



**STMA Technology Education & Engineering (TEE) Standards**

**2012**

**Based on Standards for Technological literacy: Content for the Study of Technology (2007)**

## St. Michael-Albertville TEE Standards

Standard	Benchmarks	Placement
<b>2. Students will develop an understanding of the core concepts of technology.</b>	M. Technological systems include input, processes, output, and at times, feedback.	Gr. 8
	Q. Malfunctions of any part of a system may affect the function and quality of the system.	Gr. 8
	R. Requirements are the parameters placed on the development of a product or system	Gr. 8
	W. Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.	Computer Integrated Manufacturing Digital Electronics Aviation 1
	Y. The stability of a technological system is influenced by all of the components in the system, especially those in the feedback loop.	Computer Integrated Manufacturing Principles of Engineering Digital Electronics Aviation 1
	Z. <b>Selecting resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.</b>	<b>Furniture Making</b> <b>Cabinet Making</b> <b>Advanced Woods</b> Welding & Fabrication
AA. <b>Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.</b>	Principles of Engineering <b>Intro to Engineering Design</b> Power & Energy Furniture Making Cabinet Making Advanced Woods	

Standard	Benchmarks	Placement
	BB. Optimization is an ongoing process or methodology of designing or making a product and is dependent on criteria and constraints.	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating

Standard	Benchmarks	Placement
	CC. <b>New technologies create new processes.</b>	Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating <b>Computer Integrated Manufacturing</b>
	DD. <b>Quality control is a planned process to ensure that a product, service, or system meets established criteria.</b>	Computer Integrated Manufacturing Machine Tool Digital Electronics <b>Basic Home Repair</b>
	EE. Management is the process of planning, organizing, and controlling work.	Computer Integrated Manufacturing Intro to Engineering Design Principles of Engineering Power & Energy
	FF. Complex systems have many layers of controls and feedback loops to provide information.	Principles of Engineering Computer Integrated Manufacturing

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<b>3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.</b>	F. Knowledge gained from other fields of a study has a direct effect on the development of technological products and systems	Gr. 8
	G. Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.	Principles of Technology Advanced Woods Intro to Engineering Design Media Graphic Design
	<b>H. Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.</b>	<b>Intro to Engineering Design</b> Principles of Engineering
	J. Technological progress promotes the advancement of science and mathematics.	Aviation 1 Digital Electronics Intro to Engineering Design Power & Energy
<b>5. Students will develop an understanding of the effects of technology on the environment.</b>	<b>D. The management of waste products by technological systems is an important societal issue.</b>	Gr. 8
	G. Humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.	Computer Integrated Manufacturing Machine Tool Welding & Fabricating General Metals Power & Energy Principles of Engineering

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	H. When new technologies are developed to reduce the use of resources, considerations of trade-offs are important.	General Metals
	<b>I. With the aid of technology, various aspects of the environment can be monitored to provide information for decision making</b>	Aviation 1
	J. The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.	Architecture 1 Architecture 2 Power & Energy
<b>6. Students will develop an understanding of the role of society in the development and use of technology</b>	<b>E. The use of inventions and innovations has led to changes in society and the creation of new needs and wants.</b>	Gr. 8
	H. Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values	Power & Energy
	<b>I. The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.</b>	Intro to Engineering Design
	<b>J. A number of different factors, such as advertising, the strength of the economy, the goals of a company and the latest fads contribute to shaping the design of and demand for various technologies.</b>	Intro to Engineering Design <b>Media Graphic Design</b>

Standard	Benchmarks	Placement
<p><b>7. Students will develop an understanding of the influence of technology on history.</b></p>	<p>G. Most technological development has been evolutionary, the result of a series of refinements to a basic invention.</p>	<p>Computer Integrated Manufacturing  Machine Tool  Digital Electronics  Basic Home Repair  Power &amp; Energy  Furniture Making  Cabinet Making  Advanced Woods  Intro to Engineering  Principles of Engineering  Principles of Technology  Media Graphic Design  General Metals  Aviation 1  Aviation 2  Architecture 1  Architecture 2  CADD  Welding &amp; Fabricating</p>

Standard	Benchmarks	Placement
	H. The evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating
	<b>I. Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.</b>	<b>Aviation 1</b>
	J. Early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	General Metals
	K. The Iron Age was defined by the use of iron and steel as the primary materials for tools.	General Metals Machine Tool Welding & Fabricating Computer Integrated Manufacturing



Standard	Benchmarks	Placement
	N. The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	Aviation 1
	O. The Information Age places emphasis on the processing and exchange of information.	Principles of Engineering Digital Electronics Principles of Technology
<b>8. Students will develop an understanding of the attributes of design.</b>	<b>E. Design is a creative planning process that leads to useful products and systems.</b>	<b>Gr. 8</b>
	F. There is no perfect design.	Gr. 8
	G. Requirements for a design are made up of criteria and constraints.	Gr. 8

Standard	Benchmarks	Placement
	<p>H. <b>The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.</b></p>	<p>Machine Tool  Digital Electronics  Basic Home Repair  Power &amp; Energy  Furniture Making  Cabinet Making  Advanced Woods  Principles of Technology  Media Graphic Design  <b>Aviation 1</b>  <b>Aviation 2</b>  Architecture 1  Architecture 2  CADD  Welding &amp; Fabricating  <b>Intro to Engineering Design</b>  <b>Principles of Engineering</b>  <b>Computer Integrated Manufacturing</b>  <b>Metals</b></p>
	<p>I. Design problems are seldom presented in a clearly defined form.</p>	<p>Aviation 1  Welding &amp; Fabricating  Machine Tool  CADD 3  Advanced Woods  Furniture Making  Cabinet Making  Intro to Engineering Design  Principles of Engineering  Architecture 1  Architecture 2</p>

Standard	Benchmarks	Placement
	J. The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved.	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating
	K. Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.	Principles of Engineering Aviation 1 Aviation 2 Machine Tool Welding & Fabricating Media Graphic Design Architecture 1 Architecture 2
<b>9. Students will develop an understanding of engineering design.</b>	F. Design involves a set of steps, which can be performed in different sequences and repeated as needed.	Gr. 8
	H. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.	Gr. 8

Standard	Benchmarks	Placement
	<p>I. <b>Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.</b></p>	<p><b>Architecture 1</b>  <b>Architecture 2</b>  <b>Intro to Engineering Design</b>  Aviation 1  Media Graphic Design  <b>Welding &amp; Fabricating</b>  <b>Computer Integrated Manufacturing</b>  <b>Metal Technology</b></p>
	<p>J. <b>Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</b></p>	<p>Computer Integrated Manufacturing  Machine Tool  Digital Electronics  Basic Home Repair  Power &amp; Energy  Furniture Making  Cabinet Making  Advanced Woods  Intro to Engineering  Principles of Engineering  Media Graphic Design  General Metals  Aviation 1  Aviation 2  Architecture 1  Architecture 2  CADD  Welding &amp; Fabricating  <b>Principles of Technology</b></p>

Standard	Benchmarks	Placement
	<p><b>K. A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.</b></p>	<p><b>Aviation 1</b>  <b>Aviation 2</b>  <b>Intro to Engineering Design</b>  <b>Principles of Engineering</b>  <b>Power &amp; Energy</b>  <b>Computer Integrated Manufacturing</b>  <b>Digital Electronics</b>  <b>Media Graphic Design</b></p>
	<p><b>L. The process of engineering design takes into account a number of factors.</b></p>	<p>Computer Integrated Manufacturing  Machine Tool  Digital Electronics  Basic Home Repair  Power &amp; Energy  Intro to Engineering  Principles of Engineering  Principles of Technology  Media Graphic Design  General Metals  <b>Aviation 1</b>  <b>Aviation 2</b>  CADD  Welding &amp; Fabricating  <b>Furniture Making</b>  <b>Architecture 1</b>  <b>Architecture 2</b>  <b>Cabinet Making</b>  <b>Advanced Woods</b></p>

Standard	Benchmarks	Placement
<b>10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.</b>	I. Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	Intro to Engineering Design Aviation 1 Principles of Engineering
	J. Technological problems must be researched before they can be solved.	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating

Standard	Benchmarks	Placement
	K. Not all problems are technological, and not every problem can be solved using technology.	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding & Fabricating

Standard	Benchmarks	Placement
	L. <b>Many technological problems require a multidisciplinary approach</b>	Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power & Energy Furniture Making Cabinet Making Advanced Woods Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 CADD Welding & Fabricating <b>Architecture 1</b> <b>Architecture 2</b>
<b>11. Students will develop the abilities to apply the design process.</b>	I. Specify criteria and constraints for the design.	Gr. 8
	<b>J. Make two-dimensional and three-dimensional representations of the designed solution.</b>	<b>Gr. 8</b>
	L. Make a product or system and document the solution.	Gr. 8



Standard	Benchmarks	Placement
	M. <b>Identify the design problem to solve and decide whether or not to address it.</b>	Intro to Engineering Design <b>Cabinet Making</b> <b>Furniture Making</b> <b>Aviation 1</b> <b>Aviation 2</b> Welding & Fabricating Machine Tool Technology Principles of Engineering
	N. Identify criteria and constraints and determine how these will affect the design process.	Intro to Engineering Design
	O. <b>Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.</b>	<b>Intro to Engineering Design</b> <b>Aviation 1</b> Digital Electronics Computer Integrated Manufacturing
	P. <b>Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.</b>	Intro to Engineering Design Digital Electronics <b>Principles of Engineering</b>

Standard	Benchmarks	Placement
	<b>Q. Develop and produce a product or system using a design process.</b>	<b>Computer Integrated Manufacturing Machine Tool Digital Electronics Basic Home Repair Power &amp; Energy Intro to Engineering Principles of Engineering Principles of Technology Media Graphic Design General Metals Aviation 1 Aviation 2 Architecture 1 Architecture 2 CADD Welding &amp; Fabricating Furniture Making Cabinet Making Advanced Woods</b>
	<b>R. Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual and written means, in addition to three dimensional models.</b>	Intro to Engineering Design Aviation 2 <b>Principles of Engineering</b>
<b>12. Students will develop the abilities to use and maintain technological products and systems.</b>	I. Use tools, materials, and machines to safely diagnose, adjust, and repair systems.	Gr. 8
	J. Use computers and calculators in various applications.	Gr. 8

Standard	Benchmarks	Placement
	L. <b>Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.</b>	Intro to Engineering Design Computer Integrated Manufacturing <b>Media Graphic Design</b> Basic Home Repair Architecture 1 Architecture 2
	M. Diagnose a system that is malfunctioning and use tools, materials, machines and knowledge to repair it.	Power & Energy Machine Tool Technology
	<b>O. Operate systems so that they function in the way they were designed.</b>	<b>Computer Integrated Manufacturing</b> <b>Machine Tool</b> <b>Digital Electronics</b> <b>Basic Home Repair</b> <b>Power &amp; Energy</b> <b>Furniture Making</b> <b>Cabinet Making</b> <b>Advanced Woods</b> <b>Intro to Engineering</b> <b>Principles of Engineering</b> <b>Principles of Technology</b> <b>Media Graphic Design</b> <b>General Metals</b> <b>Aviation 1</b> <b>Aviation 2</b> <b>Architecture 1</b> <b>Architecture 2</b> <b>CADD</b> <b>Welding &amp; Fabricating</b>

Standard	Benchmarks	Placement
	<p><b>P. Use computers and calculators to access, retrieve, organize process, maintain, interpret, and evaluate data and information in order to communicate.</b></p>	<p>Machine Tool  Basic Home Repair  Power &amp; Energy  Furniture Making  Cabinet Making  Advanced Woods  Intro to Engineering  Principles of Engineering  Principles of Technology  Media Graphic Design  General Metals  Aviation 1  Aviation 2  Architecture 1  Architecture 2  Welding &amp; Fabricating  <b>Computer Integrated Manufacturing</b>  <b>Digital Electronics</b>  <b>CADD I, II, III</b></p>
<p><b>13. Students will develop the abilities to assess the impact of products and systems.</b></p>	<p>J. Collect information and evaluate its quality</p>	<p>Principles of Engineering</p>
<p><b>16. Students will develop an understanding of and be able to select and use energy and power technologies.</b></p>	<p>J. Energy cannot be created nor destroyed; however, it can be converted from one form to another.</p>	<p>Principles of Engineering  Power &amp; Energy</p>
	<p><b>K. Energy can be grouped into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.</b></p>	<p><b>Principles of Engineering</b>  Power &amp; Energy</p>

Standard	Benchmarks	Placement
	L. It is impossible to build an engine to perform work that does not exhaust thermal energy to the surroundings	Power & Energy
	M. Energy resources can be renewable or nonrenewable.	Principles of Engineering Power & Energy
	N. Power systems must have a source of energy, a process, and loads.	Power & Energy
<b>17. Students will develop an understanding of and be able to select and use information and communication technologies.</b>	L. <b>Information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information.</b>	<b>Digital Electronics</b> Media Graphic Design
	M. Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.	Media Graphic Design
	N. <b>Information and communication systems can be used to inform, persuade, entertain, control, manage, and educate.</b>	Intro to Engineering Design <b>Media Graphic Design</b>
	O. Communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.	Media Graphic Design Digital Electronics
	P. <b>There are many ways to communicate information, such as graphic and electronic means.</b>	Principles of Technology Intro to Engineering Design <b>Media Graphic Design</b> Architecture 2 CADD Architecture 1

Standard	Benchmarks	Placement
	<p>Q. <b>Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.</b></p>	<p>Principles of Technology Intro to Engineering Design <b>Media Graphic Design</b> <b>CADD</b> Architecture 1 Architecture 2 Digital Electronics</p>
<p><b>18. Students will develop an understanding of and be able to select and use transportation technologies.</b></p>	<p>K. Intermodalism is 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.</p>	<p>Power &amp; Energy</p>
	<p>L. Transportation services and methods have led to a population that is regularly on the move.</p>	<p>Power &amp; Energy Aviation 1</p>
	<p>M. The design of intelligent and non intelligent transportation systems depends on many processes and innovative techniques.</p>	<p>Power &amp; Energy Aviation 1</p>
<p><b>19. Students will develop an understanding of and be able to select and use manufacturing technologies.</b></p>	<p><b>F. Manufacturing systems are mechanical processes that change the form of materials through the process of separating, forming, combining, and conditioning them.</b></p>	<p><b>Gr. 8</b></p>
	<p><b>H. The manufacturing process includes the designing, development, and making and servicing of products and systems.</b></p>	<p><b>Gr. 8</b></p>
	<p>M. Materials have different qualities and may be classified as natural, synthetic, or mixed.</p>	<p>Principles of Engineering Computer Integrated Manufacturing Machine Tool</p>

Standard	Benchmarks	Placement
<b>20. Students will develop an understanding of and be able to select and use construction technologies.</b>	F. The selections of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function,	Gr. 8
	K. Structures are constructed using a variety of processes and procedures.	Architecture 1 Architecture 2 Principles of Technology
	L. The design of structures includes a number of requirements.	Architecture 1 Architecture 2 Intro to Engineering Design Principles of Engineering
	N. Structures can include prefabricated materials.	Architecture 1 Principles of Engineering