	Unit 1: Definitions and Types of Engineering													Unit 2: Communication and Documentation									Unit 3: The Design Process			Unit 4: Engineering Systems																				Unit 5: Statics and Strength of Materials							Unit 6: Materials and Materials Testing																								Unit 7: Engineering For Reliabilitation								Unit 8: Introduction to Dynamics/Kinesthetics					
	Students will have an understanding of engineering and be able to identify engineering achievements through histo	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 individ	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 affect co	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 engi	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 in er	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 collected	Students will design and deliver a presentation utilizing appropriate support materials about research they have con	Students will create and assemble support materials to appropriate demonstrate concepts used in their presentatior	Students will compose and diagram the product development lifecycle of an invention of their choice and report find	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 to c	Students will identify and explain the function of the essential components of a mechanical system on a display they	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 different t	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 and w	Students will develop effective presentation skills.	Students will research and evaluate systems undergoing thermodynamic cycles for efficiency and present findings t	Students will give an oral presentation incorporating the first and second laws of thermodynamics, describing the cc	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 presen	Students will mathematically calculate and explain the work being done by a specific fluid power device as part of a	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 comm	Students will be able to estimate current consumption by a circuit and be able to compare estimates to accurate me	Students will design, diagram and implement a program to control a device they construct to perform a sorting oper	Students will select and apply concepts of mechanical, electrical, and control systems in solving design problems.	Students will formulate a plan for evaluating the functioning of their sorting device and to make appropriate changes	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 the tru	Students will design, construct and test a model bridge to support the greatest amount of weight per gram of bridge	Students will prepare and present a mathematical analysis of a truss design as part of a 5 minute oral presentation	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 mon	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, and c	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 process	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 presentations	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 mat	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, mass,	Students will be able to understand and explain why companies have a need for quality control and will describe wh	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 quality	Students will understand how control charts are used in industry and will be able to predict whether a process is "ou	Students will be able to describe and safely conduct destructive and non-destructive material testing and will be abl	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 compon	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 case	Students will analyze an engineering failure for the purpose of presenting an aural report which identifies; causes, d	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, displacement, ar	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, drawings a	Students will be able to analyze test data and utilize the results to make decisions.
Michigan Grades 9-12 Grade Math Standards																																																																																									
MATH GRADES 9-12: http://www.michigan.gov/mde/0,1607,7-140-38924_41644_42668---,00.html									x					x	x	x			x	x			x			x	x	x							x	x		x					x			x		x		x						x				x			x							x		x			x	x							x	x	x	x		
STRAND 1: QUANTITATIVE LITERACY AND LOGIC																				x	x								x	x								x		x					x			x		x												x			x							x		x														
STANDARD L1: REASONING ABOUT NUMBERS, SYSTEMS, AND QUANTITATIVE SITUATIONS																				x	x							x	x								x																																			x																		
QSRR1.2 Representations and Relationships																				x	x							x	x								x																																			x																		
QSRR1.2.1 Use mathematical symbols (e.g., interval notation, set notation, summation notation) to represent quantitative relationships and situations.																												x																																																														
QSRR1.2.3 Use vectors to represent quantities that have magnitude and direction; interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors.																																				x																																																							
QSRR1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.																				x	x							x																																												x																		
STANDARD L3: MEASUREMENT AND PRECISION																																						x					x																						x																								
QSMP3.1.2 Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements (e.g., explain why a small change in the scale can represent a large change in intensity); solve applied problems.																																											x																						x																								
QSMP3.2 Understanding Error																																						x																																																			
QSMP3.2.1 Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.																																						x																																																			
STANDARD L4: MATHEMATICAL REASONING, LOGIC, AND PROOF																												x																		x		x																											x																	
QSMRLP4.2 Language and Laws of Logic																												x																		x		x																																												
QSMRLP4.2.2 Use the connectives NOT, AND, OR, and IF, THEN, in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.																												x																				x																																												
QSMRLP4.2.3 Use the quantifiers THERE EXISTS and ALL in mathematical and everyday settings and know how to logically negate statements involving them.																												x																				x																																												
QSMRLP4.2.4 Write the converse, inverse, and contrapositive of an If, then statement; use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and converse are not.																																														x																																											
QSMRLP4.3 Proof																																																																										x																	
QSMRLP4.3.1 Know the basic structure for the proof of an If, then statement (assuming the hypothesis and ending with the conclusion) and know that proving the contrapositive is equivalent.																																																																										x																	
QSMRLP4.3.3 Explain the difference between a necessary and a sufficient condition within the statement of a theorem; determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied.																																																																										x																	
STRAND 2: ALGEBRA AND FUNCTIONS														x	x	x							x			x																																											x															x								x	x	x			
STANDARD A1: EXPRESSIONS, EQUATIONS, AND INEQUALITIES																																																																																					x	x	x			
AFEEI1.2 Solutions of Equations and Inequalities (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)																																																																																					x	x	x			
AFEEI1.2.9 Know common formulas (e.g., slope, distance between two points, quadratic formula, compound interest, distance = velocity · time), and apply appropriately in contextual situations.																																																																																					x	x	x			
STANDARD A2: FUNCTIONS														x	x	x				x			x			x																																					x															x													
AFF2.1 Definitions, Representations, and Attributes of Functions																																																													x																												
AFF2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations.																				x			x																																									x															x													
AFF2.3 Families of Functions (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)																									x																																																															
AFF2.3.1 Identify a function as a member of a family of functions based on its symbolic, or graphical representation; recognize that different families of functions have different asymptotic behavior at infinity, and describe these behaviors.																									x																																																															
AFF2.5 Exponential and Logarithmic Functions														x	x	x																																																																										
AFF2.5.1 Write the symbolic form and sketch the graph of an exponential function given appropriate information. (e.g., given an initial value of 4 and a rate of growth of 1.5, write f(x) = 4 (1.5)x).														x	x	x																																																																										
AFF2.6 Quadratic Functions														x	x	x																																																																										
AFF2.6.1 Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.).														x	x	x																																																																										
AFF2.7 Power Functions (including roots, cubics, quartics, etc.)														x	x	x																																																																										
AFF2.7.1 Write the symbolic form and sketch the graph of power functions.														x	x	x																																																																										
AFF2.8 Polynomial Functions														x	x	x																																																																										
AFF2.8.1 Write the symbolic form and sketch the graph of simple polynomial functions.														x	x	x																																																																										
AFF2.9 Rational Functions														x	x	x																																																																										
AFF2.9.1 Write the symbolic form and sketch the graph of simple rational functions.														x	x	x																																																																										
STRAND 3: GEOMETRY AND TRIGONOMETRY														x	x																																																																											
STANDARD G2: RELATIONSHIPS BETWEEN FIGURES														x	x																																																																											
GTRF2.2.1 Identify or sketch a possible 3-dimensional figure, given 2-dimensional views (e.g., nets, multiple views); create a 2-dimensional representation of a 3-dimensional figure.														x	x																																																																											
GTRF2.2.2 Identify or sketch cross-sections of 3-dimensional figures; identify or sketch solids formed by revolving 2-dimensional figures around lines.														x	x																																																																											
STRAND 4: STATISTICS AND PROBABILITY									x														x											x																	x							x														x						x											x		
STANDARD S1: UNIVARIATE DATA – EXAMINING DISTRIBUTIONS																																																		x							x														x																	x		
SPUD1.1 Producing and Interpreting Plots																																																		x							x														x																	x		
SPUD1.1.1 Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics.																																																										x														x																			
SPUD1.1.2 Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures.																																																																																								x		
SPUD1.2 Measures of Center and Variation																																																																																								x		
SPUD1.2.3 Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, and standard deviation.																																																																																								x		
STANDARD S3: SAMPLES, SURVEYS, AND EXPERIMENTS																																																																														x											
SPSSE3.1.2 Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates.																																																																														x											
STANDARD S4: PROBABILITY MODELS AND PROBABILITY CALCULATION									x														x											x																																																						
SPPMPC4.2 Application and Representation																							x											x																																																						
SPPMPC4.2.1 Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other counting techniques.																							x											x																																																						
SPPMPC4.2.2 Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology, to make informed decisions									x																																																																																