Course: CET 4805 - Component and Subsystem Design II
Course coordinator: Prof. O. Kwon
Revision Date: Spring 2014

Credits: Contact Hrs: Class Hrs: Lab Hrs: Recitation Hrs:
This course is: [X]Required

Catalog Course Description:
Continuation of CET 4705. Further design of subsystems requiring solution by differential equations. Worst-case designs and component tolerances, development of control systems. A term project may be assigned.

Pre-Requisites: CET4705
Co-Requisites: None

Text book:

Other supplemental materials:

Course learning outcomes:
The course provides an exciting and challenging laboratory component for implementation and testing of complex engineering projects. Each digital component and system design will come with integrated laboratory experimental activities. The prototyping of complex digital logic and software systems are used as a means to demonstrate engineering practice and design. The course will introduce the students to basic design methodology, VHDL and CAD tools used in the design, synthesis and analysis of digital computer and communication systems, and Field-programmable gate array device (FPGAs). Upon successful completion of this course, the student will be able to use of the IEEE standard hardware description language (VHDL) and schematic design as practical means to implement hybrid sequential and combinational designs. Students will gain practical experience in the protocol, design, simulation and testing of digital systems. The Altera DE2 education board will provide the desired platform.
**Brief list of topics to be covered:**

**Week 1**
Introduction to the Altera Quartus II Design Software and Simulation
(schematic capture design and VHDL design)

**Week 2**
Programmable Logic Devices: SPLD, CPLDs and FPGAs.
Getting Started with DE2 Board

**Week 3**
Explore Switches and Lights on DE2 and VHDL. Programming FPGA board

**Week 4-5**
Design Code Character and Decoder. Programming FPGA board

**Week 6**
Using BDF/VHDL Components in Digital Logic Design
Multi-bit Multiplexer and Programming FPGA

**Week 7**
Choosing an LMP model with design

**Week 8**
Designing the controlled character patterns and Programming FPGA

**Week 9**
Midterm project

**Week 10-11**
Real time clock design, counter and frequency divider applications

**Week 12-13**
System design - Integrated components and subsystems.

**Week 14**
Memory with read and write control design

**Week 15**
Final project and final presentation

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**Student Outcomes listed in ABET Criterion 3 Addressed in this Course**

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<tr>
<th>Outcomes</th>
<th>Level</th>
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<tr>
<td>a. An ability to apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities</td>
<td>E</td>
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<tr>
<td>b. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies</td>
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<td>c. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes</td>
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<tr>
<td>d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives</td>
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<td>e. An ability to function effectively as a member or leader on a technical team</td>
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<td>f. An ability to identify, analyze, and solve broadly-defined engineering technology problems</td>
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<td>g. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature</td>
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<td>h. An understanding of the need for and an ability to engage in self-directed continuing professional development</td>
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<td>i. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity</td>
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<td>j. A knowledge of the impact of engineering technology solutions in a societal and global context</td>
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<td>k. A commitment to quality, timeliness, and continuous improvement</td>
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<td>l. The ability to analyze, design, and implement hardware and software computer systems</td>
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<td>m. The ability to apply project management techniques to computer systems</td>
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<td>n. The ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of computer systems and networks</td>
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Legend: I (Introduce), R (Reinforce) and E (Emphasize). Unmarked means not addressed.