

CURRICULUM MAPPING TEMPLATE

Program: Engineering Technology 15.0000

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
1	OVERVIEW OF ENGINEERING				
	<p>I. ACADEMIC FOUNDATIONS</p> <p>A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <p>3. Locate, organize and reference written information from various sources to communicate with co-workers and clients/participants.</p> <p>5. Use correct grammar, punctuation and terminology to write and edit documents.</p> <p>C. Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.</p> <p>3. Explain the relationships between scientific theory, scientific principles and laws, in technology, and engineering.</p>				
	<p>II. COMMUNICATIONS</p> <p>E. Prepare STEM material in oral, written, or visual formats that provide information to an intended audience to fulfill specific communication need of an audience.</p> <p>1. Use effective methods to communicate concepts of STEM to a broadly represented audience.</p> <p>2. Apply the ability to read, interpret, and analyze STEM materials discerning the information and concepts.</p>	2) All Standard	Reading charts, graph (I)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1
	<p>III. PROBLEM-SOLVING AND CRITICAL THINKING</p> <p>A. Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.</p> <p>6. Conduct technical research to gather information necessary for decision-making.</p>	a.6) All Standards	Area, operations with rational numbers, geometry, trig (I)	6.G.1; 6.G.2; 6.G.3; 7.G.1; 7.G.4; 7.G.6; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 7.G.5	G.GPE.7; G.MG.2; A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.CO.9; G.CO.12; G.CO.13; G.SRT.6; G.SRT.8; G.SRT.9;

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					G.SRT.10; G.SRT.11; F.TF.3; F.TF.5; F.TF.7
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>B. Employ technological tools to expedite workflow.</p> <p>1. Use information technology tools to manage and perform work responsibilities.</p> <p>12. Deliver presentations with supporting materials.</p>				
	<p>V. SYSTEMS</p> <p>A. Describe the nature and types of business organizations to build an understanding of the scope of organizations.</p> <p>1. Describe the types and functions of businesses.</p> <p>2. Diagnose and make necessary corrections or improvements to a technical system in a business, industry, or simulated work place setting.</p> <p>B. Implement quality control systems and practices to ensure quality products and services.</p> <p>2. Diagnose and make necessary corrections or improvements to a technical system in a business, industry, or simulated work place setting.</p>	<p>A.1 Research statistics industry trends</p> <p>A.2;B2 Redesign/Q.C.</p>	<p>Charts, graphs, central tendencies (II)</p> <p>A.2;B2 Operation with reals (III)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.ID.2</p>
	<p>VI. SAFETY, HEALTH AND ENVIRONMENTAL</p> <p>A. Apply safety practices in the environment where science, technology, engineering, and/or mathematical principles are appropriate to ensure a safe workplace.</p> <p>1. Assess workplace conditions with regard to safety and health.</p> <p>2. Select appropriate personal protective equipment as needed for a safe workplace/jobsite.</p> <p>3. Employ a safety hierarchy and communication system within the workplace/jobsite workplace/jobsite.</p> <p>4. Implement safety precautions to maintain a safe worksite.</p> <p>5. Use appropriate safety techniques, equipment, and processes in planning and /or project applications.</p> <p>6. Identify existing or potential hazards to existing or assigned plans, projects, or processes</p>	<p>C.1;C.2 Read charts and graphs, analyze data, develop spread sheets</p>	<p>C1;C2 Operations with real numbers, charts and graphs, central tendencies, Logic if and then (III)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.CP.1; S.ID.1; S.ID.2; S.CP.1</p>

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	<p>where safety, health, or environment might be in play.</p> <p>B. Employ emergency procedures as necessary to provide aid in workplace accidents.</p> <ol style="list-style-type: none"> 1. Use knowledge of First Aid procedures as necessary. 2. Use knowledge of CPR procedures as necessary. 3. Use safety equipment as necessary. <p>C. Employ knowledge of response techniques to create a disaster and/or emergency response plan.</p> <ol style="list-style-type: none"> 1. Complete an assessment of an emergency and/or disaster situation. 2. Create an emergency and/or disaster plan. 				
	<p>VII. LEADERSHIP AND TEAMWORK</p> <p>A. Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.</p> <ol style="list-style-type: none"> 4. Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks. 	A.4 Organizing events, designing chart, graphs, and spread sheets	A.4 Tables, Charts, Graphs, central tendency (II), Logic If then (III)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.CP.1; S.ID.1; S.ID.2; S.CP.1
	<p>IX. EMPLOYABILITY AND CAREER DEVELOPMENT</p> <p>A. Know and understand the importance of employability skills.</p> <ol style="list-style-type: none"> 1. Apply ethical reasoning to a variety of workplace situations in order to make ethical decisions. Identify and demonstrate positive work behaviors and personal qualities needed to be employable. <p>B. Explore, plan, and effectively manage careers.</p> <ol style="list-style-type: none"> 1. Develop a personal career plan to meet career goals and objectives. 2. Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster. 3. Recognize and act upon requirements for career advancement to plan for continuing education and training. 4. Continue professional development to 	C.8;C.9 Trends in employment	C.8; C.9 Percentages (III)	6.RP.2; 6.RP.3; 7.EE.2; 7.EE.3	

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	<p>keep current on relevant trends and information within the industry.</p> <p>5. Examine licensing, certification and credentialing requirements at the national, state and local levels to maintain compliance with industry requirements.</p> <p>6. Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning.</p> <p>c. Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.</p> <p>1. Use multiple resources to locate job opportunities.</p> <p>2. Prepare a résumé.</p> <p>3. Prepare a letter of application.</p> <p>4. Complete an employment application.</p> <p>5. Interview for employment.</p> <p>6. List the standards and qualifications that must be met in order to enter a given industry.</p> <p>7. Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer.</p> <p>8. Maintain a career portfolio to document knowledge, skills and experience in a career field.</p> <p>9. Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals.</p> <p>10. Identify and exhibit traits for retaining employment to maintain employment once secured.</p> <p>11. Engage experiences in STEM where an individual can identify personal interests and expectations for career and personal development.</p>				
	<p>X. TECHNICAL SKILLS</p> <p>A. Employ information management techniques and strategies in the workplace to assist in decision-making.</p> <p>1. Use information literacy skills when accessing, evaluating and disseminating information.</p> <p>2. Describe the nature and scope of information management.</p> <p>3. Maintain records to facilitate ongoing business operations.</p> <p>D. Overview of Engineering</p>	<p>A.1 Reading charts and graphs, measurement and conversion</p> <p>A.3 spread sheets</p>	<p>A.1 Reading charts and graphs (I), Operations with rational numbers, measurements and measurement conversions (III)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p>

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	<ol style="list-style-type: none"> 1. Describe major engineering fields 2. Identify functions an engineer performs 3. Describe education required to be an engineer 4. Identify ethics related to engineering situations 5. Describe relationships between the engineer and other technical personnel 6. Identify the progression of the engineering field 				
	<p>XI. ENGINEERING & TECHNOLOGY PATHWAY</p> <p>A. Know the elements of the processes and concepts for understanding the design process.</p> <ol style="list-style-type: none"> 1. Explain why and how the contributions of great innovators are important to society. 				
2	<p>COMPONENT DESIGN PROCESS/PROBLEM SOLVING</p>				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>A. Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.</p> <ol style="list-style-type: none"> 1. Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate). 6. Conduct technical research to gather information necessary for decision-making. <p>B. Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).</p> <ol style="list-style-type: none"> 1. Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls). 2. Develop the active use of information technology applications. 3. Use computer applications to solve 	<p>A.1; B.1 All CTE skills in CIP</p> <p>B.3 Dimensioning, constraining, Mechanical timing, GD&T, Problem solving</p>	<p>B.3 Ratios, Measurement and Conversion (I), Limits Min & Max (II), Logic if then, Logic connectives, quantifiers, Logic Math symbols and Math sequences (II), Problem solving (I)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.MG.3; S.CP.1; F.BF.2; N.Q.2; N.Q.3; S.ID.6</p>

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	problems by creating and using algorithms, and through simulation and modeling techniques.				
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>C. Demonstrate Digital Citizenship</p> <p>1. Identify legal and ethical issues related to the use of information and communication technologies (e.g., properly selecting and citing resources)</p> <p>D. Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.</p> <p>1. Use IT tools to manipulate data creating reports, plans, processes, or projects from data provided.</p> <p>4. Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem.</p> <p>5. Apply a technological, scientific, or mathematical concept (use of algorithms) when communicating with others on issues, plans, processes, problems, or concepts.</p> <p>E. Select and use different forms of communications technology including word processing, spreadsheets, database, presentation software, email to communicate, and use of the internet to search for and display information.</p> <p>1. Select and use information technology tools to collect, analyze, synthesize, and display data to solve problems.</p> <p>2. Read and create basic computer aided engineering drawings.</p>	<p>C.1 Reading Charts and Graphs (II)</p> <p>D.1 Reading Charts and Graphs</p> <p>D.4;D.5;E.1</p> <p>Creating spread sheets</p> <p>E.2; All CTE skills in CIP</p>	<p>C.1 Reading Charts and Graphs (II)</p> <p>D.1 Reading Charts and Graphs (II)</p> <p>D.4;D.5;E.1; Basic central tendency (I), creating linear and non-linear equations (II), Substituting data into formulas (I), Logic If Then (II)</p> <p>E.2; All CTE skills in CIP</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.ID.2; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6; A.CED.4; S.CP.1</p>
	<p>X. TECHNICAL SKILLS</p> <p>E. Design Process/Problem Solving</p> <p>1. Identify principles of the problem solving process</p> <p>2. Utilize the steps in a design process</p> <p>3. Translate word problems into mathematical statements</p> <p>4. Analyze solutions, identifying strengths and weaknesses</p> <p>5. Develop details of a solution</p> <p>6. Develop, test, and redesign prototypes</p> <p>7. Utilize a standardized troubleshooting method for diagnosis</p>	<p>E.1-E.9 Reading charts and graphs, measurement and conversion, spread sheets, Develop and solve equations, Problem solving, Using</p>	<p>E1-E9 Reading Charts and Graphs (I), measurement and conversion (I), operations with Reals (I), Problem solving (I), Creating and solving equations (II),</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 7.SP.5; 8.SP.1; 8.SP.3; 8.SP.4; 6.EE.6; 6.EE.7;</p>	<p>A.APR.1; A.APR.7; N.RN.3; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; N.Q.1; N.Q.2; N.Q.3; S.ID.1; S.ID.2; S.ID.3; S.ID.5; S.ID.6; S.MD.1; S.CP.1; A.CED.1;</p>

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	8. Identify common quality control methods 9. Discuss quality and continuous improvement methods used in engineering	Limits Min Max	Min and Max and statistics (I), Logic (III)	6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4	A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.CP.1
	<p>XI. ENGINEERING & TECHNOLOGY PATHWAY</p> <p>A. Know the elements of the processes and concepts for understanding the design process.</p> <p>2. Explain the elements and steps of the design process and tools or techniques that can be used for each step.</p> <p>3. Describe design constraints, criteria, and trade-offs in regard to variety of conditions (e.g. technology, cost, safety, society, the environment, time, human resources, manufacturability).</p> <p>B. Develop processes and concepts to apply the design process.</p> <p>1. Apply the design process, including understanding customer needs, interpreting and producing design constraints and criteria, planning and requirements analysis, brainstorming and idea generation, using appropriate modeling and prototyping, testing, verification, and implementation.</p> <p>2. Demonstrate the ability to evaluate a design or product and improve the design using testing, modeling, and research.</p> <p>3. Demonstrate the ability to record and organize information and test data during design evaluation.</p>	<p>A.1;A.2;A.3; Explaining Plans</p> <p>B.1-B.3 Reading charts and graphs, measurement and conversion, spread sheets, Develop and solve equations, Problem solving, Using Limits Min Max</p>	<p>A.1; A.2;A.3 Angles, Geometric shape applications, relations ships/comparison between 3D and 2D(I), Limits Min Max (II)</p> <p>B.1-B.3 Angles, Geometric Shapes applications (I), Reading Charts and Graphs (I), measurement and conversion (I), operations with Reals (I), Problem solving (I), Creating and solving equations (II), Min and Max and statistics (I), Logic (III)</p>	<p>7.G.5; 6.G.3; 7.G.1; 7.G.6; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 6.NS.2; 6.NS.3; 7.NS.1; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 7.SP.2; 7.SP.3; 7.SP.4; 7.SP.5; 8.SP.1; 8.SP.3; 8.SP.4</p>	<p>G.CO.9; G.CO.12; G.CO.13; G.GPE.7; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.1; S.ID.2; S.ID.3; S.ID.5; S.ID.6; S.MD.1; S.CP.1; N.Q.1; N.Q.2; N.Q.3</p>
3	SYSTEM PROJECT PLANNING				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>I. ACADEMIC FOUNDATIONS</p> <p>A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <ol style="list-style-type: none"> 1. Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 2. Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace. 3. Locate, organize and reference written information from various sources to communicate with co-workers and clients/participants. 4. Evaluate and use information resources to accomplish specific occupational tasks. 5. Use correct grammar, punctuation and terminology to write and edit documents. 6. Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences. 7. Interpret verbal and nonverbal cues/behaviors to enhance communication with co-workers and clients/participants. <p>C. Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.</p> <ol style="list-style-type: none"> 2. Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation, predictions, and problem identification. 	C.2 All CTE skills in CIP			
	<p>III. COMMUNICATIONS</p> <p>A. Develop and interpret tables, charts, and figures to support written and oral communications.</p> <ol style="list-style-type: none"> 1. Create tables, charts, and figures to support written and oral communications. 2. Interpret tables, charts, and figures used to support written and oral communication. <p>B. Apply active listening skills to obtain and clarify information.</p> <ol style="list-style-type: none"> 1. Interpret a given verbal message/information. 2. Respond with restatement and clarification techniques to clarify information. 3. Model behaviors that demonstrate active listening. 	A.1;A.2 Read Charts and tables, create spread sheets	A.1;A.2 Angles, Geometric Shapes applications (I), Reading Charts and Graphs (I), measurement and conversion (I), operations with Reals (I), Creating and solving equations (II), Min and Max and	7.G.5; 6.G.3; 7.G.1; 7.G.6; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3;	G.CO.9; G.CO.12; G.CO.13; G.GPE.7; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5;

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	<p>C. Listen to and speak with diverse individuals to enhance communication skills.</p> <ol style="list-style-type: none"> 1. Apply factors and strategies for communicating with a diverse workforce. 2. Demonstrate ability to communicate and resolve conflicts within a diverse workforce. <p>F. Exhibit public relations skills to increase internal and external customer/client satisfaction.</p> <ol style="list-style-type: none"> 1. Communicate effectively when developing positive customer/client relationships. 2. Use correct grammar to communicate verbally. 3. Listen to a presentation and record important information. Report back identifying central themes and use key points to explain how the message applies to a similar situation. 		statistics (I), Logic (III)	7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 7.SP.5; 8.SP.1;	F.IF.5; A.SSE.1; F.BF.1; S.ID.1; S.ID.2; S.ID.3; S.ID.5; S.ID.6; S.MD.1; S.CP.1
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>A. Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.</p> <ol style="list-style-type: none"> 1. Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate). 2. Use the skills required in project management to track and assess the progress of a plan, process, or project as assigned. 3. Apply the skills in quality assurance as well as those in process management and development for appropriate applications of systems integration techniques to an assigned project. 4. Employ critical thinking and interpersonal skills to resolve conflicts with staff and/or customers. 5. Identify, write and monitor workplace performance goals to guide progress in assigned areas of responsibility and accountability. <p>B. Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and</p>	A.1-A.3 B.1 All CTE skills in CIP			

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	<p>communication, transportation, manufacturing, and construction).</p> <p>1. Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls).</p>				
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>A. Use Personal Information Management (PIM) applications to increase workplace efficiency.</p> <p>1. Manage personal schedules and contact information.</p> <p>2. Create memos and notes.</p> <p>B. Employ technological tools to expedite workflow.</p> <p>1. Use information technology tools to manage and perform work responsibilities.</p> <p>2. Use email to share files and documents.</p> <p>3. Identify the functions and purpose of email systems.</p> <p>4. Use email to communicate within and across organizations.</p> <p>5. Access and navigate Internet (e.g., use a web browser).</p> <p>6. Search for information and resources.</p> <p>7. Evaluate Internet resources for reliability and validity.</p> <p>8. Prepare simple documents and other business communications.</p> <p>9. Prepare reports and other business communications by integrating graphics and other non-text elements.</p> <p>10. Prepare complex multi-media publications.</p> <p>11. Prepare presentations for training, sales and information sharing.</p> <p>12. Deliver presentations with supporting materials.</p> <p>19. Facilitate group work through management of shared schedule and contact information.</p> <p>20. Facilitate group work through management of shared files and online information.</p> <p>21. Facilitate group work through instant messaging or virtual meetings.</p> <p>22. Manage computer operations.</p> <p>23. Manage file storage.</p>	<p>A.1 Charts and graphs, tables</p> <p>B.6 Boolean</p> <p>D.2; D.4 Identifying data points, Collecting Data, analysis, apply working solution, material analysis, spatial reasoning, Create Spread sheets charts and graphs</p>	<p>A.1 Operations with Real numbers (II), Measure in time (III), ratios (III)</p> <p>B.6 Logic (III)</p> <p>D.2;D.4 Problem solving (I), Operations with Real numbers(I),Central Tendency (I), charts, tables, and graphs (I), Geometric Shapes applications (I), Proportions, ratios (I), Measurement(II), Measurement Conversions (II)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 6.SP.1; 6.SP.2; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.G.3; 7.G.1; 7.G.6;</p>	<p>A.APR.1; A.APR.7; N.RN.3; G.MG.3; S.CP.1; N.Q.1; N.Q.2; N.Q.3; S.ID.6; S.ID.1; S.ID.2; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; G.GPE.7; G.MG.3</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>24. Compress or alter files. 25. Operate computer driven equipment and machines. 26. Use installation and operation manuals. 27. Troubleshoot computer driven equipment and machines. 28. Access support as needed to maintain operation of computer driven equipment and machines. 29. Use IT in support of gathering, storage, and transfer of data or results in appropriate formats to support assigned projects. 30. Select and use assorted forms of IT to meet the requirements of a plan, process, project, report, issue, or problem.</p> <p>D. Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.</p> <p>2. Use modeling, simulation, or visual reproduction to effectively analyze, create, and/or communicate to others regarding plans, projects, problems, issues or processes. 4. Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem.</p>				
	<p>VII. LEADERSHIP & TEAMWORK</p> <p>A. Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.</p> <p>1. Employ leadership skills to accomplish organizational goals and objectives. 2. Employ organizational and staff development skills to foster positive working relationships and accomplish organizational goals. 3. Employ teamwork skills to achieve collective goals and use team members' talents effectively. 4. Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks. 5. Conduct and participate in meetings to accomplish work tasks. 6. Employ mentoring skills to inspire and teach others.</p>	<p>A.4 Organizing events, designing chart, graphs, and spread sheets</p>	<p>A.4 Tables, Charts, Graphs, central tendency (II), Logic If then (III)</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2;</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.ID.2; S.CP.1</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>VIII. ETHICS & LEGAL RESPONSIBILITIES</p> <p>A. Develop the knowledge and abilities to comprehend ethical and legal standards as they apply to STEM where plans, processes, and projects will be dependent upon them.</p> <p>2. Interpret and explain written organizational policies and procedures to help employees perform their jobs according to employer rules and expectations.</p>				
	<p>IX. EMPLOYABILITY & CAREER DEVELOPMENT</p> <p>A. Know and understand the importance of employability skills.</p> <p>1. Identify and demonstrate positive work behaviors and personal qualities needed to be employable.</p> <p>2. Manage resources in relation to the position (i.e. budget, supplies, computer, etc).</p> <p>B. Explore, plan, and effectively manage careers.</p> <p>1. Develop a personal career plan to meet career goals and objectives.</p> <p>2. Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster.</p> <p>C. Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.</p> <p>10. Identify and exhibit traits for retaining employment to maintain employment once secured.</p>	<p>A.2 Budget, Time Management Inventory</p> <p>B.1 Trends in employment</p>	<p>A.2 Operations with Real numbers</p> <p>B.1 Percentages (III)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.RP.2; 6.RP.3; 7.EE.2</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1</p>
	<p>X. TECHNICAL SKILLS</p> <p>B. Employ planning and time management skills and tools to enhance results and complete work tasks.</p> <p>1. Develop goals and objectives.</p> <p>2. Prioritize tasks to be completed.</p> <p>3. Develop timelines using time management knowledge and skills.</p> <p>4. Use project-management skills to improve workflow and minimize costs.</p> <p>C. Apply concepts and processes for the application of technology to engineering.</p>	<p>B.1 Identifying data points, Collecting Data, analysis, apply working solution, spatial reasoning, Create Spread sheets charts and</p>	<p>B.1 Problem solving (I), Operations with Real numbers(I),Central Tendency (I), charts, tables, and graphs (I), Geometric Shapes</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.SP.1; 6.SP.2; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.G.3; 7.G.1;</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6; S.ID.1; S.ID.2; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; G.GPE.7; G.MG.3; S.CP.1</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>1. Use knowledge, techniques, skills, and modern tools necessary for engineering practice.</p> <p>2. Describe the elements of good engineering practice (e.g. understanding customer needs, planning requirements analysis, using appropriate engineering tools, prototyping, test, evaluation, and verification).</p> <p>3. Demonstrate the ability to characterize a plan and identify the necessary engineering tools that will produce a technical solution when given a problem statement.</p> <p>4. Effectively use project management techniques (e.g. working in teams, appropriate time management practices, effective organizational skills, conduct analysis of cost, resources, and production capacity, and quality practices with continuous improvement).</p> <p>5. Use and calibrate probes, sensors, measuring systems, and devices to collect data using traceable standards.</p> <p>F. Project Planning</p> <p>1. Identify project requirements & estimate resources</p> <p>2. Create an effective project plan</p> <p>3. Anticipate project constraints and create alternative plans</p> <p>4. Evaluate and report on the results of the project</p>	<p>graphs</p> <p>C.1-C.5 All CTE skills in CIP</p> <p>F.1-F.4 Reading Charts, Graphs, Creating Spread Sheet</p>	<p>applications (I), Proportions, ratios (I), Measurement(II), Measurement Conversions (II)</p> <p>F.1-F.4 Tables, Charts, Graphs, central tendency (II), Logic If then (III)</p>	<p>7.G.6; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3</p>	
	<p>XI. ENGINEERING & TECHNOLOGY PATHWAY</p> <p>A. Know the elements of the processes and concepts for understanding the design process.</p> <p>3. Describe design constraints, criteria, and trade-offs in regard to variety of conditions (e.g. technology, cost, safety, society, the environment, time, human resources, manufacturability).</p> <p>B. Develop processes and concepts to apply the design process.</p> <p>1. Apply the design process, including understanding customer needs, interpreting and producing design constraints and criteria, planning and requirements analysis, brainstorming and idea generation, using appropriate modeling and prototyping, testing, verification, and implementation.</p>	<p>A.3; Explaining Plans</p> <p>B.1 Reading charts and graphs, measurement and conversion, spread sheets, Develop and solve equations, Problem solving, Using Limits Min Max</p>	<p>A.3 Angles, Geometric shape applications, relations ships/comparison between 3D and 2D(I), Limits Min Max (II)</p> <p>B.1 Angles, Geometric Shapes applications (I), Reading Charts and Graphs (I), measurement and conversion (I), operations with Reals</p>	<p>7.G.5; 6.G.3; 7.G.1; 7.G.6; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 7.SP.5; 8.SP.1;</p>	<p>G.CO.9; G.CO.12; G.CO.13; G.GPE.7; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; A.APR.1; A.APR.7; N.RN.3; N.Q.1;; N.Q.2; N.Q.3; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.1; S.ID.2; S.ID.3;</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
			(I), Problem solving (I), Creating and solving equations (II), Min and Max and statistics (I), Logic (III)	8.SP.3; 8.SP.4	S.ID.5; S.ID.6; S.MD.1; S.CP.1
4	ENGINEERING ETHICS				
	IV. INFORMATION TECHNOLOGY APPLICATIONS C. Demonstrate Digital Citizenship 2. Discuss possible long-range effects of unethical uses of technology (e.g., virus spreading, file pirating, hacking) on cultures and society 3. Discuss and demonstrate proper netiquette in online communications 4. Identify ways that individuals can protect their technology systems from unethical or unscrupulous users 5. Create appropriate citations for resources when presenting research findings 6. Discuss and adhere to fair use policies and copyright guidelines	C.2-C.6 Reading Charts and Graphs (II) Creating spread sheets	C.2-C.6 Reading Charts and Graphs (II), Operations with Reals (I)	6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1
	VIII. ETHICS & LEGAL RESPONSIBILITIES A. Develop the knowledge and abilities to comprehend ethical and legal standards as they apply to STEM where plans, processes, and projects will be dependent upon them. 1. Apply ethical reasoning to a variety of workplace situations in order to make ethical decisions. 2. Interpret and explain written organizational policies and procedures to help employees perform their jobs according to employer rules and expectations. 3. Demonstrate the skill of application to ethical and legal standards as they apply to the plans, processes, and projects as assigned in simulated environments. B. Demonstrate an understanding of the cultural, social, economic, and political consequences of engineering decisions	A.2 Read Charts and Graphs, Measurement, Basic Shapes C.1 Measurement, Ratios and proportions, Read Charts and Graphs D.1;D.2 Compliance	A.2 Read Charts and Graphs, Customary measure (II) Measurements (I) C.1 Measurement(II), Ratios and proportions (II) D.1;D.2 Reading Charts and Graphs	6.NS.2; 6.NS.3; 7.NS.1; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; G.MG.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>1. Identify changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.</p> <p>2. Classify the use of technology involving weighing the trade-offs between the positive and the negative effects.</p> <p>3. Identify ethical considerations important in the development, selection, and use of technologies.</p> <p>4. List the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.</p> <p>C. Demonstrate an understanding of the effects of technology on the environment</p> <p>1. Select technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling.</p> <p>2. List trade-offs of developing technologies to reduce the use of resources.</p> <p>3. Identify technologies devised to reduce the negative consequences of other technologies.</p> <p>4. Discuss the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.</p> <p>D. Demonstrate knowledge of constraints on global sustainability issues</p> <p>1. Recognize sustainability methods and materials</p> <p>2. Recognize the impact of engineering & technology on the environment</p>				
5	ENGINEERING GRAPHICAL COMMUNICATIONS				
	<p>I. ACADEMIC FOUNDATIONS</p> <p>A. Apply and use algebraic, geometric and trigonometric relationships, characteristics, and properties to solve problems.</p> <p>1. Identify whole numbers, decimals, and fractions.</p> <p>2. Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division.</p> <p>3. Demonstrate use of relational expressions such as equal to, not equal, greater than, less than, etc.</p>	All CTE skills in CIP Use CAD software	Whole numbers, fractions, decimals (I)	6.NS.2; 6.NS.3; 7.EE.3; 6.NS.1; 6.EE.2; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3	A.APR.1; A.APR.7; N.RN.3; N.Q.1

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>4. Apply data and measurements to solve a problem.</p> <p>5. Analyze Mathematical problem statements for missing and/or irrelevant data.</p> <p>6. Construct charts/tables/graphs from functions and data.</p> <p>7. Analyze data when interpreting operational documents.</p> <p>C. Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.</p> <p>1. Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables.</p> <p>D. Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.</p> <p>1. Apply scalar and vector quantities as applied to physical systems, such as the relationship between position, velocity, and acceleration.</p>				
	<p>II. COMMUNICATIONS</p> <p>D. Apply active listening skills to obtain or clarify information pertaining to plans, processes, projects, or designs.</p> <p>1. Interpret messages or information provided that clarifies issues, ideas, plans, projects, or processes.</p> <p>2. Respond and/or restate information that will clarify STEM techniques to be used and/or information to be applied to projects, plans, or processes.</p> <p>G. Create and assemble a prototype using CAD modeling software.</p> <p>1. Brainstorm and sketch possible solutions to an existing design problem.</p> <p>2. Select an approach that meets or satisfies the constraints given in a design brief.</p> <p>3. Create simple extruded solid Computer Aided Design (CAD) models from dimensioned sketches.</p> <p>4. Generate dimensioned multiview drawings from simple CAD models.</p> <p>5. Measure and Fabricate parts for a functional prototype from the CAD multiview drawings.</p> <p>6. Assemble the product using the CAD modeling software.</p>	<p>G.1-G.9;H-1-12;I-16 All CTE skills in CIP</p>			

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>7. Test and evaluate the prototype and record results.</p> <p>8. Apply geometric and numeric constraints to CAD sketches.</p> <p>9. Identify the purpose of packaging in the design of consumer products.</p> <p>H. Demonstrate an understanding of mathematics and dimensioning associated with CAD design software.</p> <p>1. Identify common geometric shapes and forms by name.</p> <p>2. Calculate the area of simple geometric shapes.</p> <p>3. Calculate the surface area and volume of simple geometric forms.</p> <p>4. Identify and explain the various geometric relationships that exist between the elements of two-dimensional shapes and three-dimensional forms.</p> <p>5. Identify and define the axes, planes, and sign conventions associated with the Cartesian coordinate system.</p> <p>6. Apply geometric and numeric constraints to CAD sketches.</p> <p>7. Utilize sketch-based, work reference, and placed features to develop solid CAD models from dimensioned drawings.</p> <p>8. Explain how a given object's geometry is the result of sequential additive and subtractive processes.</p> <p>9. Explain the differences between size and location dimensions.</p> <p>10. Differentiate between datum dimensioning and chain dimensioning.</p> <p>11. Identify and dimension fillets, rounds, diameters, chamfers, holes, slots, and screw threads in orthographic projection drawings.</p> <p>12. Explain the rules that are associated with the application of dimensions to multiview drawings.</p> <p>I. Demonstrate an understanding of tolerances and their implications on an engineering design.</p> <p>1. Identify, sketch, and explain the difference between general tolerances, limit dimensions, unilateral, and bilateral tolerances.</p> <p>2. Differentiate between clearance and interference fits.</p> <p>3. Sketch and model an auxiliary view of a given object to communicate the true size and</p>				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	shape of its inclined surface. 4. Describe the purpose and demonstrate the application of section lines and cutting plane lines in a section view drawing. 5. Sketch a full and half section view of a given object to communicate its interior features. 6. Identify algebraic relationships between the dimensional values of a given object.				
	<p>IV. INFORMATION TECHNOLOGY APPLICATION</p> <p>B. Employ technological tools to expedite workflow.</p> 13. Create a spreadsheet. 14. Perform calculations and analyses on data using a spreadsheet. 15. Manipulate data elements. 16. Manage interrelated data elements. 17. Analyze interrelated data elements. 18. Generate reports showing interrelated data elements. <p>D. Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.</p> 1. Use IT tools to manipulate data creating reports, plans, processes, or projects from data provided. 2. Use modeling, simulation, or visual reproduction to effectively analyze, create, and/or communicate to others regarding plans, projects, problems, issues or processes. 3. Apply a currently applicable computer programming language to a process, project, plan, or issue as assigned. 5. Apply a technological, scientific, or mathematical concept (use of algorithms) when communicating with others on issues, plans, processes, problems, or concepts.				
	<p>V. SYSTEMS</p> <p>B. Implement quality control systems and practices to ensure quality products and services.</p> 1. Describe quality control standards and practices common to the workplace.				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>X. TECHNICAL SKILLS C. Apply concepts and processes for the application of technology to engineering. 5. Use and calibrate probes, sensors, measuring systems, and devices to collect data using traceable standards. 6. Explain the impact of error in measurement, predict the effect of error propagation in calculations, and record data with the correct number of significant digits. 7. Safely operate a variety of tools, machines, and equipment (e.g. milling machines, rapid prototyping machines, drill press, band saw, CNC machines, and hand tools). 8. Use, handle, and store tools and materials correctly, perform preventative maintenance, understanding the results of negligence and improper maintenance or improper calibration.</p>	C.5-C.6 Reading Charts and Graphs, Creating spread sheets, Measurement, Statistical analysis	C.2-C.6 Reading Charts and Graphs (II), Operations with Reals (I), Measurement (I), Central Tendency (II)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.ID.2
	<p>XI. ENGINEERING & TECHNOLOGY PATHWAY B. Develop processes and concepts to apply the design process. 3. Demonstrate the ability to record and organize information and test data during design evaluation.</p>	C.2-C.6 Reading Charts and Graphs (II) Creating spread sheets	C.2-C.6 Reading Charts and Graphs (II), Operations with Reals (I)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; A.APR.1; A.APR.7; N.RN.3; N.Q.1
6	MATERIALS AND ENGINEERING SYSTEMS				
	<p>V. SYSTEMS C. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities. 1. Identify common materials used in engineering projects 2. Compare and contrast physical properties of materials 3. Select correct materials for specific functions 4. Perform test and destructive testing of materials for specific characteristics</p>	C.1-C4 Measurement, Ratios	C1-C4 Operations with Reals (I), Ratios and proportions (II), Measurement (I)	6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3	A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.MG.3
	<p>XI. ENGINEERING & TECHNOLOGY PATHWAY B. Develop processes and concepts to apply the design process.</p>	All CTE skills in CIP			

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	2. Demonstrate the ability to evaluate a design or product and improve the design using testing, modeling, and research.				
7	LOGISTICAL ENGINEERING TECHNOLOGIES				
	<p>V. SYSTEMS</p> <p>D. Demonstrate an understanding of and be able to select and use transportation and logistical engineering technologies</p> <ol style="list-style-type: none"> 1. Service products to keep them in good operating condition. 2. Classify materials based on their qualities as natural, synthetic, or mixed. 3. Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. 4. Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. 5. Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. 6. Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it. 7. Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. 8. Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. 9. Discuss how transportation services and methods have led to a population that is regularly on the move. 10. Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems. 	D.5 Max Limits D.6 Reading Charts and Graphs	D.5;D.6 Operations with Real Numbers (I), Reading Charts and Graphs (II)	6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1
8	CIVIL ENGINEERING TECHNOLOGIES				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>V. SYSTEMS</p> <p>E. Demonstrate an understanding of and be able to select and use civil and construction engineering technologies</p> <ol style="list-style-type: none"> 1. Define infrastructure as the underlying base or basic framework of a system. 2. Identify a variety of processes and procedures used in constructing structures. 3. Identify requirements involved in the design of structures. 4. Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. 5. Identify prefabricated materials used in some structures. 	E.4 Structural analysis, Measurement	E.4 Substituting for Formulas (I), Solving Equation (II), Measurement (I), Operations with Real numbers (I)	6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 6.EE.2; 6.NS.2; 6.NS.3; 7.NS.1	A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6; A.APR.1; A.APR.7; N.RN.3; N.Q.1
9	ELECTRICAL ENGINEERING TECHNOLOGIES				
	<p>I. ACADMEIC FOUNDATIONS</p> <p>C. Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.</p> <ol style="list-style-type: none"> 3. Explain the relationships between scientific theory, scientific principles and laws, in technology, and engineering. <p>D. Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.</p> <ol style="list-style-type: none"> 2. Apply fundamental laws and principles relevant to engineering and technology. 	All CTE skills in CIP			
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>B. Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).</p> <ol style="list-style-type: none"> 2. Develop the active use of information technology applications. 3. Use computer applications to solve problems by creating and using algorithms, and through simulation and modeling techniques. 	B.2;B.3 Dimensioning, constraining, Mechanical timing, GD&T, Problem solving	B.2;B.3 Ratios, Measurement and Conversion (I), Limits Min & Max (II), Logic if then, Logic connectives, quantifiers, Logic Math symbols and Math sequences (II), Problem solving (I)	6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3	G.MG.3; S.CP.1; F.BF.2; N.Q.1; N.Q.2; N.Q.3; S.ID.6

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>D. Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.</p> <p>3. Apply a currently applicable computer programming language to a process, project, plan, or issue as assigned.</p>	D.3 Programming	D.3 Operations with Real Numbers (I), All listed Logic (I)	6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.CP.1; F.BF.2
	<p>V. SYSTEMS</p> <p>F. Demonstrate an understanding of and be able to use electrical and electronic engineering technologies</p> <ol style="list-style-type: none"> Demonstrate the effect of resistance Apply Ohm's Law, Watt's Law, and Kirchoff's Law Identify series, parallel, and combination circuits Apply knowledge of AC and DC systems Identify the uses and types of inductors and capacitors Use appropriate electrical units to solve problems Draw a circuit diagram and lay out the circuit Identify the difference between analog and digital signals Identify electrical components and their functions Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. 	F.2-F.6 Ohms Law, Watts Law, Logic, Krichoff's Law	F.2-F.6 Solving Direct variation equations (I), Substituting Data into formulas (I), Solving systems of linear equations and/or Operations with Matrix (I), Logic and or if then(I), Measurement (II)	6.NS.2; 6.NS.3; 7.NS.1; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 6.EE.2	A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6; S.CP.1
10	THERMAL DYNAMIC PRINCIPLES				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>V. SYSTEMS</p> <p>G. Demonstrate an understanding of and be able to use thermal dynamic principles</p> <ol style="list-style-type: none"> 1. Identify the three ways heat is transferred 2. Explain the difference between Celsius and Fahrenheit scales 3. Describe heat conductors and insulators 4. Solve thermal problems using appropriate units 5. Identify direction of heat flow given differences in temperature 6. Understand the use of insulation to minimize heat flow 	G.4 Thermal problems	G.4 Operations with Real Numbers (I), Measurement (I), Substituting data into formulas (II),	6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2	A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.4
11	MECHANICAL ENGINEERING PRINCIPLES				
	<p>I. ACADEMIC FOUNDATIONS</p> <p>D. Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.</p> <ol style="list-style-type: none"> 1. Apply scalar and vector quantities as applied to physical systems, such as the relationship between position, velocity, and acceleration. 2. Apply fundamental laws and principles relevant to engineering and technology. <p>E. Demonstrate the ability to use Newton's Laws of Motion to analyze static and dynamic systems with and without the presence of external forces.</p> <ol style="list-style-type: none"> 1. Use the laws of conservation of energy, charge, and momentum, to solve a variety of problems involving mechanical, fluid, chemical, biological, electrical, and thermal systems. 2. Use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems. 3. Use the principles of ray optics to describe reflection and refraction of light. 	<p>D.1 Scalar and vectors</p> <p>D.2 All CTE skills in CIP</p> <p>E.1;E2 Newton's Law formulas</p> <p>E3 Interior and exterior lighting</p>	<p>D.1 Substituting Data into formulas(I), Graphing Linear equations (II), Triangle Trigonometry (II)</p> <p>E.1;E2 Substituting Data into formulas(I), Graphing Linear equations (II), Triangle Trigonometry (II)</p> <p>E3: Operations with Real Numbers, angles (III), Triangle Trig(III)</p>	6.EE.2; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 7.G.5	A.CED.4; G.SRT.6; G.SRT.8; G.SRT.9; G.SRT.10; G.SRT.11; F.TF.3; F.TF.5; F.TF.7; A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.CO.9; G.CO.12; G.CO.13
	<p>V. SYSTEMS</p> <p>H. Demonstrate an understanding of and be able to use mechanical engineering principles</p> <ol style="list-style-type: none"> 1. Identify the six simple machines and their applications 2. Solve problems using appropriate units in engineering systems 	H.1-H.4 Vectors, energy transfer, Motion	H.1-H.4 Substituting Data into formulas(I), Graphing Linear equations (II), Triangle	6.EE.2; 7.EE.3	A.CED.4; G.SRT.6; G.SRT.8; G.SRT.9; G.SRT.10; G.SRT.11; F.TF.3; F.TF.5; F.TF.7

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	3. Solve problems using vectoring, predict resultant forces 4. Apply knowledge of hydraulic and pneumatic systems		Trigonometry (II)		
12	MANUFACTURING, ASSEMBLY & FABRICATION PRINCIPLES				
	V. SYSTEMS I. Demonstrate an understanding of common manufacturing, assembly and fabrication principles used in engineering 1. Explain components of set up, machining, casting, molding, welding, and finishing 2. Identify and use common hand tools 3. Identify and properly use fasteners 4. Estimate and measure the size of objects using SI and US units 5. Explain the role of quality control in manufacturing 6. Measure with precision tools and instruments 7. Explain the role of quality control in assembly and fabrication 8. Identify situations of supplying and outsourcing 9. Identify the order and methodology of the assembly process	I.1 Shrinkage, Machine Calibration I.4;I.6 Measurement and scaling I.5;I.7 Quality Control and tolerance I.8 Cost analysis I.9 Object Location Referencing, Manufacturing Process Efficiency	I.1 Measurement (I), Min and Max (I), Central Tendency (II), I.4;I.6 Measurement, Measurement Conversions (II) I.5:I.7 Central tendency (III), Operations with real numbers (I) I.8 Central tendency (II), Operations with Real Numbers (II), Substituting data into formal (II) I.9 Operations with Real Numbers, Measurement (Time, Area, Linear, Volume) (II)	6.NS.2; 6.NS.3; 7.NS.1; 6.SP.1; 6.SP.2; 7.SP.2; 6.EE.2; 7.EE.3; 6.G.1; 6.G.2; 6.G.3; 7.G.1; 7.G.4; 7.G.6; 8.G.9; 6.RP.3; 7.RP.1	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.ID.1; S.ID.2; A.CED.4; G.GMD.1; G.GMD.3; G.MG.2; G.GPE.7