- Code Academy
- Fusion360
- Graphical Analysis 4
- Java
- LabVIEW/Xilinx 14.7 Tools - CMOD S6
- LabVIEW/Xilinx 14.7 Drivers - CMOD S6
- MD Solids
- MS MakeCode
- Multisim
- NI ELVISmx 16.0
- Onshape
- Python
- ROBOTC
- Vecode V5
- Vernier Graphical Analysis 4
- Vernier Software
- Logger Pro 3
- West Point Bridge Designer
- Xilinx Configuration Files
- Xilinx Vivado Design Suite

STEM Applications & Traditional Industrial Arts

- Code Academy
- Fusion360
- Google SketchUp
- MSMakeCode
- OzoBot
- TinkerCAD

Drafting, CAD, and Civil Engineering & Architecture

- AutoCAD
- AutoDesk Inventor
- AutoDesk Revit
- Google SketchUp
- Solidworks
- TinkerCAD

AVAILABLE TO ALL STUDENTS

MONROE TOWNSHIP SCHOOL DISTRICT

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