Number: ENGR 490 (Section 01)

Title: Senior Capstone: Design Laboratory

Credits: 4 credits

Course Format: Two 1-hour lectures and two 2-hour lab per week.

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Catalog Description:
This course will simulate the industrial environment, where students will have to work in a team to solve a real world problem, from design to implementation. Team dynamics will be strictly monitored and each student’s unique skills will be utilized in different stages of the design process. Dealing with problems typical of a team environment will result in an invaluable learning experience both in the professional and civic lives of the students.

Learning Objectives (and corresponding mapping to ABET Criteria 3): Upon completion of this course, students will be able to:
1. Define and describe the various activities involved in the process of managing projects (ABET 3g)
2. Describe techniques and tools for effective team work (ABET 3g).
3. Prepare effective technical presentations and documentation for the design project (ABET 3g).
4. Prepare effective resumes (ABET 3g)
5. Demonstrate cost accounting, cost control and the engineering economic decision process used to design and develop a real-world project (ABET 3a, 3h).
6. Define professional ethics and explain its role and expectations (ABET 3f)
7. Explain the role of the various departments within a business organization (ABET 3d).
8. Complete planning, design, implementation, analysis and improvement of a product (ABET 3a, 3b, 3c, 3e, 3j)
9. Demonstrate independent learning by using unfamiliar tools and processes to design, evaluate, verify and implement an electronic product (ABET 3i, 3j, 3k).

Textbooks: Handouts will be made available through the course website: http://www.ewu.edu/x30360.xml

Prerequisites: Senior Standing and ENGR331 or Senior Standing and TECH408.

Topics:
- Project management
- Team work
- Professional Presentations
- Resumes and Interview Process
- Ethics
- High Tech. Business Organization:
  o R&D
  o Marketing
  o Sales and Distribution
Computer Usage:
1. Extensive CAD tool use.
2. Homework and project design and implementation involve writing formal technical reports that requires the use of word processing and graphics software for their presentation.

Laboratory:
Students work in an unsupervised open lab to complete assignments/project.

Grading:
- A = 3.5−4.0 (90−100%), B = 3.0−3.4 (80−89%), C = 2.0−2.9 (70−79%),
- D = 1.0−1.9 (60−69%), F= 0.0 (0−59%)

Assignments: 20%
Midterm: 15%
Project Reports and Documentation: 25%
Final presentation: 15%
Final Project Product: 25%

Course Outcomes and mapping to ABET Criteria 3:

a. An ability to apply knowledge of mathematics, science, and engineering.
   Students are required to use their background in mathematics, physics and engineering to successfully finish a self-determined design project.

b. An ability to design and conduct experiments, as well as to analyze and interpret data.
   Design and implementation results must be analyzed and improvements implemented.

c. An ability to design a system component, or process to meet desired needs within realistic constraints.
   The assignment of self-determined project requires students to plan, analyze, design, evaluate, and improve the various components and processes used to complete the project within the specified constraints.

d. An ability to function effectively on multi-disciplinary teams.
   Students are required to work in team and engage in multi-disciplinary activities to successfully complete their project.

e. An ability to identify, formulate, and solve engineering problems
   The open-ended nature of the project to be completed requires students to identity, formulate, model and solve several engineering challenges.

f. An understanding of professional and ethical responsibility.
   Students are required to explain role and expectation of professional ethics

g. An ability to communicate effectively.
   Each group needs to communicate effectively to successfully specify, develop and document a final open-ended project.

h. Understand impact of engineering solutions in a global, economic, environmental and societal context
   Students are required to evaluate the economical impact of the engineering solutions adopted in their project.

i. Recognition of the need for and an ability to engage in life-long learning
   Students must plan the design and development of an open-ended project and self-learn several CAD tools.

j. A Knowledge of contemporary issues
   Assignments and the open-ended project focus on current issues and modern developments in the field of engineering design and development

k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
   The open-ended project requires the use of modern methodologies and CAD tools.