ROBOT DRONE LEAGUE
2024 Challenge: MINESHAFT

Standards Alignment with the Computer Science Georgia Standards of Excellence (GSE) 6-8, 9-12, and GSE for Science, Technology, Engineering, Mathematics 9-12

RDL Introduction
Creativity and innovation are key elements to advancing the fields of science, technology, engineering, and mathematics (STEM) into the future. Robot Drone League (RDL) has been designed to provide students with open-ended challenges that allow for creation and innovation by engaging in hands-on design, engineering, and programming of interactive robots and drones. Students are presented with the opportunity to develop real-world connections to classroom learning. Working with robots in a collaborative game format can be a very powerful tool to engage students and enhance math and science skills through hands-on, student-centered learning. Through participation in RDL, students can develop the essential life skills of teamwork and collaboration, as well as critical thinking, project management, and communication required to become the next generation of innovators and problem-solvers in our global society.

Georgia Standards for Computer Science - Middle School

The 6 - 8 GSE for Computer Science also correspond to the ISTE standards for students as organizational domains. These domains are intended to be cross-curricular. The ISTE domains (e.g. Empowered Learner) define a high-level perspective on the characteristics of a 21st century student. These characteristics are couched in a digital society but are not restricted to computer science content.

6 - 8 GSE Computer Science Course Standards

Middle School Computer Science I (11.03000)
Empowered Learner

- CSS.EL.6-8.1 Use technology resources to increase self-direction and self-regulation in learning, including for problem solving and collaboration (e.g., using the Internet to access online resources, edit documents collaboratively).

Digital Citizen

- CSS.DC.6-8.2 Understand benefits and risks of digital citizenship and practices safe, responsible, legal, and ethical behavior while using technology tools and resources, especially related to personal information.
- CSS.DC.6-8.4 Articulate ideas responsibly by observing intellectual property rights and giving appropriate attribution.
- CSS.DC.6-8.5 Understand the pervasiveness and tradeoffs of computers and computing in daily life.

- CSS.DC.6-8.6 Apply strategies for troubleshooting hardware and software problems that may occur during use.
- CSS.DC.6-8.7 Explore the relationship between computer hardware and software.

Knowledge Constructor

- CSS.KC.6-8.14 Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and biases that occur in electronic information sources.
- CSS.KC.6-8.15 Gather, manipulate, and analyze data using a variety of digital tools to identify solutions and make informed decisions.
- CSS.KC.6-8.16 Traverse online environments using critical thinking to find valid sources of information.
- CSS.KC.6-8.17 Analyze various ways to visually represent data.

Innovative Designer and Creator

- CSS.IDC.6-8.18 Recognize that there may be multiple approaches to solving a problem.
- CSS.IDC.6-8.19 Approach problem solving iteratively, using a cyclical process.
- CSS.IDC.6-8.20 Design, develop, debug and implement computer programs.
- CSS.IDC.6-8.29 Create digital artifacts to address a current issue requiring resolution.

Computational Thinker

- CSS.CT.6-8.30 Identify subproblems to consider while addressing a larger problem.
- CSS.CT.6-8.31 Recognize when it is appropriate to solve a problem computationally; Make sense of computational problems and persevere in solving them.
- CSS.CT.6-8.32 Develop through application, logical observations relative to computational thinking procedures to analyze and solve problems current to everyday life.
- CSS.CT.6-8.33 Utilize computational thinking to solve problems.
- CSS.CT.6-8.34 Recognize when to use the same solution for multiple problems.
- CSS.CT.6-8.35 Evaluate the storage and representation of data; Analyze how data is collected with both computational and non-computational tools and processes.
- CSS.CT.6-8.36 Understand and use the basic steps in algorithmic problem solving in computing and other authentic applications.
- CSS.CT.6-8.37 Use and compare simple coding control structures (e.g., if-then, loops)
- CSS.CT.6-8.38 Consider the purpose of computational artifacts for practical use, personal expression, and/or societal impact.
- CSS.CT.6-8.39 Test computational artifacts systematically by considering multiple scenarios and using test cases.
- CSS.CT.6-8.40 Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.

Creative Communicator

- CSS.CC.6-8.41 Use online resources to participate in collaborative activities for the purpose of developing solutions or products.
- CSS.CC.6-8.42 Improve teamwork and collaboration skills: providing useful feedback, integrating feedback, understanding, and accepting multiple perspectives.
- CSS.CC.6-8.43 Collaborate productively and recognize the value of working with individuals of varying perspectives, skills, and backgrounds.

- CSS.CC.6-8.44 Demonstrate correct keyboarding techniques while increasing speed and maintaining accuracy.
- CSS.CC.6-8.45 Use productivity technology tools (e.g. word processing, spreadsheet, presentation software) for individual and collaborative writing, communication, and publishing activities.

Global Collaborator

- CSS.GC.6-8.46 Recognize that equitable access to computing benefits society as a whole.
- CSS.GC.6-8.47 Consider others' perspectives as well as one's own perspective when developing computational solutions.
- CSS.GC.6-8.48 Consider the needs of a variety of end users regarding accessibility and usability.
- CSS.GC.6-8.49 Use software applications to collaborate and create authentic products.

Middle School Computer Science II (11.04000)

Empowered Learner

- CSS.EL.6-8.1 Use technology resources to increase self-direction and self-regulation in learning, including for problem solving and collaboration (e.g., using the Internet to access online resources, edit documents collaboratively).

Digital Citizen

- CSS.DC.6-8.3 Explore computer science and computing-related careers.
- CSS.DC.6-8.8 Investigate and identify the basic components of computers and networks.
- CSS.DC.6-8.9 Investigate ways to differentiate networks and how they are used in business and industry.
- CSS.DC.6-8.10 Evaluate and provide a rationale for the levels of the Open Systems Interconnection (OSI) model.
- CSS.DC.6-8.11 Examine the basics of cybersecurity needs for business, government, and organizations.
- CSS.DC.6-8.12 Cite evidence regarding the principles of cybersecurity and basic mechanisms used for protecting data and resources.
- CSS.DC.6-8.13 Analyze and describe the characteristics of cybersecurity ethics, digital citizenship, and laws governing privacy.

Innovative Designer and Creator

- CSS.IDC.6-8.21 Develop a plan to create, design, and build a website with digital content to a specific target market.
- CSS.IDC.6-8.22 Design digital products that reveal a professional layout and look by applying design principles to produce professional quality digital products.
- CSS.IDC.6-8.23 Create a single functional web page using a web development platform based on a design mockup and user requirements.
- CSS.IDC.6-8.24 Develop and use a test plan to debug each new website version to ensure it runs as intended and meets the end-user requirements for a responsive site.
- CSS.IDC.6-8.25 Develop a plan to create, design, and build a game with digital content for a specific target market.

- CSS.IDC.6-8.26 Develop a visual model of a game from the Game Design Document (GDD).
- CSS.IDC.6-8.27 Create a functional game, using a game development platform, based on the storyboards, wireframes, and comprehensive layout.
- CSS.IDC.6-8.28 Develop and use a test plan to debug each time a version of the game is released to ensure it runs as intended and meets the end-user requirements.

Computational Thinker

- CSS.CT.6-8.32 Develop through application, logical observations relative to computational thinking procedures to analyze and solve problems current to everyday life.
- CSS.CT.6-8.33 Utilize computational thinking to solve problems.
- CSS.CT.6-8.34 Recognize when to use the same solution for multiple problems.
- CSS.CT.6-8.35 Evaluate the storage and representation of data; Analyze how data is collected with both computational and non-computational tools and processes.
- CSS.CT.6-8.36 Understand and use the basic steps in algorithmic problem solving in computing and other authentic applications.
- CSS.CT.6-8.37 Use and compare simple coding control structures (e.g., if-then, loops)
- CSS.CT.6-8.38 Consider the purpose of computational artifacts for practical use, personal expression, and/or societal impact.
- CSS.CT.6-8.39 Test computational artifacts systematically by considering multiple scenarios and using test cases.
- CSS.CT.6-8.40 Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.

Creative Communicator

- CSS.CC.6-8.41 Use online resources to participate in collaborative activities for the purpose of developing solutions or products.
- CSS.CC.6-8.42 Improve teamwork and collaboration skills: providing useful feedback, integrating feedback, understanding, and accepting multiple perspectives.
- CSS.CC.6-8.43 Collaborate productively and recognize the value of working with individuals of varying perspectives, skills, and backgrounds.
- CSS.CC.6-8.44 Demonstrate correct keyboarding techniques while increasing speed and maintaining accuracy.
- CSS.CC.6-8.45 Use productivity technology tools (e.g. word processing, spreadsheet, presentation software) for individual and collaborative writing, communication, and publishing activities.

Global Collaborator

- CSS.GC.6-8.46 Recognize that equitable access to computing benefits society as a whole.
- CSS.GC.6-8.47 Consider others' perspectives as well as one's own perspective when developing computational solutions.
- CSS.GC.6-8.48 Consider the needs of a variety of end users regarding accessibility and usability.
- CSS.GC.6-8.49 Use software applications to collaborate and create authentic products.

Foundations of Computer Programming (11.01200)

- MS-CS-FCP-1 Demonstrate employability skills required by business and industry and explore, research, and present careers in information technology.
- MS-CS-FCP-2 Explore and explain the basic components of computers and their relationships to programming.
- MS-CS-FCP-3 Utilize computational thinking to solve problems.
- MS-CS-FCP-4 Design, develop, debug and implement computer programs.
- MS-CS-FCP-5 Explore the relationship between computer hardware and software.
- MS-CS-FCP-6 Create digital artifacts to address a current issue requiring resolution.

Foundations of Interactive Design (11.01300)

- MS-CS-FID-1 Demonstrate employability skills required by business and industry and explore, research, and present careers in information technology.
- MS-CS-FID-2 Develop a plan to create, design, and build a website with digital content to a specific target market.
- MS-CS-FID-3 Design digital products that reveal a professional layout and look by applying design principles to produce professional quality digital products.
- MS-CS-FID-4 Create a single functional web page using a web development platform based on a design mockup and user requirements.
- MS-CS-FID-5 Develop and use a test plan to debug each new website version to ensure it runs as intended and meets the end-user requirements for a responsive site.
- MS-CS-FID-6 Develop a plan to create, design, and build a game with digital content for a specific target market.
- MS-CS-FID-7 Develop a visual model of a game using the Game Design Document (GDD).
- MS-CS-FID-8 Create a functional game, using a game development platform, based on the storyboards, wireframes, and comprehensive layout.
- MS-CS-FID-9 Develop a test plan to debug and use each time a version of the game is released to ensure it runs as intended and meets the end-user requirements.

- **Foundations of Secure Information Systems** (11.01100)
- MS-CS-FSIS-1 Demonstrate employability skills required by business and industry to explore, research, and present careers in information technology.
- MS-CS-FSIS-2 Investigate and identify the basic components of computers and networks.
- MS-CS-FSIS-3 Develop through application logical observations relative to computational thinking procedures to analyze and solve problems current to everyday life.
- MS-CS-FSIS-4 Investigate ways to differentiate networks and how they are used in business and industry.
- MS-CS-FSIS-5 Evaluate and provide a rationale for the levels of the Open Systems Interconnection (OSI) model.
- MS-CS-FSIS-6 Examine the basics of cybersecurity needs for business, government, and organizations.

- MS-CS-FSIS-7 Cite evidence regarding the principles of cybersecurity and basic mechanisms used for protecting data and resources.
- MS-CS-FSIS-8 Analyze and describe the characteristics of cybersecurity ethics, digital citizenship, and laws governing privacy.

9-12 GSE High School Computer Science Standards

11.42700 Embedded Computing

- IT-EP-1 Demonstrate employability skills required by business and industry.
- IT-EP-2 Explain Embedded Computing (EC) and the Internet of Things (IoT).
- IT-EP-3Demonstrate a working knowledge of basic networking protocols for industry, homes, and the internet including speed, power requirements, and popularity in industry and personal devices.
- IT-EP-4 Develop and investigate interfacing circuits.
- IT-EP-5 Classify and categorize multiple kinds of sensors.
- IT-EP-6 Manipulate, connect, and examine performance aspects of motors.
- IT-EP-7 Investigate and draw connections within the context of programming as it relates to Embedded Computing/Internet of Things.
- IT-EP-8 Interpret debugging techniques in hardware and software.
- IT-EP-9 Compare, contrast, and utilize Cloud Service features.
- IT-EP-10 Design an embedded computing application that solves a current problem (e.g., robotics, artbotics, visual, and kinetic art).
- IT-EP-11 Organize personal online career portfolio for specific career interests.
- IT-EP-12 Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

11.45100 Digital Design

- IT-DD-1 Demonstrate employability skills required by business and industry.
- IT-DD-2 Organize personal online career portfolio for specific career interests.
- IT-DD-3 Research, explain, and summarize current state of the web, functions of the web, and future trends emerging on the web.
- IT-DD-4 Identify logistical, ethical, and legal Issues related to digital media and apply concepts to use o f text, graphics, animation, sound, video, and digital images in digital products.
- IT-DD-5Develop a plan to create, design, and market a web site with digital content to a specific target market.
- IT-DD-6 Explore and write using the various writing styles used on web sites and in digital content to get the intended message across.
- IT-DD-7 Identify and develop model digital products that reveal a professional layout and look by applying design principles to produce professional quality digital products.
- IT-DD-8 Create and edit images and graphics.
- IT-DD-9 Plan, produce, edit, and publish digital audio.
- IT-DD-10 Plan, edit, produce, and post a multimedia-rich video project.

- IT-DD-11 Plan, produce, edit, and publish animations.
- IT-DD-12 Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

11.47100 Computer Science Principles

- IT-CSP-1 Demonstrate employability skills required by business and industry.
- IT-CSP-2Create digital artifacts that foster creative expression including programs, digital music, videos, images, documents, and combinations of these such as infographics, presentations, and web pages.
- IT-CSP-3Apply abstractions in digital data to explain how bits are grouped to represent higher-level abstractions such as numbers and characters.
- IT-CSP-4Design and create computer programs to process and extract information to gain insight and knowledge.
- IT-CSP-5 Develop, express, implement, and analyze algorithms analytically and empirically
- IT-CSP-6 Create programs that translate human intention into computational artifacts including music, images, visualizations, and more while exploring the concepts, techniques and development used in writing programs.
- IT-CSP-7 Gain insight into the operation of the Internet, study characteristics of the Internet and systems built upon it, and analyze important concerns, such as cybersecurity.
- IT-CSP-8 Develop a logical argument from the many ways in which computing enables innovation and our methods for communicating, collaborating, problem solving, and doing business, and analyze the potential benefits and harmful effects of computing in the way people think, work, live, and play.
- IT-CSP-9 Review and update personal online career portfolio.
- IT-CSP-10 Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

11.47200 Programming, Games, Apps, and Society

- IT-PGAS-1 Demonstrate employability skills required by business and industry.
- IT-PGAS-2 Describe the software application life cycle and use a prototype development model to develop applications.
- IT-PGAS-3Design and develop applications using objects.
- IT-PGAS-4Design, develop, and implement accessible and usable interfaces, and analyze applications for engaging the user.
- IT-PGAS-5 Use and implement different digital representations of media.
- IT-PGAS-6 Evaluate an application design in terms of meeting privacy needs, legal and intellectual property requirements, and security considerations.
- IT-PGAS-7 Develop applications that read real-world data from sensors, interpret the data, and respond to the real-world stimuli.

- IT-PGAS-8Describe the unique needs for information and communication technologies for diverse audiences
- IT-PGAS-9Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

11.48100 Introduction to Cybersecurity

- IT-PICS-1 Demonstrate employability skills required by business and industry.
- IT-ICS-2Demonstrate an understanding of cybersecurity concepts and research.
- IT-IS-3 Identify the fundamental principles of networking (wired and wireless), local area networks (elements, perimeter networks, IP addressing, access methods and topologies), client-server and peer-to-peer networking models, and wide area networks.
- IT-IS-4 Identify the fundamental principles of the Open Systems Interconnection Model, Internet Protocol IPv4 and IPv6, and common networking services to include Name Resolution Techniques.
- IT-IS-5 Demonstrate how to work with the basic and advanced command prompts.
- IT-IS-6 Explore and research network infrastructures and network security.
- IT-IS-7 Demonstrate how to work with fundamental components of cybersecurity.
- IT-IS-8 Demonstrate how to employ host system and application security.
- IT-IS-9 Demonstrate how to implement proper security administration.
- IT-IS-10 Demonstrate how to implement proper access controls and identity management.
- IT-IS-11 Research and explore basic principles of cryptology.
- IT-IS-12 Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

Introduction to Python Programming (11.08300)

Python's introduction into robotics has completely changed how robots are controlled and programmed. Python's ease of use, adaptability, and vast library render it a top pick for developers operating in the robotics and automation domain.

Pyth-5 Implement different types of control structures (conditionals, loops, functions) in programs.
Pyth-8 Develop and implement objects in Python.
Pyth-9 Analyze algorithms and the implementation of algorithms in Python.

GSE for Science, Technology, Engineering, Mathematics 9-12

Electronics

Foundations of Electronics 21.45200

- STEM-FE-1 Demonstrate employability skills required by business and industry.
- STEM-FE-2Develop an understanding of engineering and electronics and describe the principal fields of engineering and electronic specializations (ex. aeronautical,

automotive, chemical, civil, industrial, and mechanical, computer software, electrical, and biomedical) and identify associated career tracks.
- STEM-FE-3 Describe and follow safety, health and environmental standards related to Science, Technology, Engineering, and Math (STEM) workplaces.
- STEM-FE-4 Identify criteria of usage, care, and maintenance for tools and machines.
- STEM-FE-5 Introduce the history and development of electron theory.
- STEM-FE-6 Identify electronic theories applicable to electronic processes.
- STEM-FE-7 Introduce electronic components that comprise an electronic system.
- STEM-FE-8 Introduce the techniques and processes in electronics systems.
- STEM-FE-9 Understand the various measuring apparatuses appropriate to electronics systems.
- STEM-FE-10 Use appropriate technology to collect, record, manipulate, analyze, and report data.
- STEM-FE-11 Design a solution to an engineering and electronics problem applying math and science principles.
- STEM-FE-12 Construct an electronic device as a culminating experience.
- STEM-FE-13 Explore how related career and technology student organizations are integral parts of career and technology education courses. Students will develop leadership, interpersonal, and problem-solving skills through participation in co-curricular activities associated with the Technology Student Association.

Advanced AC and DC Circuits (21.45300)
- STEM-AACDCC-1 Demonstrate employability skills required by business and industry.
- STEM-AACDCC-2 Analyze fields of engineering and electronic specializations (i.e. aeronautical, automotive, chemical, civil, industrial, and mechanical, computer software, electrical, and biomedical) and identify associated career tracks.
- STEM-AACDCC-3 Describe and follow safety, health and environmental standards related to Science, Technology, Engineering and Math (STEM) workplaces.
- STEM-AACDCC-4 Investigate the history and development of analog circuits.
- STEM-AACDCC-5 Research and present operational characteristics and applications of amplifiers.
- STEM-AACDCC-6 Research and define oscillator characteristics and applications.
- STEM-AACDCC-7 Research and define operating characteristics and applications of communication circuits.
- STEM-AACDCC-8 Research and present characteristics and construction of integrated circuits.
- STEM-AACDCC-9 Research and present operational characteristics of electronic control devices and circuits.
- STEM-AACDCC-10 Create a digital project that displays mastery of the standards involved with electronics.

Digital Electronics (21.45400)
- STEM-DE-1 Demonstrate employability skills required by business and industry.

- STEM-DE-2 Analyze fields of engineering and electronic specializations (i.e. aeronautical, automotive, chemical, civil, industrial, and mechanical, computer software, electrical, and biomedical) and identify associated career tracks.
- STEM-DE-3 Describe and follow safety, health and environmental standards related to Science, Technology, Engineering and Math (STEM) workplaces 3.1 Implement workplace and product safety standards such as Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), International Organization for Standardization (ISO), Good Manufacturing Practice (GMP), and Underwriters Laboratories (UL).
- STEM-DE-4 Analyze characteristics of digital and analog systems.
- STEM-DE-5 Demonstrate knowledge of logic gates (IF, Then, Else).
- STEM-DE-6 Compare and contrast the use of several commonly used digital codes, including the differences between conversion of decimal numbers and letters to code.
- STEM-DE-7 Use truth tables and interpret waveforms to determine flip-flop modes of operation and outputs.
- STEM-DE-8 Analyze the output for a variety of counters based on a series of inputs.
- STEM-DE-9 Analyze block-style logic diagrams.
- STEM-DE-10 Investigate common memory and storage devices used in a microcomputer system.
- STEM-DE-11 Create a digital project that displays mastery of the standards involved with electronics.

Engineering and Technology

Foundations of Engineering and Technology (21.42500)

- STEM-FET-1 Demonstrate employability skills required by business and industry.
- STEM-FET-2 Develop an understanding of engineering and technology and describe the principal fields of engineering specializations (ex. aeronautical, automotive, chemical, civil, industrial, mechanical, computer software, electrical, and biomedical) and identify associated career tracks.
- STEM-FET-3 Identify the history of technology and engineering and its impact on society in the past, present, and future.
- STEM-FET-4 Demonstrate and follow safety, health, and environmental standards related to the Science, Technology, Engineering, and Math (STEM) workplaces.
- STEM-FET-5 Identify criteria of usage, care, and maintenance for tools and machines.
- STEM-FET-6 Apply fundamental principles of the engineering design process.
- STEM-FET-7 Use appropriate technology to collect, record, manipulate, analyze, and report data.

Engineering Concepts (21.47100)

- STEM-EC-1 Demonstrate employability skills required by business and industry.
- STEM-EC-2 Demonstrate and follow safety, health, and environmental standards related to the Science, Technology, Engineering, and Math (STEM) workplaces.

- STEM-EC-3 Describe the characteristics of engineering disciplines and engineered products.
- STEM-EC-4 Demonstrate the knowledge and skills required to pursue the full range of engineering post-secondary education and career opportunities.
- STEM-EC-5 Explain a whole systems approach to the engineering design process to solve a technical problem.
- STEM-EC-6 Employ critical thinking skills and teamwork skills when working in groups to solve problems, to make decisions, achieve group goals and use team members' talents effectively.
- STEM-EC-7 Summarize and apply engineering solutions through the audience appropriate application of engineering graphics and technical writing.
- STEM-EC-8 Apply basic engineering tools and resources to aid in data collection and problem solution sets.
- STEM-EC-9 Cite evidence for the role of troubleshooting, research and development, inventions, and innovations in problem solving.
- STEM-EC-10 Explore the use of social media and other 21st century technologies and their impact(s) on the fields of engineering and technology.
- STEM-EC-11 Critique and synthesize how related career and technology student organizations are integral parts of career and technology education courses. Students will develop leadership, interpersonal, and problem-solving skills through participation in co-curricular activities associated with the Technology Student Association (TSA).

Engineering Applications (21.47200)

- STEM-EA-1 Demonstrate employability skills required by business and industry.
- STEM-EA-2 Demonstrate and follow safety, health, and environmental standards related to the STEM workplace and apply specific engineering tools, machines, materials and processes in a safe and orderly manner to formulate, analyze, and verify engineering practices and solutions.
- STEM-EA-3 Identify and explore career opportunities in one or more engineering career pathways to build an understanding of the opportunities available in the STEM workplace.
- STEM-EA-4 Apply knowledge of the engineering design process to solve engineering/ technological problems in the STEM workplace.
- STEM-EA-5 Employ planning and time management skills and tools to enhance results and complete work tasks.
- STEM-EA-6 Apply oral, written, and visual communication skills to obtain, interpret, and present information to and from intended audiences.
- STEM-EA-7 Develop and apply detailed plans to solutions for design problems using mathematical and scientific concepts.
- STEM-EA-8 Develop appropriate models.
- STEM-EA-9 Design and construct a testable prototype.
- STEM-EA-10 Understand engineering impacts of social, economic, design and environmental issues.
- STEM-EA-11 Explain the impact of business and marketing on engineering design.

- STEM-EA-12 Explore how related career and technology student organizations are integral parts of career and technology education courses. Students will develop leadership, interpersonal, and problem-solving skills through participation in cocurricular activities associated with the Technology Student Association (TSA).

Engineering Drafting and Design

Introduction to Drafting and Design (48.54100)

- AC-IDD-1 Demonstrate employability skills required by business and industry.
- AC-IDD-2 Identify the disciplines related to architectural and engineering professions.
- AC-IDD-3 Demonstrate the knowledge and skills to properly use the tools and equipment safely in the drafting lab.
- AC-IDD-4 Demonstrate the correct use and management of all drafting tools and supplies.
- AC-IDD-5 Create technical freehand sketches.
- AC-IDD-6 Demonstrate proper lettering techniques.
- AC-IDD-7 Demonstrate the use of proper line types.
- AC-IDD-8 Demonstrate the ability to read and draw using the proper scale.
- AC-IDD-9 Demonstrate the knowledge and skills of computer operations.
- AC-IDD-10 Create and dimension single view drawings while applying geometric construction.
- AC-IDD-11 Utilize orthographic projection to create and dimension multi-view drawings manually and using CADD.

Survey of Engineering Graphics (48.54200)

- STEM-SEDG-1 Demonstrate employability skills required by business and industry.
- STEM-SEDG-2 Demonstrate and follow safety, health, and environmental standards related to the STEM workplace and apply specific engineering tools, machines, materials and processes in a safe and orderly manner to formulate, analyze, and verify engineering practices and solutions.
- STEM-SEDG-3 Analyze applied math required by business and industry for engineering graphics.
- STEM-SEDG-4 Demonstrate purpose and correct application of sectional views.
- STEM-SEDG-5 Demonstrate purpose and correct application of Auxiliary views.
- STEM-SEDG-6 Demonstrate purpose and correct application of pictorial views.
- STEM-SEDG-7 Cite evidence of developments in engineering graphics and engineering.
- STEM-SEDG-8 Present appropriate views of an object.

3-D Modeling and Analysis (48.54300)

- STEM-3DMA-1 Demonstrate employability skills required by business and industry.
- STEM-3DMA-2 Identify the disciplines related to engineering graphics and engineering professions.
- STEM-3DMA-3 Analyze applied math required by business and industry for engineering graphics.

- STEM-3DMA-4 Demonstrate an understanding for fasteners and the correct application in engineering graphics and product design.
- STEM-3DMA-5 Produce a working drawing artifact that conveys all of the information needed to manufacture and assemble a design.
- STEM-3DMA-6 Evaluate and develop assembly drawings.
- STEM-3DMA-7 Construct a 3D assembly model showing criteria, constraints, design, and quality of a final product by creating a presentation or capstone final project.