**ME 4973W – Senior Design Project II**

***Credits and Contact Hours***: 3 Credits. Two 180 minute meetings per week.

***Instructors***: Vito Moreno, Bryan Weber

***Textbook***: (recommended) *The Engineering Design Process*, by A. Ertas and J.C. Jones, John Wiley & Sons, Inc., 1993.

***Specific Course Information***:

a. Catalog Description: Projects which have started in the previous semester will be completed. The project analysis, design, and manufacture stages will take place. Both written and oral reports will be required.

b. Prerequisites: ME 3263 or ME 3262, ME 3264 or ME 3260, ME 4972, ENGL 1010 or ENGL 1011 or ENGL 2011

c. Required, Elective or Selected Elective: Required

***Specific Goals***:

a. Course Outcomes:

After completing ME 4972/3 students should be able to:

1. Develop problem specifications.
2. Brainstorm alternative solutions to problems.
3. Select a final design approach and defend a critical design review.
4. Understand how to schedule, plan and manage a project.
5. Conduct analysis to substantiate design concepts.
6. Deliver written documentation and oral presentations of items 1-5.
7. Understand the ethical implications of engineering in the modern world
8. Understand importance of intellectual property in the modern competitive world.

b. Relationship of Course Outcomes to Criterion 3 Student Outcomes:

3) an ability to identify, formulate and solve engineering problems by applying principles of engineering, science and mathematics:

*Students apply knowledge acquired in their undergraduate course work to the design of engineered systems and hardware.*

4) an ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs:

*Students demonstrate the ability to design and conduct physical and/or numerical experiments as well as analyze and interpret the data from these experiments.*

3) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions:

*Students design and fabricate a system, component or process to investigate basic principles or validate the final solution. This is done at both the sub element (unit) and full prototype levels.*

4) an ability to communicate effectively with a range of audiences:
*Each senior design team makes 2 oral presentations each semester to an audience of their peers, faculty and sponsors. At the conclusion of this course, they are required to produce a written final report to the sponsors. In addition, at Senior Design Demo Day the teams demonstrate and provide oral presentations to faculty, judges, sponsors and the general public.*

5) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts:
*Students acquire an understanding of professional and ethical responsibility through course presentations, realistic design constraint treatment, the application of regulated standards to their work, and knowledge of patent and intellectual property law. Many of the students are required to sign Non-Disclosure Agreements (NDAs) and Intellectual Property (IP) agreements with the sponsoring company.*

6) An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate and apply this knowledge appropriately.
*Students gain an appreciation of the need for life-long learning by conducting independent literature reviews and researching project-related problems. Students learn about life-long learning in professional development through presentations from working professionals and select alumni, and are formally introduced to graduate education as an opportunity for future intellectual development.*

7) an ability to function effectively on teams that establish goals, plan tasks, meet deadlines and analyze risk and uncertainty:
*The senior design capstone project requires students to work in multidisciplinary teams. Some of these teams may encompass different aspects of only Mechanical Engineering while others may require the incorporation of other engineering disciplines (such as Electrical, Computer, and Materials Engineering).*

***Topics Covered***:

- Project Management Tools
- Intellectual property
- Copy writing/patent law/Intellectual Property
- Product liability
- Written and oral presentations
- Critical design evaluations
- Design fabrication, project redesign and completion
- Lean Manufacturing
- Design of experiments
- Quality and Reliability
- Professionalism and ethics