1. EX401/402 Multidisciplinary Engineering Design I & II

2. Credit Hours (3)/Contact Hours (4)

3. Course Director – Joel Schubbe

4. None

5. Specific course information

   a. A two-semester interdisciplinary capstone design sequence. Projects and teams are selected during the previous academic semester. Student teams work through the design process including the problem definition, information gathering, concept generation, and design selection phases. Project management and design communication - both written and oral - are emphasized throughout. In the second semester, teams work to develop a working prototype, be it a physical product, detailed analytical model, algorithm, or software application. The design process concludes with the product architecture, configuration design, parametric design, and detail design phases: testing, evaluation, and redesign of prototypes
   b. Prerequisites: EM371, ER371.
   c. Required for Mechanical Engineering, Nuclear Engineering, and General Engineering.

6. Educational objectives for the course
   a. Perform the necessary steps to define an engineering design problem including: gathering information on the problem and customer, developing a list of customer requirements, establishing a set of engineering characteristics, conducting any necessary preliminary analysis, performing a trade study on potential competing products, and identifying and following any applicable codes and standards.
   b. Generate design concepts that are likely to meet customer requirements, predict the performance of these design concepts with regard to the previously identified customer requirements, and use these predictions to select a design concept for detail design and prototyping.
   c. Demonstrate the professionalism required of an engineer by effectively communicating the design process and detail through oral presentations and written reports, using project management tools to track and predict progress, working effectively in interdisciplinary teams, and evaluating the ethical considerations associated with the design, manufacture, use, and disposal of engineering designs.
   d. Create a prototype of the design (i.e. a physical product, detailed analytical model, algorithm, or software application), develop and execute a test plan to evaluate prototype performance based on engineering characteristics, and apply the results of prototype testing to inform redesign.
   e. Demonstrate the capacity to mature as an engineer by learning beyond the curriculum, understanding the impact of engineering solutions in a global, economic, environmental, and societal context, and having a knowledge of contemporary issues facing the engineering profession.

f. Demonstrate the professionalism required of an engineer by effectively communicating the design process and detail through oral presentations and written reports, using project management tools

7. Specific program outcomes addressed by this course

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reinforced	X	X	X	X	X	X	
Mastered							X

8. Brief list of topics to be covered
   a. Customer Identification and Problem Definition
   b. Engineering Codes and Standards
   c. Global and Societal Impact of Design
   d. Customer Requirements Definition
   e. Engineering Characteristics Definition
   f. House of Quality and Quality Functional Deployment
   g. Ideation and Brainstorming
   h. Morphological and Functional Decomposition
   i. Project Managment
   j. Confirmation and Parametric Design
   k. Modeling and Simulation
   l. Prototyping and Testing Methods
   m. Design Iteration and Revision
   n. Technical Writing and Reporting
   o. Technical Presentations and Communication