ICOM 5047: Design in Computer Engineering (Capstone)

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Outline

- Computer Engineering
- What is Capstone?
- Prerequisites
- Seminars
- Course content
- Projects?
- Your feedback

Computer Engineer [1]

- Definition
    - Computer engineering is concerned with the design and construction of computers and computer-based systems.
    - It involves the study of hardware, software, communications, and the interaction among them.

- Computer engineering students study the design of digital hardware systems including communications systems, computers, and devices that contain computers. They study software development, focusing on software for digital devices and their interfaces with users and other devices.

- CE has a strong engineering flavor.

What is Capstone Design?

- Apply the engineering sciences to the design of a system, component or process

- Students choose the particular design project with approval of appropriate faculty.

- Computer Engineering
  - "The solution must involve the design and implementation of some product containing hardware and/or software components" [2].

Our capstone course in Computer Engineering (ICOM5047

- Experience like no other in the program and probably in most other academic programs
- Exciting opportunity to put your creativity, innovation and skill at work; how about a new venture?
- You are not going to have new technical contents in Computer Engineering in this course but you are going to learn a lot of techniques and opportunities in this exciting career and how to put them at work.

Capstone Project

- Project
  - open-ended problems [3]
  - development and use of design methodology, formulation of design problem statements and specification, consideration of alternative solutions
  - feasibility considerations
  - detailed system descriptions
  - realistic constraints
    - Economic factors
    - Social impact

Design Experience [2]

- The culminating design experience should provide students with a wealth of learning benefits. The benefits stemming from this experience include:
    - Demonstration of the ability to integrate concepts from several different subjects into a solution
    - Demonstration of the application of disciplines associated with computer engineering
    - Production of a well-written document detailing the design and the design experience
    - Demonstration of creativity and innovation
    - Development of time management and planning skills
    - Self-awareness opportunities provided by an assessment of achievement as part of a final report

ICOM 5047 – Design Project in Computer Engineering (Capstone)

- Syllabus Description:

  Capstone course in which student teams design a project to solve a complete Computer Engineering Problem considering engineering standards and realistic constraints. The project should integrate **both hardware and software**.

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- Course Goal:

  After completing the course, students should understand and manage all aspects related to the solution of a problem in Computer Engineering, thus demonstrating the knowledge acquired in previous courses. The student should demonstrate his/her capability to solve a real engineering problem.

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- Course Purpose:
  Students will solve a complete Computer Engineering Problem incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social and political.

Prerequisites

- One of these courses
  - ICOM 4009: Software Engineering
  - ICOM 5016: Introduction to Database Design
- One of these courses
  - INEL 5206: Digital Systems Design
  - INEL 5265: Analog Integrated Circuit Design
  - ICOM 5217: Microprocessor Interfacing

Seminars

Seminars

- Project Management
- MS Project
- Budget Writing
- Proposals
- Teamwork
- Effective Meetings
- Document and Info. Management

- Conflict Management
- Oral Communication
- Creativity
- Writing a Report
- Environmental Impact Ethics
- Entrepreneurship
- Intellectual Property

Examples of past projects

☐ Scoreboard

Scoreboard

- Hardware
  - Wireless connection between a score keeper box and computer
  - Display
- Software
  - Database
  - Web interface
  - Firmware

Some success stories: Scoreboard

Some success stories: ParkAid

- **Hardware**
  - Wireless sensors network
  - Parking lot gate control
  - Display
- **Software**
  - Database & Parking priority management
  - Web interface
  - Firmware

Some success stories: Smart Shopping System

- Hardware
  - Cart offering unit
  - Check out station
  - RFID
- Software
  - Database (Inventory control, shopper helper, store guide, shopping list)
  - Web interface
  - Firmware

Quotation from a former student referring to his job in a large company

"Fernando, esto es como el capstone, pero ¡con chavos de verdad!"

Your feedback

- Are there any groups already?
- Possible projects?

References

1. **Computing Curricula 2005, The Overview Report, covering undergraduate degree programs in Computer Engineering, Computer Science, Information Systems, Information Technology, Software Engineering**
2. **CCCE Final Report: Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering, IEEE, ACM, 2004.**
3. **What is the open-ended problem solving?. http://www.mste.uiuc.edu/users/aki/open_ended/WhatIs Open-ended.html**