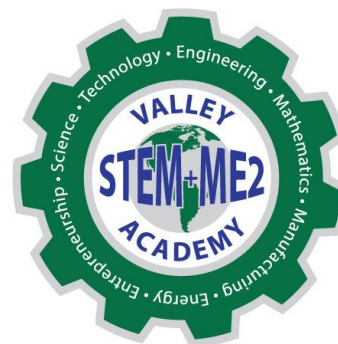


2017-2018 Valley STEM + ME2 Academy-Coursework

Mission: To prepare students with skills necessary to compete in the global economy while nurturing the characteristics of discovery, invention, application, and entrepreneurship.

The curriculum in Valley STEM + ME2 Academy was chosen to guide students in the mission of the program. Data from the current job market, student interests, and college/career readiness guides curriculum choices. Valley STEM + ME2 incorporates Project Lead the Way (PLTW) as the foundation for part of the curriculum. [Project Lead The Way](#) is the nation's leading provider of science, technology, engineering, and math (STEM) programs. In addition to PLTW, Advanced Career/[Clean Energy Technology](#) will be taught throughout the two year program. Specific course sequencing is below.



Freshmen Coursework 2017-2018 (descriptions below)

- [Clean Energy Technology 1](#)
- **Robotics 1** (*Inventor, RobotC, Gears, Virtual Builds, Competitions*)
- **Exploratory Engineering, divided into 4, 9-week courses:**
 - *First 9 Weeks: The Design Process, Sketching and Drawing, Blueprint Reading, Dimensioning, Research Engineering 1*
 - *Second 9 Weeks: Inventor, Simple Machines, Bridge Building, Frame Analysis in Inventor/MD Solids, Research Engineering 2*
 - *Third 9 Weeks: AC/DC Circuits, Parallel and Series Circuits, Breadboarding, Soldering, Research Engineering 3*
 - *Fourth 9 Weeks: Research Engineering 4, Capstone Project*
- [Computer Software 1 \(PLTW\)](#)
- **English Language Arts 9, or English Language Arts 9 Honors**
- **Math** (course depends on 8th grade math credit; per [Ohio Department of Education Graduation Requirements](#))
- **World History or Honors World History**
- **Biology or Honors Biology**
- **PE and Health:** Taken online semester 2, unless transcribed credit given at the middle school level per [ODE Graduation Requirements](#) (½ unit Health, ½ unit PE). Students have the option to take summer school prior to attending, or take the online coursework the summer prior to starting Valley STEM. Credit Flex options available as well per school policy.

Sophomore Coursework 2017-2018 (descriptions below)

- [Clean Energy Technology 2](#)
- **Robotics 2** (*Build and test robots; competitions*)
- **FANUC/Motoman (RAMTEC Lab-*Brand New!*)-Students may have opportunity to earn 12-points in [Industry Credentials](#)**
- **Computer Software 2**
- **English Language Arts 10 or English Language Arts 10-Honors**
- **Chemistry or Honors Chemistry (as long as Biology requirement met)**
- **American History or American History Honors**
- **Math (Geometry or Alg. 2, or honors)**
- **Online Elective(s) (see below)**

FRESHMAN COURSES

Clean Energy 1 - Clean Energy Systems

This course exposes students to three sources of renewable energy: wind, solar and biofuels. Working with solar, thermal, chemical and mechanical sources of clean energy teaches students how to apply physics, geography, chemistry, biology, geometry, algebra and engineering fundamentals. Students learn the most efficient and appropriate use of energy production as they explore the relevant relationships among work, power and energy. Students will engage in a wide variety of hands on projects and lab activities that both test their knowledge and illustrate the interrelationships between the various forms of clean energy.

Robotics 1

This course introduces students to robots and how they are used in our world. Working with virtual robots, the VEX Robotics Design System, and RobotC, teaches students how the different aspects of STEM are all used in the field of robotics. Students learn how to mechanically build and program their robot as they explore how the physical model reacts to the commands they create. Students will engage in virtual lab activities as well as hands on projects that will provide opportunities for students to participate in robotic competitions.

Exploratory Engineering

This course exposes students to the different types of engineering through conducting research about the different fields and careers of engineering and by completing hands on projects and lab activities. Each quarter students will learn new topics and engage in hands on projects, allowing them to directly experience the types of engineering in our world. Students will start by learning the basics of engineering such as the Design Process, technical writing, blueprint reading, and sketching. Students will then progress to learn Autodesk Inventor (CAD), simple machines, bridge building, AC/DC circuits, breadboard and soldering. A mini-capstone project will conclude this course, providing the opportunity for students to experience a real-world engineering application by applying their knowledge gained in this course.

SOPHOMORE COURSES

Clean Energy 2 - Clean Energy Applications

This course builds on the foundation of Course 1 and introduces nuclear power, steam generation, fuel cells, geothermal power, water power, AC/DC power generation, heat transfer and the laws of thermodynamics. In addition, students now use chemical and thermal energy principles to create, store and use energy efficiently to power a variety of mechanical and electrical devices. Students will engage in a variety of hands-on design projects to demonstrate principles using advanced technology hardware and software.

Robotics 2

This course expands upon the Robotics 1 Course and allows students to work independently on building and programming robots. Students will learn more in-depth about sensors, motors, gears, lift designs, and more complex computer programming strategies.

Machining/Manufacturing:

Along with engineering, this course will expose students to machining and the processes that are used for manufacturing. Precision machining will be a focal point in the class, allowing for students to learn Computer Numerical Controls (CNC), subtractive prototyping, milling, and turning. Classroom study along with the use of our two cutting-edge CNC systems, the CNC Shark and Roland MDX-540, will provide the students with the necessary knowledge and experience that applies to practical applications that are used in industry.

FANUC/Motoman

FANUC:

This will be a survey course, allowing students to have exposure to the concepts below. The course provides an introduction to the terminology and basic operations that an operator or technician needs to setup, record and/or troubleshoot programs on an actual FANUC Robot. Each learner will interface with FANUC RoboGuide 3-D Simulation software on a laptop computer connected to an actual FANUC robotic teach pendant.

Topics include:

- * Robot Safety
- * Basic Robot Systems and Components
- * Teach Pendant Familiarization
- * Jogging Fundamentals
- * Error and Fault Recovery
- * Frames
- * Teaching the Robot
- * Motion Programs and Motion Instructions
- * Controlling Program Flow
- * Copying and Editing Programs

Hands-on exercises include lab time working with an actual FANUC LR Mate 200iD/4S Robot in the RAMTEC lab.

Motoman:

This will be a survey course, allowing students to have exposure to the concepts below. The course provides an introduction to the terminology and basic operations that an operator or technician needs to setup, record and/or troubleshoot programs on an actual MotoMan FS100 Robot. Each learner will interface with MotoSimEG-VRC 3-D Simulation software on a laptop computer.

Topics include:

- * Working safely in and around the robot cell
- * Powering up/down
- * Jogging the robot using all coordinate systems
- * Modifying points, motion type and speed
- * Adding position levels
- * Checking specified point
- * Recovering from alarms and errors
- * Cutting and pasting instructions
- * Creating and working in user frames
- * Defining and using Position Variables
- * Programming SFTON and SFTOF Instructions

Hands-on exercises include lab time working with an actual MotoMan FS100 Robot in the RAMTEC lab.

Other Available Coursework (online via Fuel Ed, pace individualized)

Fine Arts Options (Choose 3D Arts OR Digital Arts):

3D Arts 1: Modeling

This course introduces students to 3D modeling tools and concepts. Using Blender, the popular open-source 3D modeling package, students learn the basics of creating shapes, adding textures and lighting, and rendering. By the end of the course, students produce a series of increasingly sophisticated projects for their 3D portfolio. This course is suitable for students with no prior experience in 3D game design or digital media authoring tools.

Prerequisites: None

* = .5 credit course/one semester course

[Click here to download syllabus](#)

3D Arts 2: Animation

In this advanced course, students build on the skills they developed in 3D Art I to learn 3D animation techniques. Using Blender, a powerful open-source modeling tool, students master the basics of

animation—rigging, bones, and movement—while learning how to apply traditional animation techniques to their 3D models.

Prerequisites: 3D Arts 1 = .5 credit course/one semester course

[Click here to download syllabus](#)

Digital Arts 1

In this exploratory course, students learn the elements and principles of design as well as foundational concepts of visual communication. While surveying a variety of media and art, students use image editing, animation, and digital drawing to put into practice the art principles they've learned. They explore career opportunities in the design, production, display, and presentation of digital artwork. They respond to the artwork of others, and learn how to combine artistic elements to create finished pieces that effectively communicate their ideas.

Prerequisites: None * = .5 credit course/one semester course

[Click here to download syllabus](#)

Digital Arts 2

Students build on the skills and concepts they learned in Digital Arts I as they develop their vocabulary of digital design elements. By the end of the course, they will have created a collection of digital art projects for their digital design portfolio.

Prerequisites: Digital Arts I (or equivalent) * = .5 credit course/one semester course

[Click here to download syllabus](#)

Other Available Electives:

Game Design

This course is for anyone who loves gaming and wants to design and build original games from scratch. Students learn how to use popular game-development software to create engaging, interactive games in a variety of styles. After learning about game genres, students learn about all aspects of the game-design process. From there, it's on to a series of increasingly challenging hands-on projects that teach all the elements of successful game development.

Prerequisites: None * = .5 credit course/One semester course

[Click here to download syllabus](#)

Green Design and Technology

This course examines the impact of human activities on sustainability while exploring the basic principles and technologies that support sustainable design. Students learn about the potential for emerging energy technologies such as water, wind, and solar power. They find out how today's businesses are adapting to the increased demand for sustainable products and services. In this course, students develop a comprehensive understanding of this fast-growing field.

Prerequisites: None

* = .5 credit course/One semester course

[Click here to download syllabus](#)

World Language:

Japanese 1

Students become familiar with the fundamental concepts and constructions of the Japanese language as well as the rich and ancient world of Japanese culture in this two-semester course. Japanese I has been designed to meet the standards of the American Council on the Teaching of Foreign Languages (ACTFL). Unit topics consist of the alphabet and numbers; greetings; introductions; the calendar (days, months, and seasons); weather; time; colors; familiar objects and places; family; food; pastimes; and school objects and routine. Course strategies include warm-up activities, vocabulary study, reading, threaded discussions, multimedia presentations, self-checks, practice activities and games, oral and written assignments, projects, quizzes, and exams.

Prerequisites: None

* = 1 credit course/two Semester course

[Click here to download syllabus](#)

Japanese 2

In Japanese II, course content blends different forms of communication and culture via unit activities to ensure that students meet all standards of the American Council on the Teaching of Foreign Languages (ACTFL). These standards call for a focus on successful oral and written communication as well as a through grounding in Japanese culture. Unit themes for both semesters cover a broad range of useful everyday subjects, including daily routine, animals, entertainment, body parts, rooms and furniture, shopping and clothing, meals, sports and recreation, and transportation. Students must successfully complete Japanese I in order to enroll in this course.

[Click here to download syllabus](#)

* = 1 credit course/two Semester course

Latin 1

This two-semester course provides an introduction to the fundamentals of Latin grammar. Students develop the skills necessary to translate basic sentences from Latin into English and from English into Latin, and to read simple connected passages of Latin prose and poetry. In the process, students learn how verb conjugations and noun declensions work in a highly inflected language and how to analyze the structure of Latin sentences. The course includes a cross-cultural component, introducing students to the world of ancient Rome by allowing them to acquire knowledge—through word study—of Roman institutions, practices, religious beliefs, and ideological ways of thought.

[Click here to download syllabus](#)

* = 1 credit course/two Semester course

Latin 2

Latin II builds on the foundation in Latin grammar provided by the Latin I course and also includes an in-depth study of Roman mythology and history. Students expand their use of declensions, adjectives, adverbs, and cases. These skills enable them to translate longer Latin texts into English that require a more complex knowledge of grammar rather than just vocabulary. To practice oral Latin skills, students engage in conversations, seek and give items of information, express feelings and emotions, and exchange opinions. Latin II also takes students on a tour of the ancient classical world, including literature, historical workers, and the lives of famous and influential Romans.

[Click here to download syllabus](#)

* = 1 credit course/two semester course

French 1

Students receive a thorough grounding in the basics of the French language in this introductory, two-semester course. French I has been designed to meet the standards of the American Council on the Teaching of Foreign Languages (ACTFL). These standards call for a method of teaching that focuses on successful communication through speaking, listening, reading, and writing. Course strategies include warm-up activities, vocabulary study, reading, threaded discussions, multimedia presentations, self-checks, practice activities and games, oral and written assignments, projects, quizzes, and exams. Learning activities in each unit are focused on a specific theme.

[Click here to download syllabus](#)

French 2

French II continues the learning process that began with French I and adheres to the standards of the American Council on the Teaching of Foreign Languages (ACTFL). Instructional material introduces students to new grammar and vocabulary and allows them to build conversational and reading skills to cover many common situations in daily life. Unit topics include daily routine, animals, entertainment, body parts, rooms and furniture, shopping and clothing, meals, sports and recreation, and transportation. Unit activities blend different forms of communication and culture to ensure that standards are met. The successful completion of French I is a prerequisite for this course.

[Click here to download syllabus](#)

Mandarin Chinese 1

Mandarin (Chinese) I introduces students to the study of the Chinese language. Students learn listening, speaking, reading, and writing skills through activities that are based on pedagogically proven methods of world language instruction. Instructional material introduces simple grammatical concepts in innovative ways and provides practice activities with a variety of learning styles in mind. This two-semester course sprinkles culture throughout the units to help students focus on the Chinese-speaking world, its culture, people, geographical locations, and history. Unit themes include greetings, numbers, family members, school life, clothing, daily routine, shopping, and restaurant menus. The course is aligned with national ACTFL (American Council on the Teaching of Foreign Languages) standards.

[Click here to download syllabus](#)

* = 1 credit course/two semester course

Mandarin Chinese 2

This two-semester course is a continuation of the introductory-level Mandarin (Chinese) I course. It presents students with new, more complicated areas of Chinese language learning. Units cover a variety of material that is useful to students learning everyday conversational arts. Themes include daily routine, animals, hobbies, the body, descriptions, home life, shopping, entertainment, sports, and travel. Throughout the course, students learn to express themselves using an ever increasing vocabulary of present tense verbs, articles, and adjectives. They gain the skills and confidence necessary to talk about daily activities, leisure-time pursuits and hobbies, body parts and their function, and people and culture.

[Click here to download syllabus](#)

* = 1 credit course/two semester course

Spanish 1

Spanish I gives students an introduction to the basics of the Spanish language and the Spanish-speaking world. This two-semester course aligns with the national standards of the American Council on the Teaching of Foreign Languages (ACTFL), which dictate a pedagogical method that focuses on successful communication through speaking, listening, reading, and writing. Course unit topics include the alphabet and numbers; greetings; introductions; the calendar (days, months, and seasons); weather; time; colors; familiar objects and places; family; food; pastimes; and school objects and routine. Course strategies include warm-up activities, vocabulary study, reading, threaded discussions, multimedia presentations, self-checks, practice activities and games, oral and written assignments, projects, quizzes, and exams.

[Click here to download syllabus](#)

* = 1 credit course/two semester course

Spanish 2

Students receive additional grounding in grammar and vocabulary in this two-semester course. Instructional material encourages students to build conversational and reading skills to cover many common situations in daily life. Like Spanish I, this follow-up course adheres to the standards of the

American Council on the Teaching of Foreign Languages (ACTFL). Learning activities in each unit are focused on a specific theme. The units for both semesters cover a broad range of useful everyday subjects, including daily routine, animals, entertainment, body parts, rooms and furniture, shopping and clothing, meals, sports and recreation, and transportation. Students must successfully complete Spanish I in order to enroll in this course.

Click here to download syllabus

* = 1 credit course/two semester course

Where do Students Go In Grades 11-12?

There are several paths a student could take after their sophomore year. Students will have the opportunity to choose from the following pathways:

- 1) Return to home district in traditional setting. All credits transfer.
- 2) Apply for for one of the MCCTC Programs that The Valley STEM + ME2

Academy pathway prepares students for: [Engineering](#), **Advanced**

Manufacturing ([Welding](#) and [Precision Machine](#)), Computer Science (*new*

***next year!*), Software Engineering (*new next year!*), [Information](#)**

[Technology](#), and [Biotechnology](#) (see link below).

- 3) Apply for any of the [24 programs at MCCTC](#) (*starting fall 2017, Computer Science and Computer Software Engineering will be offered!*)
- 4) **[Graduation Requirements](#): *How will these be met?***

Credit Requirements	
Ohio requires students to take and complete a minimum of 20 required credits.	State Minimum
English language arts	4 units
Health	½ unit
Mathematics	4 units ¹
Physical education	½ unit ²
Science	3 units ³
Social studies	3 units ⁴
Electives	5 units ⁵
Additional credits, if any, in district requirements	
Other Requirements	
Economics and financial literacy ⁶	
Fine arts ⁶	

*****Health and PE will be offered online through a blended learning format. PE Credits can also be obtained through credit flex. Foreign language will be provided in a blended learning environment, as well as additional electives. All appropriate grade level core-content is provided during the school day.***

1 Mathematics units must include one unit of algebra II or the equivalent of algebra II. Exceptions: a) Algebra II is not a requirement for students following a career-technical pathway. However, students still must have four units in mathematics, and b) A family may decide that their child is not prepared to meet the graduation requirement for a higher level math course. Or, their child may be planning a career that does not require higher level math. Algebra II may not be a requirement for this student. Here is more information on Curriculum Choices.

2 Physical education - School districts may adopt a policy that would exempt students who participate in interscholastic athletics, marching band or cheerleading for two full seasons or an approved Junior Reserve Officer Training Corps (JROTC) program for two years from the physical education requirement. Students must take another course, which cannot be a physical education course, of at least 60 contact hours.

3 Science units must include one unit of physical sciences, one unit of life sciences and one unit of advanced study in one or more of the following sciences: chemistry, physics or other physical science; advanced biology or other life science; astronomy, physical geology or other earth or space science. Exception: A family may decide that their student is not prepared to meet the graduation requirement for a higher level science course. Or, their student may be planning a career that does not require higher level science. Higher level science may not be a requirement for this student. Here is more information on Curriculum Choices.

4 Social studies units must include $\frac{1}{2}$ unit of American history and $\frac{1}{2}$ unit of American government in three units required for the classes of 2018 and 2019. The class of 2021 will need $\frac{1}{2}$ unit in world history and civilizations in their required three units as well as American history and American government.

5 Elective credits must include one or any combination of foreign language, fine arts, business, career-technical education, family and consumer sciences, technology, agricultural education or English language arts, mathematics, science or social studies courses not otherwise required.

6 Other state requirements - All students must receive instruction in economics and financial literacy during grades 9-12 and must complete at least two semesters of fine arts taken any time in grades 7-12. Fine arts is not a requirement for students following a career-technical pathway.

7 The State Board of Education may decide to include an algebra II end-of-course examination in place of the algebra I end-of-course exam beginning for students entering ninth grade on or after July 1, 2016.

Testing Requirements

STEM education incorporates scientific inquiry and technological design. It is a real world demonstration of learning, assessing content knowledge using methods directly aligned with scientific inquiry and/or technological design. At the same time, they actively demonstrate skills such as creativity, communication, collaboration and critical thinking. All freshmen will take the ACT Aspire, to determine ACT readiness. Some PLTW and Advanced Career requires End Of Course testing associated with the program All standards and competencies will be met per state law, and [Ohio Department of Education End of](#)

[Course Assessments administered each spring.](#) **For more information, email Mara Banfield, Valley STEM + ME2 Director, at mara.banfield@mahoningctc.com**

