Introduction to Engineering Design	Unit 1 Overview									Unit 11 Production												
	Students will develop an appreciation of how the history of art has influenced innovations in the field of enginee	Students will research how artistic period and style have influenced product and architectural design.	Students will explore the design concept of form and function and explain its use in product design.	Students will explore the evolution of technology and be able to identify engineering achievements through histo	Students will research the chronological development and accelerating rate of change that innovations in tools a	Students will review the history of measurement tools and identify two innovations that have led to improved fur	Students will explore a given professional organization and summarize in a short PowerPoint presentation the r	Students will identify career opportunities in design engineering and explain their job functions.	Students will explore career opportunities in a given engineering field and list the educational requirements for e	Students will recognize the need to involve all of the manufacturing team members in the decision making proc	Students will be able to categorize manufacturing specifications and constraints needed to produce a product.	Students will be able to evaluate material characteristics for manufacturing a specific product and identify the co	Students will evaluate and apply the correct machine process.	Students will recognize the need to limit the number of processes used to manufacture a product.	Students will develop an understanding of process routing.	Students will distinguish the differences between CNC, FMS, and CIM.	Students will explain the need for a company to minimize material handling by procurement of materials in a tir	Students will identify the need to perform a cost analysis of a product.	Students will interpret data, which has been statically analyzed, to ensure product quality.	Students will identify the need to evaluate the areas of manpower and facility requirements.	Students will recognize the need to protect a product for shipping.	Students will analyze aesthetic requirements to enhance packaging for the consumer.
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SCIENCE GRADE 9-12: http://www.michigan.gov/documents/Biology_HCSE_168202_7.pdf						x			x		x		x									
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Introduction to Engineering Design	Unit 3 Student Portfolio				Unit 5 Geometric Relationship													Unit 10 Presentation				
	Students will identify the proper elements of a fully developed portfolio.	Students will identify and discuss the ethical issues surrounding portfolio artifacts.	Students will compare and contrast defined elements of a good portfolio specified in the PowerPoint presentatio	Students will develop a portfolio to organize and display evidence of their work.	Students will define and contrast points, lines and line segments.	Students will identify major geometric shapes (isosceles triangle, right triangle, scalene triangle, rectangles, squ	Using a compass, ruler and triangle students will construct various geometric shapes.	Students will define the elements and types of angles.	Using a compass, ruler and triangle students will construct and bisect various types of angles.	Students will define terminology associated with arcs and circles.	Using a compass, ruler and triangle students will construct arcs, circles and ellipses.	Students will distinguish and define geometric constraints.	Students will identify the following geometric constraints in given three-dimensional models: horizontal, vertical,	Students will apply the right hand rule to identify the X, Y, and Z axes of the Cartesian Coordinate System.	Students will apply a combination of absolute, relative, and polar coordinates to construct a three-dimensional r	Students will define the origin planes in the Cartesian Coordinate System.	Students will identify the origin and planar orientations of each side of a three-dimensional model.	Students will demonstrate the following communication techniques: voice variation, eye contact, posture, attire,	Students will have an understanding of various forms of visual aids and when to use them in a presentation.	Considering the audience and level of formality, students will select the most appropriate type of visual aid for a	Considering the audience and level of formality, students will select the most appropriate type of written docume	Students will identify the elements of the various forms of written documentation.
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Introduction to Engineering Design	Unit 12 Marketing				Unit 2 Introduction To Design								Unit 4 Sketching and Visuals										
	Students will define, explain, and demonstrate an understanding of common vocabulary words used in associat	Students will formulate a product cost analysis for a given product.	Students will demonstrate an understanding of packaging design requirements.	Students will design a package for a given product.	Students will list the seven steps of the design process and explain the activities that occur during each phase.	Students will assess the value of working as a team and understand the benefits of collaboration.	Students will realize the importance of focusing on detail when executing the design process.	Students will apply the steps of the design process to solve a variety of design problems.	Students will investigate the principles and elements of design and demonstrate their use in the design process	Students will identify the use of the principles and elements of design in various products, print media, and art fo	Students will express their understanding of the principles and elements of design by incorporating them in des	Students will collect and display examples of the application of the principles and elements of design utilized in	Students will integrate proper sketching techniques and styles in the creation of sketches.	Students will demonstrate the ability to produce two-dimensional geometric figures.	Students will select and produce the appropriate pictorial style to best communicate solutions in the design proc	Students will formulate pictorial sketches to develop ideas, solve problems, and understand relationships during	Students will create sketches utilizing both the additive and subtractive methods to assess underlying geometric	The student will select a sketching method that is efficient in its use of color, form, and symbols representing ab	Students will augment pictorial sketches with shading to improve communication.	Students will evaluate and select the necessary views to graphically communicate design solutions.	Students will interpret annotated sketches in the design analysis process.	Students will integrate annotated sketches in presentations, portfolio, and documentation process.	Students will develop properly annotated sketches to accurately convey data in a design solution.
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Introduction to Engineering Design	Unit 6 Modeling																			
	Students will experience the creative thinking process.	Students will recognize the difference between vertical and lateral thinking.	Students will categorize and select a solution to a problem.	Students will communicate their idea through written and verbal formats.	Students will identify the different graphical method of data representation.	Students will select the appropriate graphical format to a problem.	Students will analyze and develop graphical representation of given data.	Students will have an understanding of the different physical modeling techniques.	Students will present a model with its correct proportions.	Students will select the appropriate modeling materials to complete a three-dimensional model.	Students will evaluate a problem using mathematical formulae.	Student will analyze a solution to a problem using the correct format of analysis.	Students will interpret a sketch and generate a model using a computer and a CAD software package.	Students will explain the difference between parametric and adaptive designs and be able to specify their uses.	Students will draw a two-dimensional sketch using a CAD package.	Students will apply geometrical and dimensional constraints to a sketch.	Students will demonstrate the ability to generate a three-dimensional model.	Students will understand and demonstrate the use of work features and how they are applied while constructing	Students will recognize the use and need of work planes, axes, and points in the development of a computer m	Students will demonstrate the ability to modify a sketch or feature of a model.
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Introduction to Engineering Design	Unit 7 Assembly Modeling																
	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will place and create components in the assembly modeling environment.	Students will create circular and rectangular patterns of components within an assembly model.	Students will replace components with modified external parts.	Students will perform part manipulation during the creation of an assembly model.	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will perform part manipulation during the creation of an assembly model.	Students will apply assembly constraints to successfully construct a multi-part object.	Students will utilize part libraries effectively during the assembly modeling process.	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will employ sub-assemblies during the production of assemblies.	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will understand and apply drive constraints to simulate the motion of parts in assemblies.	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.	Students will explore, understand, and apply adaptive design concepts during the development of sketches, fea	Students will explore and demonstrate assembly modeling skills to solve a variety of design problems.
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Introduction to Engineering Design	Unit 8 Modeling Analysis							Unit 9 Model Documentation																		
	Students will demonstrate how to extract mass properties data from their solid models.	Students will evaluate the accuracy of mass properties calculations.	Students will describe how analysis data can be used to update parametric models.	Students will list and explain the various mass property calculations, such as, volume, density, mass, surface ar	Students will interpret and use correct tolerancing techniques when dimensioning solid models.	Students will understand and solve tolerance problems, including limits and fits.	Students will understand the differences between clearance fit, interference fit, and allowance.	Students will select the appropriate sheet size and title block for creating a drawing layout.	Students will translate a three-dimensional drawing or model into corresponding orthographic drawing views.	Students will describe the purpose, and/or application, of the following drawing views: isometric view, section vi	Students will generate an isometric view from orthographic drawing views.	Students will determine the correct application for the various section views required to illustrate an object™s in	Students will describe the purpose and application of hatch marks and a cutting plane line, as used in a section	Students will create the appropriate section view for a specified application.	Students will create a detail view that corresponds to the appropriate orthographic drawing view.	Students will create an auxiliary view to show the detail on an inclined surface of a drawing object.	Students will list the common dimensioning standards.	Students will identify and demonstrate the use of common dimensioning systems.	Students will describe the characteristics and demonstrate the use of unidirectional and aligned dimensioning.	Students will differentiate the use of and demonstrate an understanding of size and location dimensions by app	Students will demonstrate appropriate dimensioning rules and practices.	Students will set up and integrate the use of a customized common dimensioning standard.	Students will identify and demonstrate the use of dimensioning practices on section, auxiliary, and assembly mo	Students will define and demonstrate an understanding of tolerancing, and solve tolerance problems.	Students will apply appropriate annotations on sketches and drawings.	Students will understand and formulate general and proprietary specifications to further communicate informatic
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