



Department of Teaching & Learning
Parent/Student Course Information

Integrative STEM
(TE 8405)
Grades 11 - 12
One Credit, One Year

Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.

COURSE DESCRIPTION

The courses in engineering and technology provide opportunities for students to acquire skills and knowledge necessary for technological literacy, entry-level careers and lifelong learning. Students learn Virginia's 21 Workplace Readiness Skills within the content area. Those who are completing a two-year sequence have the opportunity to verify their knowledge of the workplace readiness skills through an industry assessment. Integrative STEM is a year-long, required course for the Mathematics & Science Academy designed to enhance the students' knowledge in various areas of technology while reinforcing the interdependency of concepts within the Academy program of study.

The course is designed to expose students to authentic activities using scientific investigation, technological application, engineering design, and mathematical analysis to identify and address STEM related cases and issues. Project based experiences will delve into 3D Design, digital visualization, materials science, manufacturing and electronic control technologies.

Utilizing the experiential, design-based approach and authentic problem solving students will select an area of engagement to create a culminating project that integrates their studies of science, technology, engineering and math.

CERTIFICATION

None

STUDENT ORGANIZATION

Technology Student Association (TSA) is a co-curricular organization for all students enrolled in engineering and technology courses. Students are encouraged to be active members of their youth organization to develop leadership and teamwork skills and to receive recognition for their participation in local, regional, state and national activities.

PREREQUISITE

None

OPTIONS FOR NEXT COURSE

Various Academy sections

REQUIRED STUDENT TEXTBOOK

None

COMPETENCIES FOR INTEGRATIVE STEM

Demonstrating Workplace Readiness Skills: Personal Qualities and People Skills

- 1 Demonstrate positive work ethic.
- 2 Demonstrate integrity.
- 3 Demonstrate teamwork skills.
- 4 Demonstrate self-representation skills.
- 5 Demonstrate diversity awareness.
- 6 Demonstrate conflict-resolution skills.
- 7 Demonstrate creativity and resourcefulness.

Demonstrating Workplace Readiness Skills: Professional Knowledge and Skills

- 8 Demonstrate effective speaking and listening skills.
- 9 Demonstrate effective reading and writing skills.
- 10 Demonstrate critical-thinking and problem-solving skills.
- 11 Demonstrate healthy behaviors and safety skills.
- 12 Demonstrate an understanding of workplace organizations, systems and climates.
- 13 Demonstrate lifelong-learning skills.
- 14 Demonstrate job-acquisition and advancement skills.
- 15 Demonstrate time-, task- and resource-management skills.
- 16 Demonstrate job-specific mathematics skills.
- 17 Demonstrate customer-service skills.

Demonstrating Workplace Readiness Skills: Technology Knowledge and Skills

- 18 Demonstrate proficiency with technologies common to a specific occupation.
- 19 Demonstrate information technology skills.
- 20 Demonstrate an understanding of Internet use and security issues.
- 21 Demonstrate telecommunications skills.

Examining All Aspects of an Industry

- 22 Examine aspects of planning within an industry/organization.
- 23 Examine aspects of management within an industry/organization.
- 24 Examine aspects of financial responsibility within an industry/organization.
- 25 Examine technical and production skills required of workers within an industry/organization.
- 26 Examine principles of technology that underlie an industry/organization.
- 27 Examine labor issues related to an industry/organization.
- 28 Examine community issues related to an industry/organization.
- 29 Examine health, safety and environmental issues related to an industry/organization.

Addressing Elements of Student Life

- 30 Identify the purposes and goals of the student organization.
- 31 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.
- 32 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs and projects.
- 33 Identify Internet safety issues and procedures for complying with acceptable use standards.

Using Information as a Technological Resource

- Obtain information through interviews, computer databases, and media resource centers.
- 34 Convey three-dimensional objects on a two-dimensional surface, using conventional and computer technology.

- 35 Use various technologies to prepare and present information regarding technological solutions.
- 36 Identify career opportunities in a variety of technological systems.

Using Materials as a Technological Resource

- 37 Identify materials by the major family groups.
- MSA 1 Identify additives and other substances used to enhance the properties of materials
- 38 Trace materials used in common products to their source.
- 39 Use tools, machines, and processes to change materials.
- 40 Select materials for specific applications according to their properties.
- 41 Recycle materials for useful means.
- 42 Apply safety procedures and practices.

Using Energy as a Technological Resource

- 43 Identify the sources of energy used in technological devices.
- 44 Describe major forms of energy.
- 45 Control the use of energy with mechanical, electrical, fluidic and thermal systems.
- 46 Conserve energy through technological modification.

Analyzing Consumer Products

- 47 Identify ways that consumer products have impacted people, society, and the environment.
- 48 Select a consumer product to analyze.
- 49 Gather product information.
- 50 Record information about the product, using computer technology.
- 51 Present information about the product, using computer technology.
- 52 Analyze how the product works, using mathematical and scientific concepts.
- 53 Identify an innovation that would improve the product.
- 54 Draw illustrations or construct models of the improved product.
- 55 Construct a display to explain the improved product, emphasizing mathematical and scientific concepts.
- 56 Report results of data collection, product analysis and product improvement.

Understanding Technological Systems

- 57 Explain the concept of a technological system.
- 58 Distinguish between a system and a subsystem.
- 59 Describe the impacts of technological systems on people, society, and the environment.
- 60 Designing and Building a System Controlled by Computers or Electronics

Analyze a problem whose solution uses computer or electronic controls.

- 61 Obtain information on the computer- or electronically-controlled options for solving the problem.
- 62 Design the computer- or electronics-controlled application to be used for solving the problem.
- 63 Construct a model of the application.
- 64 Control the application with computers or electronics.
- 65 Present information about the application, demonstrating how the controls work.
- MSA 2 Compute current, voltage, resistance and power, using Ohm's law and Watt's law.
- MSA 3 Use schematics to construct and analyze electrical circuits.
- MSA 4 Use soldering techniques to create electronic components.

Designing a New or Improved Product to Solve a Problem

- MSA 5 Apply the engineering design process.
- MSA 6 Explain the validity of designing alternative solutions to an engineering design problem.

- 66 Identify the needs and wants in school, home, community or world to be solved through technological change.
- MSA 7 Develop and utilize collaboration skills to address and solve problems
- 67 Write a statement of the technological problem to be solved.
- 68 Gather information about the technological problem to be solved.
- 69 Create ideas, sketches, notes and graphics of alternative solutions.
- MSA 8 Explore various methods of rapid prototyping for creating models.
- 70 Select the best solution by applying knowledge of mathematics, science, technology and other subjects.
- 71 Build a prototype of the best solution.
- 72 Evaluate the solution by comparing it with the problem statement.
- 73 Present the new or improved product to others.
- MSA 9 Using the information from the STEM areas create a culminating project.
- MSA 10 Apply light control techniques with relationship to image capturing and presentation.

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For further information please call (757) 263-1070.

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To seek resolution of grievances resulting from alleged discrimination or to report violations of these policies, please contact the Title VI/Title IX Coordinator/Director of Student Leadership at (757) 263-2020, 1413 Laskin Road, Virginia Beach, Virginia, 23451 (for student complaints) or the Section 504/ADA Coordinator/Chief Human Resources Officer at (757) 263-1133, 2512 George Mason Drive, Municipal Center, Building 6, Virginia Beach, Virginia, 23456 (for employees or other citizens). Concerns about the application of Section 504 of the Rehabilitation Act should be addressed to the Section 504 Coordinator/ Executive Director of Student Support Services at (757) 263-1980,

2512 George Mason Drive, Virginia Beach, Virginia, 23456 or the Section 504 Coordinator at the student's school. For students who are eligible or suspected of being eligible for special education or related services under IDEA, please contact the Office of Programs for Exceptional Children at (757) 263-2400, Laskin Road Annex, 1413 Laskin Road, Virginia Beach, Virginia, 23451.

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