ECE 492 – Capstone Design I
ABET Syllabus

Catalog Data: ECE 492: Capstone Design I. Three hours. Introduces design methodology in electrical and computer engineering through lectures and participation in a design project.

Prerequisites: None (see corequisites)

Corequisites: 400-level electrical and computer engineering lecture-lab combination.
Corequisite topics: senior-level knowledge of an electrical and computer engineering specialization; laboratory skills for test and measurement of electrical and computer engineering components and systems.


Relationship of Course toward Meeting ABET Program Outcomes:

The course supports instruction for Program Outcomes C, D, E, F, G, H, I, and J as required by ABET Criterion 3 of EC 2000 and ABET Program Criteria. The relationships are indicated in the Course Learning Objectives.

The course supports assessment for Program Outcomes C, D, F, G, H, I, and J as required by ABET Criterion 3 of EC 2000 and ABET Program Criteria. The relationships are indicated in the Outcome Measure Assessments.

Course Learning Objectives:

This is the first course in a 2-semester course sequence. It is designed to introduce students to the steps in a systematic design process, to provide design experience through a capstone design project, and to build teaming, organizational, and communication skills. At the end of this course, students are expected to:

1. Explain the steps involved in an engineering design process (Outcome C).
2. Identify an appropriate problem or desired need and then design a system, component, or program to solve the problem or address the desired need (Outcomes C and E).
3. Develop a set of specifications to ensure that the system, component, or program solves the problem or addresses the need (Outcome E).
4. Function effectively on a multidisciplinary team (Outcome D).
5. Exhibit a knowledge of professional ethical codes and the need for professional and ethical responsibility (Outcome F).
6. Incorporate appropriate standards into the system, component, or program (Outcome E).
7. Design a system within a set of realistic constraints including most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political (Outcomes C, E, and H).
8. Conduct effective oral presentations (Outcome G).
9. Describe the societal impact of various engineering solutions to contemporary problems (Outcomes H and J).
10. Use external resources to obtain technical information necessary to complete design of system, component, or program (Outcome I).

Program Outcome Measure Assessments:

During this course, learning assessments will be performed using specific Program Outcome Measures that demonstrate students are able to:

1. Conduct an evaluation of preliminary designs and analyze alternatives. (Outcome C, Measure C3)
2. Write a project plan including a schedule with major milestones, a budget, a validation test plan, and a list of critical aspects. (Outcome C, Measure C4)
3. Discuss the elements of good teaming, such as resolving conflict, conducting self-evaluation, and providing leadership. (Outcome D, Measure D1)
4. Discuss an engineer’s professional responsibilities. (Outcome F, Measure F2)
5. Given a scenario identify ethical concerns, describe the appropriate behavior, and discuss the ethical basis for these choices. (Outcome F, Measure F4)
6. Describe the elements of an effective oral presentation. (Outcome G, Measure G2)
7. Create a list of questions concerning global, societal, and environmental impact of particular electrical or computer engineering implementations. (Outcome H, Measure H1)
8. Prepare an oral or written report referencing external sources concerning global, societal, and environmental impact of specific engineering implementation. (Outcome H, Measure H2)
9. Discuss methods for learning a new technology. (Outcome I, Measure I2)
10. Recognize social impacts of technology & engineering. (Outcome J, Measure J1)
11. Recognize political issues related to engineering. (Outcome J, Measure J2)

Contribution of Course to Meeting the ABET Professional Component:

- Skills required, used, and developed are connected with the selected project, and are intended as the final steps of student preparation for their professional careers. Design project will incorporate engineering standards and realistic constraints.
- Estimated Content: Engineering Design: 3 credits

Relationship of Course to Program Objectives:

The course supports Program Objectives 1, 2, and 3 by: utilizing knowledge of engineering analysis, problem solving and design; continuing career-long professional development through engagement in life-long learning; and utilizing skills in effective communication, multidisciplinary teamwork, and adherence to principles of professional ethics.

Topics Covered During Class:

1. Course organization and team formation (2 hrs)
2. Engineering Design (3 hrs)
3. Project Proposals (1 hr)
4. Effective Presentations (1 hr)
5. Teaming (1 hr)
6. Proposal Presentations (4 hrs)
7. Design Documentation and Review (9 hrs)
8. Engineering Economics (3 hrs)
9. Engineering Management Tools and Techniques (1 hr)
10. Design Validations (10 hrs)
11. Engineering Ethics and Societal Impact of Engineering (6 hrs)
12. Design Review Presentations (4 hrs)

Note: This course will conclude with students conducting a Preliminary Design Review. Formal presentations in this class include a Proposal Presentation and a Preliminary Design Review. The designs will be completed in the subsequent class, ECE 494.

Prepared by: Susan Burkett Date: 09 September 2008