1. Course number and name
MEEG 401, Senior Design

2. Credits and contact hours
6 credits, 10 contact hours

3. Instructor’s or course coordinator’s name
Michael Keefe, Mechanical Engineering

4. Required Textbook

5. Specific course information
Catalog Data
Capstone engineering practice where teams develop real engineering system designs; discover customer requirements; benchmark best practices; develop engineering specifications; generate concepts; and justify a specific concept. Design, fabricate, assemble, test and improve an actual prototype.

Prerequisites
MEEG304, Machine Design - Elements

Required undergraduate course

6. Specific goals for the course
Specific outcomes of instruction

From the Accreditation Board for Engineering and Technology (ABET), engineering design is defined as the process of devising a solution that meets a defined set of desired wants within the boundaries set by the constraints. It is a decision-making process (almost always iterative), in which mathematics, the basic sciences and the engineering sciences are applied to convert resources optimally to meet the stated objectives. To provide a realistic design experience, the design projects should: provide an open-ended problem, involve a team, and allow individuals to exercise their creativity.

When developing a solution to the particular problem, each design team will: formulate an engineering problem statement with engineering specifications, consider the feasibility of alternative solutions, consider manufacturing & assembly, and include necessary constraints, such as economic factors, safety, reliability, aesthetics, ethics, and social and environmental impact.

The principal objectives of this activity are met by placing student engineers in a situation where they experience a design process. At the end of the course, all design teams will have been required to: communicate progress in a professional manner with meetings, reviews, reports, posters, logbooks, peer evaluations and continual sponsor feedback; develop productive team work practices with team norms, roles and evaluation procedures; manage the project effort and resources with appropriate project management tools such as Gantt charts; produce high quality, explainable designs by identifying: problem, critical issues, customers, wants, constraints; then using metrics derived from system and functional benchmarking to generating multiple potential solutions; provide engineering analysis and testing that support and demonstrate the logic behind the many engineering decisions; develop appropriate physical models and feasibility prototype; compare and test the developed solution prototype against design specifications; develop a smooth transition to sponsor implementation.
Student outcomes

This is the capstone effort of the program - teams of students work in a professional environment with the engineers from the companies that sponsor projects. This course requires the students to demonstrate most of the outcomes; in particular, the design project in the course requires the physical realization of a design. The Fall 2013 term focus for MEEG401 was Outcomes f. MEEG401, engineering panel evaluation of professionalism (save student final presentations); and the sponsor evaluation of professionalism (survey, save students final design reports).

7. Topics

The design process: problem definition, concept generation/selection, detailed design, validating design via prototype testing.