	Principles of Engineering Unit 1 Definitions and Types of E													Principles of Engineering Unit 2 Communication and Documenta									Principles of Engineerin			Principles of Engineering: Unit 4 Engineering Systems																				Principles of Engineering: Unit 5 Statics and Strength of Ma							Principles of Engineering: Unit 6 Materials and Materials Te																						Principles of Engineering: Unit 7 Engineering For Reliabilit							Principles of Engineering: Unit 8 Introduction to					
	Students will have an understanding of engineering and be able to identify engineering achievements through t	Students will be able to identify five historical engineering role models, including minorities and women.	Students will be able to identify problems for engineers to solve in the future.	Students will be able to define attributes associated with being a successful engineer.	Understand that an engineering team must work together to solve problems, with each team member having in	Understand the role of out-sourcing in the engineering process, and how effective communication is essential.	Understand how gender-bias, racial-bias and other forms of stereotyping and discrimination can adversely affe	Understand how ethics influences the engineering process.	Understand how social, environmental and financial constraints influence the engineering process.	Students will have an understanding of the difference between engineering disciplines and job functions.	Students will understand the professional and legal responsibilities associated with being an engineer.	Students will research and discover the educational requirements to become an engineer.	Students will become familiar with an area of engineering by preparing for and conducting an interview with an	Students will compose sketches use proper sketching techniques in the solution of design problems.	Students will select the appropriate sketching styles for presentation of a design problem to a group.	Students will use proper proportioning while producing annotated sketches.	Students will plan and compose a written technical report about the research they conduct about a career field	Students will be able to formulate an organized outline for a technical paper.	Students will be able to design and create tables, charts, and graphs to illustrate data they have collected.	Students will evaluate and select an appropriate type of table, chart, or graph to accurately communicate collec	Students will design and deliver a presentation utilizing appropriate support materials about research they have	Students will create and assemble support materials to appropriate demonstrate concepts used in their present	Students will compose and diagram the product development lifecycle of an invention of their choice and report	Students will trace the history of an invention and evaluate its effects on society and the environment.	Students will examine the evolution of an invention to observe and report on how the design process is applied	Students will identify and explain the function of the essential components of a mechanical system on a display	Students will create a display of a mechanical system from a household item they disassemble.	Students will mathematically explain the mechanical advantage gained and explain the function of the six differ	Students will apply simple machines to create mechanical systems in the solution of a design problem.	Students will conduct an energy analysis on a section of their home and calculate the heat loss through walls a	Students will develop effective presentation skills.	Students will research and evaluate systems undergoing thermodynamic cycles for efficiency and present findi	Students will give an oral presentation incorporating the first and second laws of thermodynamics, describing th	Students will evaluate and select specific fluid power sources for different functions.	Students will create a flow diagram schematic sketch and compare it to an actual fluid power circuit during a pr	Students will mathematically calculate and explain the work being done by a specific fluid power device as part	Students will safely demonstrate proper setup and adjustment of a fluid power system.	Students will create schematic drawings to facilitate experimental measurements of electrical circuits.	Students will apply ohm's and watt's laws in designing safe electrical circuits.	Students will appraise community needs and evaluate the impact supplying electrical generation has on their co	Students will be able to estimate current consumption by a circuit and be able to compare estimates to accurate	Students will design, diagram and implement a program to control a device they construct to perform a sorting	Students will select and apply concepts of mechanical, electrical, and control systems in solving design problem	Students will formulate a plan for evaluating the functioning of their sorting device and to make appropriate cha	Students will demonstrate and defend their solution to the design problem in an oral presentation to the class.	Students will mathematically analyze a simple truss to determine types and magnitude of forces supported in th	Students will design, construct and test a model bridge to support the greatest amount of weight per gram of br	Students will prepare and present a mathematical analysis of a truss design as part of a 5 minute oral presenta	Students explain the use of factors of safety in the design process.	Students will be able to explain the difference between the area of a cross section of an object and the second	Students will be able to use a computer aided engineering package to analyze a shape.	Students will explain the effects that stress has on a material and explain how the material will react.	Students will be able to identify and differentiate the five basic categories of solid engineering materials.	Students will be able to compare and contrast the physical properties of organic, metals, polymers, ceramics, a	Students will be able to trace the production of raw material to finished product.	Students will be able to identify practical applications of each material category to engineered products and pro	Students will be able to collect, analyze, and test samples of the four basic materials.	Students will be able to document and present laboratory data related to studies of material classifications.	Students will be able to identify and document the properties of materials.	Students will be able to design an experiment to identify an unknown material.	The student will be able to formulate conclusions through analysis of recorded laboratory test data for presenta	Students will be able to analyze word problems about forces acting on materials.	Students will be able to define and state examples of the major categories of Production Processes.	Students will be able to analyze a component of a product and describe the processes used in its creation.	Students will be able to interpret a drawing and produce a part.	Students will give an oral presentation on the production processes used to create products from a category of	Students will be able to state the difference between mass and weight.	Students will be able to utilize a variety of precision measurement tools to measure appropriate dimensions, ma	Students will be able to understand and explain why companies have a need for quality control and will describ	Students will be able to explain the difference between process and product control.	Students will be able to distinguish between the characteristics of quality in a final product and the control of qu	Students will understand how control charts are used in industry and will be able to predict whether a process i	Students will be able to describe and safely conduct destructive and non-destructive material testing and will be	Students will be able to analyze a product that breaks and be able to explain how the material failed.	Students will be able to diagram a system and identify the critical components.	Students will be able to mathematically estimate chance of failure of a system given information on certain com	Students will list the causes of failure and be able to propose solutions.	Students will prepare and defend a position on an ethical engineering dilemma.	Students will research the engineering, legal, social, and ethical issues related to a final design developed in a	Students will analyze an engineering failure for the purpose of presenting an aural report which identifies; caus	Students will prepare a written report explaining their analysis of an engineering failure.	Students will be able to explain the difference between distance traveled and displacement.	Students will design and build a device for the purpose of conducting experiments of acceleration, displacemen	Students will be able to explain how velocity and acceleration are calculated.	Students will be able to calculate range and initial acceleration from data they record from experiments.	Students will design and produce a three fold pamphlet to include an explanation of their ballistic device, drawi	Students will be able to analyze test data and utilize the results to make decisions.
Michigan 9-12 Technology Standards																																																																																								
BASIC OPERATIONS AND CONCEPTS					x																																																																																	
BOC1. discuss emerging technology resources (e.g., podcasting, webcasting, compressed video delivery, online fi le sharing, graphing calculators, global positioning software)																																																																																							
BOC2. identify the capabilities and limitations of emerging communication resources					x																																																																																
BOC3. understand the importance of both the predictable and unpredictable impacts of technology																																																																																								
BOC4. identify changes in hardware and software systems over time and discuss how these changes might affect the individual personally in his/her role as a lifelong learner																																																																																								
BOC5. understand the purpose, scope, and use of assistive technology																																																																																								
BOC6. understand that access to online learning increases educational and workplace opportunities																																																																																								
BOC7. be provided with the opportunity to learn in a virtual environment as a strategy to build 21st century learning skills																																																																																								
BOC8. understand the relationship between electronic resources, infrastructure, and connectivity																																																																																								
BOC9. routinely apply touch-typing techniques with advanced accuracy, speed, and effi ciency																																																																																								
BOC10. assess and solve hardware and software problems by using online help or other user documentation and support																																																																																								
BOCT11. identify common graphic, audio, and video fi le formats (e.g., jpeg, gif, bmp, mpeg, wav)																																																																																								
BOC12. demonstrate how to import/export text, graphics, or audio fi les																																																																																								
BOX13. proofread and edit a document using an application's spelling and grammar checking functions																																																																																								
SOCIAL, ETHICAL, AND HUMAN ISSUES		x			x			x			x	x					x																																																																				
SEH1. identify legal and ethical issues related to use of information and communication technology								x			x																																																																											
SEH2. analyze current trends in information and communication technology and assess the potential of emerging technologies for ethical and unethical uses					x			x																																																																															
SEH3. discuss possible long-range effects of unethical uses of technology (e.g., virus spreading, fi le pirating, hacking) on cultures and society								x																																																																															
SEH4. discuss the possible consequences and costs of unethical uses of information and computer technology								x																																																																															
SEH5. identify ways that individuals can protect their technology systems from unethical or unscrupulous users								x																																																																															
SEH6. demonstrate the ethical use of technology as a digital citizen and lifelong learner								x																																																																															
SEHI7. explain the differences between freeware, shareware, and commercial software																																																																																								
SEHI8. adhere to fair use and copyright guidelines																																																																																								
10. adhere to the district acceptable use policy as well as state and federal laws 11. explore career opportunities and identify their related technology skill requirements 12. design and implement a personal learning plan that includes technology to support his/her lifelong learning goals7. explain the differences between freeware, shareware, and commercial software 8. adhere to fair use and copyright guidelines 9. create appropriate citations for resources when presenting research fi ndings 10. adhere to the district acceptable use policy as well as state and federal laws 11. explore career opportunities and identify their related technology skill requirements 12. design and implement a personal learning plan that																																																																																							
SEH9. create appropriate citations for resources when presenting research findings																																																																																								
SEHI10. adhere to the district acceptable use policy as well as state and federal laws																																																																																								
SEHI11. explore career opportunities and identify their related technology skill requirements		x										x					x																																																																							
SEHI12. design and implement a personal learning plan that includes technology to support his/her lifelong learning goals																																																																																								
TECHNOLOGY PRODUCTIVITY TOOLS				x																																															x																																								
TPT1. complete at least one online credit, or non-credit, course or online learning experience																																																																																								
TPT2. use technology tools for managing and communicating personal information (e.g., fi nances, contact information, schedules, purchases, correspondence)																																																																																								
TPT3. have access to and utilize assistive technology tools																																																																																									
TPT4. apply advanced software features such as an application's built-in thesaurus, templates, and styles to improve the appearance of word processing documents, spreadsheets, and presentations																																																																																								
TPT5. identify technology tools (e.g., authoring tools or other hardware and software resources) that could be used to create a group project																																																				x																																								
TPT6. use an online tutorial and discuss the benefi ts and disadvantages of this method of learning																																																																																								
TPT7. Develop a document or fi le for inclusion into a web site or web page																																																																																								
publication, or other creative work)																																																																																								
TPT8. Use a variety of applications to plan, create, and edit a multimedia product (e.g., model, webcast, presentation,																																																																																							
TPT9. have the opportunity to participate in real-life experiences associated with technology-related careers				x																																																																																					
TECHNOLOGY COMMUNICATIONS TOOLS					x																	x	x									x																																						x																	x	
TCT1. identify and describe various telecommunications or online technologies (e.g., desktop conferencing, listservs, blogs, vir tual reality)																																																																																							
TCT2. use available technologies (e.g., desktop conferencing, e-mail, groupware, instantmessaging) to communicate with others on a class assignment or project																																																																																							
TCT3. use a variety of media and formats to design, develop, publish, and present products (e.g., presentations, newsletters, web sites) to communicate original ideas to multiple audiences																						x	x									x																																																								x	
TCT4. collaborate in content-related projects that integrate a variety of media (e.g., print, audio, video, graphic, simulations, and models) with presentation, word processing, publishing, database, graphics design, or spreadsheet applications																																																																					x																					
TCT5. plan and implement a collaborative project using telecommunications tools (e.g., groupware, interactive web sites, videoconferencing)					x																																																																																		
TECHNOLOGY RESEARCH TOOLS						x	x						x																																															x											x																	
TRT1. compare, evaluate, and select appropriate internet search engines to locate information																																																																																									
TRT2. formulate and use evaluation criteria (authority, accuracy, relevancy, timeliness) for information located on the internet to present research fi ndings																																																																																								
TRT3. determine if online sources are authoritative, valid, reliable, relevant, and comprehensive																																																																																									
TRT4. distinguish between fact, opinion, point of view, and inference																																																																												x																	
TRT5. evaluate resources for stereotyping, prejudice, and misrepresentation							x																																																																																
TRT6. develop a plan to gather information using various research strategies (e.g., interviews, questionnaires, experiments, online surveys)													x																																															x																											
TECHNOLOGY PROBLEM-SOLVING AND DECISION-MAKING TOOLS					x																																							x								x							x							x																				x						x
TPSDMT1. use a variety of technology resources (e.g., educational software, simulations, models) for problem solving and independent learning																																																				x																																								
TPSDMT2. describe the possible integration of two or more information and communication technology tools or resources to collaborate with peers, community members, and field experts					x	x																																																																																		
TPSDMT3. formulate a research question or hypothesis, then use appropriate information and communication technology resources to collect relevant information, analyze the findings, and report the results to multiple audiences																																												x															x							x																				x						x