

Engineering Design and Development

	Performance Objectives	Show-Me Content	Show-Me Goals	National Standards	Alignment
1.1	Justification				
1.	Describe and define the purpose and rationale of the course and the skills and knowledge base it is designed to present.	CA1, CA4			A
2.	Describe the characteristics of a successfully completed project based on previously completed projects.	CA1, CA4	1.5, 1.6		A
3.	Distinguish the differences between the goals of this class and the type of projects done in other classes.	CA1, CA4	1.6		A
1.2	Review of Expectations				
1.	Describe and define the structure for evaluating a research project.	CA1, CA4		10:9-12I, 10:9-12J	A
2.	List examples of levels of performance within the grading structure of this course.	CA1, CA4			A
3.	Create a resume to record academic achievements and extra-curricular activities in school.	CA1, CA4	1.8, 4.8		B
4.	Develop a portfolio of past accomplishments and research project.	CA1, CA4	1.8, 4.8		B
2.1	Daily Research Journal				
1.	Recognize the need for retaining in one location all information relevant to a research project.	SC7		10:9-12I	C
2.	Identify information encountered in the research process that belongs in the journal.	SC7		10:9-12I	C
3.	Design a format for the journal, which is well-organized and easy to use.	CA4, SC7	1.8		C
4.	Use the journal as the source for returning to any desired previously encountered information.	SC7	1.10		C
2.2	Conventional Library Resources				
1.	Use conventional library resources as a starting point for all research.	CA3	1.4	12:9-12P	D
2.	Select the appropriate media to obtain the desired information.		1.4	12:9-12P	D
2.3	Using the Computer as a Research Tool				
1.	Distinguish relevant from irrelevant web sites.	CA5	1.7	13:9-12J	E
2.	Manipulate search engines to find specific information.		1.4	17:9-12N	E

3.	Create strategies for identifying key terms that narrow the search topic.		3.2, 3.3		E
4.	Examine on-line databases to search for patents, people, business, government and academic information.	CA3	1.4		E
5.	Correspond by e-mail including the use of attachments.	CA1, CA4	2.7	17:9-12M	E
6.	Differentiate between an e-mail address and a Web site address.				E
2.4	Contacting the Experts				
1.	Compose a business letter and a thank you letter.	CA1, CA4	2.6		F
2.	Define the positive characteristics for personal interviewing (e.g., courtesy, professionalism, listening skills, and personal hygiene).	CA1, CA4, CA6	2.6		F
3.	Develop communication skills that will allow conversation over the phone and conduction of a face-to-face interview.	CA1, CA6	2.6		F
3.1	Methods of Brainstorming				
1.	Use a decision matrix in narrowing a topic of research.	SC7	1.1, 1.8	8:9-12H, 10:9-12I	G
2.	Develop and define constraints and specifications for use in a decision matrix.	SC7	1.1	2:9-12AA, 8:9-12H, 11:9-12N	G
3.	Use a decision matrix to rank order alternatives.	SC7	1.8	8:9-12H, 11:9-12N	G
4.	Use decision matrices to develop a concise problem statement.	SC7	1.8, 3.1	8:9-12H, 9:9-12L	G
3.2	Research the Topic				
1.	Discuss and explain key issues and terminology within a topic area.	CA1, CA6	2.1		G
2.	Narrow the focus of a topic using the decision matrix.	SC7	1.1, 1.8, 3.1	8:9-12H, 10:9-12I	G
3.	Give an oral presentation.	CA1, CA6	2.1	12:9-12L	I
3.3	How to Write a Problem Statement				
1.	Develop a problem statement based on research.	SC7	1.1, 3.1	8:9-12H, 9:9-12L	G
2.	Apply the decision matrix to a problem, justifying problem statements based on previous research findings and decision matrices.	SC7	3.2, 3.3	8:9-12H, 10:9-12I	G
3.4	Researching Alternative Solutions				
1.	Generate a list of existing solutions to a research problem.	SC7	3.2, 3.3	8:9-12H	H
2.	Evaluate the advantages and disadvantages of present solutions to a research problem using decision matrices.	SC7	3.7, 3.8	6:9-12J, 8:9-12H	H
3.5	Developing Alternative Solutions				

1.	Develop a list of alternative solutions to a stated problem following a review of the specifications and constraints identified in decision matrices.	SC7	3.2, 3.3	2:9-12AA, 8:9-12H	H
3.6	Redefining & Justifying Alternative Solutions				
1.	Conduct preliminary patent searches to determine the originality of alternative choices.		1.2	3:9-12I	D
2.	Conduct research to determine the merit of alternative choices based on the state of the art in the field.		1.2	10:9-12I	H
3.7	Presentation Methods				
1.	Identify techniques for delivering formal presentations.		2.1		I
2.	Select an appropriate formal presentation format and prepare a presentation.	CA6	2.1	12:9-12L	I
3.	Construct and deliver a PowerPoint presentation centered on a topic of research.	CA6	2.1	12:9-12L	I
4.1	Independent Research				
1.	Define and demonstrate time management planning skills as they pertain to a project.		4.5	2:9-12EE	J
2.	Identify methods and sources for obtaining materials and supplies.				J
3.	Complete an independent research project.	SC7	1.1, 1.2	11:9-12Q	J
4.2	Developing the Prototype				
1.	Create a detailed set of instructions for producing a testable prototype based upon research.	CA1, CA4, SC7	2.1	11:9-12O	K
2.	Identify safe practices for the use of tools and equipment.	H/PE6	4.7	9:9-12L	K
3.	Create and justify a process for testing the prototype design that will yield valid data concerning the design's attempt at solving the problem statement.	SC7	3.2, 3.3, 3.4, 3.6	11:9-12O	K
4.	Review the testing procedures to determine the validity.	SC7	3.4	11:9-12P	K
5.	Apply the appropriate statistical analysis tools to determine the validity and significance of the test results.	MA3, SC7	3.7	11:9-12P	K
6.	Identify, define, and implement needed modifications to the design based upon ongoing research.	SC7	3.7	11:9-12O	K
7.	Evaluate and explain the effectiveness of the design at solving the defined problem.		2.1, 3.7, 3.8, 4.1	11:9-12R	K
4.3	Research Paper				

1.	Arrange the data and information compiled throughout the project and compose a technical research paper.	CA1, CA4	1.8, 2.1	11:9-12R	L
2.	Use a standardized format for composing a research paper.	CA1, CA4	2.1		L
5.1	Formal Presentations				
1.	Discuss the findings in a formal presentation before an audience.	CA1, CA6	2.1	12:9-12L	I