Catalog Data: Computer Engineering Project Design (3) 
Computer engineering design project, project management, documentation, reporting, and group and individual communication skills. Prerequisite: EE 310, EE 353, CMPSC 473; ENGL 202C.


Course Objectives: CMPEN 482W is the capstone design course for computer engineers. As such, the course presents little in the way of new material. Rather, the primary goal of the course is to assess the ability of students in teams to complete a significant project with little supervision or technical instruction. The course does, however, provide instruction on the design process and project management. In particular, students learn the fundamentals of systems engineering and systems engineering management. Students study the process of translating a problem statement into an effective and economical computer system that meets the needs of the customer. Topics include a comparison of popular process models, concept generation and selection, analysis and derivation of specifications, specification allocation and flow down, project management, and ethics. Communication skills are developed through oral presentations and a sequence of writing assignments, beginning with a project proposal and leading to a final design document.

Primary Course Outcomes: Upon completion of the course, students should have sufficient understanding of the design process such that given realistic time and budget constraints and a set of specifications for a computer system involving hardware and software, they can design and fabricate a product that meets the specifications. (Outcomes 8, 11, 14)

Secondary Course Outcomes: Students should also be able to do the following:

Design:
- List at least three common process models, describing the pros and cons of each.
- Given a problem statement, describe the solution space via a classification tree to at least three levels.
- From a classification tree, derive a problem solution by using a concept combination table.

Project Management:
- Explain the concept of designing for the product’s lifecycle.
- Create a work breakdown structure and associated dictionary.
- Create and maintain a schedule using a Gantt chart.
- Work effectively in a team environment. (Outcome 16)
- Develop and execute an acceptance test plan.

Communication:
- Succinctly summarize team progress through a series of memos. (Outcome 12)
- Prepare a proposal that is technically sound and convincing. (Outcome 12)
- Prepare a design document sufficient to allow a technician to fabricate the product. (Outcome 12)
- Defend a proposal through an effective oral presentation. (Outcome 13)

Ethics:
- Recite the IEEE code of ethics. (Outcome 17)
- Analyze case studies, identifying the IEEE codes that apply. (Outcome 17)
- Recite a process for reasoning about ethical dilemmas. (Outcome 17)
- Recite four common frameworks for reasoning about ethical dilemmas. (Outcome 17)
CMPEN 482W supports the following program outcomes:

- **Outcome 8:** Develop a modest (on the order of a thousand lines of code) software application, using appropriate data structures and algorithms.
- **Outcome 11:** Given specifications, design and implement a computer system (defined as any digital device used for computation or control) under time and budget constraints.
- **Outcome 12:** Write clear and effective technical prose.
- **Outcome 13:** Speak clearly and persuasively about technical subjects in large and/or small group settings, and use supporting materials effectively.
- **Outcome 14:** Demonstrate independent learning by using unfamiliar computer systems, test equipment, and software tools to solve technical problems.
- **Outcome 16:** Demonstrate an ability to work effectively in multi-disciplinary teams. The term multi-disciplinary is used here in the broader sense to include teams of computer professional having different skills; e.g., one team member might be familiar with web development, whereas another might have experience with microprocessor systems.
- **Outcome 17:** Be able to state a code of professional ethics and to identify ethical issues in engineering case studies.

**Required Topics:**
- Project-specific technical material (~13 hrs)
- Design process & project management (~5 hrs)
- Ethics (~5 hrs)

**Class Format:**
Two class periods per week. One 75 min. period and one 3 hour period. The course is front loaded with project-specific technical material, including a few structured laboratories, presented early in the semester (3-4 hours per week). The semester project is developed through a series of milestones. Later in the semester the long period is used for milestone demos and presentations. The short periods are used for lecture materials covering design, project management, and ethics.

**Professional Component:**
CMPEN 482W is designed to provide computer engineering students a “real world” design problem with realistic time and budget constraints.

**Evaluation:**
- 20% proctored assessments (exams)
- 80% unproctored assignments (project, reports)

**Suggested breakdown:**
- 7.5% Exam 1 (individual)
- 7.5% Exam 2 (individual)
- 35% Semester Project (team)
- 5% Memos (2; individual)
- 10% Pre-proposal (team)
- 15% Full proposal (team; including individual oral presentations)
- 15% Design Document (team)
- 5% Poster (team)

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