

Engineering Design & Development	Unit 1 Introduction Engineering	Unit 2 Elements of Formal Presentation	Unit 3 Guided Research	Unit 4 Independent Research	Unit 5 Formal Presentation
	Students will be able to describe and define the purpose and rationale of the course and the skills and knowledge				
	Students will be able to describe the characteristics of a successfully completed project based on previously completed projects				
	Students will be able to distinguish the differences between the goals of this class and the type of projects done in other classes				
	Students will be able to describe and define the structure for evaluating a research project.				
	Students will be able to list examples of levels of performance within the grading structure of this course.				
	The students will be able to create a resume to record their academic achievements and extra-curricular activities				
	The students will begin to develop a portfolio of their past accomplishments and research project.				
	Students will be able to recognize a need for retaining in one location all information relevant to the research project.				
	Students will design a format for the journal, which is well-organized and easy to use.				
	Students will use their journal as the source for returning to any desired previously encountered information.				
	Students will be able to use conventional library resources as a starting point for all research.				
	Students shall be able to choose the appropriate media to obtain the desired information.				
	Students will be able to distinguish relevant from irrelevant web sites.				
	Students will be able to manipulate search engines to find specific information.				
	Students will create strategies for identifying key terms that narrow their search topic.				
	Students will examine on-line databases to search for patents, people, business, Government and Academic information.				
	Students will correspond by E-mail including the use of attachments.				
	Students will differentiate between an E-mail address and a Web site address.				
	Students will be able to compose a business letter and a thank you letter.				
	Students will define the positive characteristics for personal interviewing. (e.g. courtesy, professionalism, listening)				
	Students will develop communication skills that will allow them to converse over the phone and conduct a face to face interview.				
	The learner will be able to use a decision matrix in narrowing a topic of research.				
	The students will be able to develop and define constraints and specifications for use in a decision matrix.				
	The student will be able to use a decision matrix to rank order alternatives.				
	The student will be able to use decision matrices to develop a concise problem statement.				
	The students will be able to discuss and explain key issues and terminology within their topic area.				
	The students will be able to narrow the topic focus using the decision matrix.				
	The students will be able to give an oral presentation.				
	Based on their research students will be able to develop a problem statement.				
	The students will be able to apply the decision matrix to a problem, justifying their problem statements based on the information gathered.				
	Students will be able to generate a list of existing solutions to their research problem.				
	Using decision matrices, students will be able to evaluate the advantages and disadvantages of present solutions.				
	Following a review of the specifications and constraints identified in their decision matrices, students will be able to select the most appropriate solution.				
	The students will be able to conduct preliminary patent searches to determine the originality of their alternative choices.				
	The students will be able to conduct research to determine the merit of their alternative choices based on the status of current research.				
	Students will be able to identify techniques for delivering formal presentations.				
	Students will be able to choose an appropriate formal presentation format and prepare their presentation.				
	The students will be able to define and demonstrate time management planning skills as they pertain to their project.				
	The student will be able to identify methods and sources for obtaining materials and supplies.				
	The student will complete an independent research project.				
	The students will provide a detailed set of instructions for producing a testable prototype based upon their research.				
	The students will be able to identify safe practices for the use of tools and equipment.				
	The students will be able to create and justify a process for testing their prototype design that will yield valid data.				
	The students will review their testing procedures to determine the validity of the testing procedures.				
	The students will be able to apply the appropriate statistical analysis tools to their test results to ensure their validity.				
	The students will be able to identify, define, and implement needed modifications to their design based upon their testing results.				
	The students will be able to evaluate and explain the effectiveness of their design at solving the problem that they were given.				
	Students will arrange the data and information compiled throughout the project and compose a technical research report.				
	Students will use a standardized format for composing their research papers.				
	The student will be able to discuss their findings in a formal presentation before an audience.				

Michigan Grade 9-12 Science Standards Linked

GRADE 9-12:									
http://www.michigan.gov/documents/Biology_HCSE_1682_02_7.pdf					X	X	X		
STANDARD B1: INQUIRY, REFLECTION, AND SOCIAL IMPLICATIONS					X	X	X		
IRSB1.1 Scientific Inquiry					X	X			
B1.1A Generate new questions that can be investigated in the laboratory or field.					X				
IRSB1.1B Evaluate the uncertainties or validity of scientific conclusions using an understanding of sources of measurement error, the challenges of controlling variables, accuracy of data analysis, logic of argument, logic of experimental design, and/or the dependence on underlying assumptions.									
IRSB1.1C Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).						X	X		
IRSB1.1D Identify patterns in data and relate them to theoretical models.									
IRSB1.1E Describe a reason for a given conclusion using evidence from an investigation.									
IRSB1.1f Predict what would happen if the variables, methods, or timing of an investigation were changed.									
IRSB1.1g Use empirical evidence to explain and critique the reasoning used to draw a scientific conclusion or explanation.									
IRSB1.1h Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables.									
IRSB1.1i Distinguish between scientific explanations that are regarded as current scientific consensus and the emerging questions that active researchers investigate.					X				
IRSB1.2 Scientific Reflection and Social Implications					X	X			
IRSB1.2D Evaluate scientific explanations in a peer review process or discussion format.						X			
IRSB1.2f Critique solutions to problems, given criteria and scientific constraints.									
IRSB1.2g Identify scientific tradeoffs in design decisions and choose among alternative solutions.					X	X			
IRSB1.2j Apply science principles or scientific data to anticipate effects of technological design decisions.					X	X			