

Knowledge	Skills	Performance Element		15.0000 Engineering, General (2011)
				Technical Standards - Michigan Customized List
	I			Engineering Design
	A			Overview of Engineering
		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
				Science, Technology, Engineering & Mathematics - Engineering and Technology Pathway
	I			ACADEMIC FOUNDATIONS
	F			Explain the relationships between scientific theory, scientific principles and laws, in technology, and engineering.
		1		Develop concepts and processes for the application of technology standards.
	XI			DESIGN
	A			Know the elements of the processes and concepts for understanding the design process.
		1		Explain why and how the contributions of great innovators are important to society.
				Science, Technology, Engineering and Mathematics Cluster Foundation Standards

15.0000 Engineering, General (2011)

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II			COMMUNICATIONS: <i>Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.</i>
	A		Prepare STEM material in oral, written, or visual formats that provide information to an intended audience to fulfill specific communication need of an audience.
		1	Use effective methods to communicate concepts of STEM to a broadly represented audience.
		a	Report subjective and objective information.
		b	Report information with the intent of being persuasive.
		c	Report information with the intent of being informational.
		d	Report information with the intent of being instructional.
		e	Analyze the audience and presentation environment.
		f	Explain technical concepts to non-technical audiences
		g	Use professional terminology.
		h	Identify, select, use appropriate multimedia resources.
		i	Discern between various communication techniques and their ability to convey various types of information.
		j	Explain various methods of obtaining information.
		2	Effectively communicate STEM information to a select audience.
		a	Explain the various methods of presenting information.
		b	Use oral presentation skills to present scientific, technological, engineering, or mathematical reports.
		c	Use written presentation skills to present scientific, technological, engineering, or mathematical reports.
		d	Use visual presentation skills to present scientific, technological, engineering, or mathematical reports.
		e	Use multimedia presentation skills to present scientific, technological, engineering, or mathematical reports.
		3	Apply the ability to read, interpret, and analyze STEM materials discerning the information and concepts.

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<h1>15.0000 Engineering, General (2011)</h1>				
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			a	Use appropriate note-taking methods.
			b	Write a report on technical literature; use graphical tools as appropriate.
			c	Present a report on technical literature; use graphical tools as appropriate.
			d	Discriminate between fact and opinion.
VI				<i>SAFETY, HEALTH AND ENVIRONMENTAL: Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.</i>
	A			Apply safety practices in the environment where science, technology, engineering, and/or mathematical principles are appropriate to ensure a safe workplace.
		1		Apply appropriate safety and health practices when developing plans, projects, processes, or solving complex problems.
			a	Exercise good safety practices.
			b	Follow various regulatory codes, such as EPA, FEMA, UL, OSHA, CSA.
			c	Reference and use material safety data sheets (MSDS).
			d	Encourage others to employ safe practices.
		2		Use appropriate safety techniques, equipment, and processes in planning and /or project applications.
			a	Demonstrate safe use of tools and equipment.
			b	Develop and implement emergency plans.
			c	Develop and implement workplace lab safety plan.
			d	Follow workplace regulations and record-keeping requirements.
			e	Demonstrate the use of safety equipment in the workplace.

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			f	Demonstrate the use of eyewash and safety showers
			g	Accurately interpret safety signs, symbols, and labels.
			h	Demonstrate basic first aid techniques.
	B			Develop an awareness of safety, health, and environmental hazards inherent in the STEM arenas when solving problems, developing plans, processes, or completing projects to be proactive in promoting safety.
		1		Identify existing or potential hazards to existing or assigned plans, projects, or processes where safety, health, or environment might be in play.
			a	Describe potential safety, health and environmental hazards in various situations.
			b	Identify physical, chemical, toxicological, biological, and radioactive hazards.
			c	Analyze environmental impacts.
			d	Conduct a safety audit.
IX				EMPLOYABILITY AND CAREER DEVELOPMENT: <i>Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.</i>
	A			Develop the skills and abilities to research career pathways in STEM.
		1		Engage experiences in STEM where an individual can identify personal interests and expectations for career and personal development.
			a	List resources for researching funding sources for scientific projects and technology.
			b	List careers that you have investigated, internships that you could apply for, and job shadowing opportunities that you have identified.
			c	Construct and maintain a portfolio of experiences and accomplishments.
				Science, Technology, Engineering and Mathematics Cluster Essential Standards

15.0000 Engineering, General (2011)

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I			ACADEMIC FOUNDATIONS: <i>Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.</i>
	A		Complete required training, education, and certification to prepare for employment in a particular career field.
		1	Identify training, education and certification requirements for occupational choice.
		2	Participate in career-related training and/or degree programs.
		3	Pass certification tests to qualify for licensure and/or certification in chosen occupational area.
V			SYSTEMS: <i>Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.</i>
	A		Describe the nature and types of business organizations to build an understanding of the scope of organizations.
		1	List the types and functions of businesses.
		2	Describe the types and functions of businesses.
		3	Explain the functions and interactions of common departments within a business.
VI			SAFETY, HEALTH AND ENVIRONMENTAL: <i>Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.</i>
	A		Implement personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.
		1	Assess workplace conditions with regard to safety and health.
		2	Align safety issues with appropriate safety standards to ensure a safe workplace/jobsite.
		3	Identify safety hazards common to workplaces.
		4	Identify safety precautions to maintain a safe worksite.

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<h1>15.0000 Engineering, General (2011)</h1>			
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		5	Select appropriate personal protective equipment as needed for a safe workplace/jobsite.
		6	Inspect personal protective equipment commonly used for selected career pathway.
		7	Use personal protective equipment according to manufacturer rules and regulations.
		8	Employ a safety hierarchy and communication system within the workplace/jobsite.
		9	Implement safety precautions to maintain a safe worksite.
	B		Complete work tasks in accordance with employee rights and responsibilities and employers obligations to maintain workplace safety and health.
		1	Identify rules and laws designed to promote safety and health in the workplace.
		2	State the rationale of rules and laws designed to promote safety and health.
	C		Employ emergency procedures as necessary to provide aid in workplace accidents.
		1	Use knowledge of First Aid procedures as necessary.
		2	Use knowledge of CPR procedures as necessary.
		3	Use safety equipment as necessary.
	D		Employ knowledge of response techniques to create a disaster and/or emergency response plan.
		1	Complete an assessment of an emergency and/or disaster situation.
		2	Create an emergency and/or disaster plan.
IX			EMPLOYABILITY AND CAREER DEVELOPMENT: <i>Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.</i>
	B		Develop a personal career plan to meet career goals and objectives.
		1	Develop career goals and objectives as part of a plan for future career direction.
		2	Develop strategies to reach career objectives.

15.0000 Engineering, General (2011)

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	C		Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.
		1	Use multiple resources to locate job opportunities.
		2	Prepare a résumé.
		3	Prepare a letter of application.
		4	Complete an employment application.
		5	Interview for employment.
		6	List the standards and qualifications that must be met in order to enter a given industry.
		7	Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer.
	D		Maintain a career portfolio to document knowledge, skills and experience in a career field.
		1	Select educational and work history highlights to include in a career portfolio.
		2	Produce a record of work experiences, licenses, certifications and products.
		3	Organize electronic or physical portfolio for use in demonstrating knowledge, skills and experiences.
	E		Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals.
		1	Compare employment opportunities to individual needs and career plan objectives.
		2	Evaluate employment opportunities based upon individual needs and career plan objectives.
		3	Demonstrate appropriate methods for accepting or rejecting employment offers.
	G		Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster.
		1	Locate and identify career opportunities that appeal to personal career goals.
		2	Match personal interest and aptitudes to selected careers.

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<h1>15.0000 Engineering, General (2011)</h1>			
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	H		Recognize and act upon requirements for career advancement to plan for continuing education and training.
		1	Identify opportunities for career advancement.
		2	Pursue education and training opportunities to acquire skills necessary for career advancement.
		3	Examine the organization and structure of various segments of the industry to prepare for career advancement.
		4	Research local and regional labor (workforce) market and job growth information to project potential for advancement.
		5	Manage employment relations to make career advancements.
	I		Continue professional development to keep current on relevant trends and information within the industry.
		1	Use self assessment, organizational priorities, journals, Internet sites, professional associations, peers and other resources to develop goals that address training, education and self-improvement issues.
		2	Read trade magazines and journals, manufacturers' catalogues, industry publications and Internet sites to keep current on industry trends.
		3	Participate in relevant conferences, workshops, mentoring activities and in-service training to stay current with recent changes in the field.
	J		Examine licensing, certification and credentialing requirements at the national, state and local levels to maintain compliance with industry requirements.
		1	Examine continuing education requirements related to licensing, certification, and credentialing requirements at the local, state and national levels for chosen occupation.
		2	Examine the procedures and paperwork involved in maintaining and updating licensure, certification and credentials for chosen occupation.

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15.0000 Engineering, General (2011)			
Technical Standards - Michigan Customized List			
		3	Align ongoing licensing, certification and credentialing requirements to career plans and goals.
	K		Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning.
		1	Describe the opportunities for entrepreneurship in a given industry.
X			TECHNICAL SKILLS: Use of technical knowledge and skills required to pursue careers in all career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.
	A		Employ information management techniques and strategies in the workplace to assist in decision-making.
		1	Use information literacy skills when accessing, evaluating and disseminating information.
		2	Describe the nature and scope of information management.
		3	Maintain records to facilitate ongoing business operations.
MICHIGAN CAREER AND EMPLOYABILITY STANDARDS			
I			APPLIED ACADEMIC SKILLS
	A		Reading, English & Language Arts
		1	Read a technical manual and write a clear & logical report explaining the information using standard business English.
		2	Give a verbal report on reading from a technical manual.
		3	Read a case study and identify the details about the situation, define technical terms, jargon, or words with multiple meanings based on context, and summarize the conclusion.
		4	Take a verbal and written position on a topic and use correct grammar to defend it.
II			CAREER PLANNING
	A		Career Planning
		1	Organize career information and labor market trends from a variety of sources.

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		2	Explain the advantages and disadvantages of working for self, others, being an employee of a large or small organization.
		3	Analyze information & preferences from work-based opportunity.
		4	Interpret information from a variety of career assessments to identify career interests and abilities.
		5	Apply a decision-making model and use career assessment information to choose a career pathway.
		6	Annually review EDP and include plan for continuing education.
V			PERSONAL MANAGEMENT
	A		Responsibility
		1	Demonstrate regular attendance, promptness, and staying with a task until satisfactory completion.
		2	Complete assignments with minimum supervision and meet deadlines.
		3	Use mistakes as learning opportunities, demonstrate persistence and adaptability to change.
		4	Initiate projects and extra activities for personal satisfaction.
	B		Self-Management
		2	Demonstrate health and safety practices and drug-free behavior in school & workplace setting.
		3	Obtain a driver license and demonstrate driving skills and safety and/or use public transportation.
IX			UNDERSTANDING SYSTEMS AND USING TECHNOLOGY
	A		Understanding Systems and Using Technology
		3	Compare management systems and consider how employees function and adapt to change within them.
		4	Describe the technical systems related to a career interest area.

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		5	Diagnose and make necessary corrections or improvements to a technical system in a business, industry, or simulated work place setting.
		6	Describe how changes in technology have impacted business and industry, identify current trends, and recommend how a technical system might be improved.
		7	Demonstrate the use of equipment and machines to solve practical or work-based problems.
		8	Demonstrate effective use of a variety of on-line technological resources.
		9	Determine what kind of application is needed for a given task and use effectively.
X			EMPLOYABILITY SKILLS
	A		Employability Skills
		2	Participate in work-based opportunities such as job-shadowing, mentorships, work experiences, etc.
		3	Show ability to market oneself by preparing for and completing an interview process.
		4	Accurately complete records/documents to support job applications (inquiry letters, resume, references, evaluations, follow-up letters).
		5	Use a portfolio, resume, record of attendance, certificates, and/or transcript as self-marketing tools to demonstrate interest and competence.
		6	Apply career and labor market information to seek and obtain employment and/or pursue educational goals.
		7	Research availability of educational programs, financial requirements, and resource and complete an application process as appropriate for career goals.
		8	Understand the need for lifelong learning in a rapidly changing job market.
XI			MICHIGAN TECHNOLOGY STANDARDS
			Michigan Educational Technology Standards for Students (METS-S) 2009
	F		Technology Operations and Concepts - By the end of Grade 12 each student will:

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		3		Explore career opportunities, especially those related to science, technology, engineering, and mathematics and identify their related technology skill requirements
		4		Describe uses of various existing or emerging technology resources (e.g., podcasting, webcasting, videoconferencing, online file sharing, global positioning software)
		5		Identify an example of an assistive technology and describe its potential purpose and use
		6		Participate in a virtual environment as a strategy to build 21st century learning skills