ELECTRICAL, COMPUTER, AND SYSTEMS ENGINEERING DEPARTMENT

ABET COURSE SYLLABUS

ECSE 4120 Electric Circuits Design

Course Catalog Description: A capstone design course. This course integrates theory, computer simulation, and experimental laboratory work. Included are the principles of reliability and optimization. Projects include the design, simulation, practical implementation, and testing of electronic circuits

Pre-Requisite Courses: ECSE-2050

Co-Requisite Courses: ECSE-2060, ENGR-4010 and senior standing

Prerequisites by Topic:

1. Students should possess *general familiarity* with basic Physics, Calculus, and Engineering Drawing.
2. Students should possess *working knowledge* with Electronics and Circuits, basic Computer Programming and Mechanics.
3. Students should prepare themselves on Project Management and Engineering Design Strategies by reading the prescribed textbook (in the first 3 weeks of the semester).

Textbook: (and/or other required material) "Engineering Design for Electrical Engineers" by Alan D. Wilcox (Prentice Hall, published 1990; ISBN 0132781360)

References: "Electronics Project Management and Design, 2nd Edition" by D. Joseph Stadtmiller (Prentice Hall, published 2004; ISBN: 0130127299)
Scientific Journal Articles, Commercial Catalogues, White Papers and Application Notes (these are collected by students)

Course Coordinator: Partha Dutta

Overall Educational Objective: Understanding the process and elements of electrical engineering design through experience in a multidisciplinary project. Multi-disciplinary capstone design projects for "Electrical Engineers" encompassing: Analog, digital and power electronics; Computer science, Mechanical engineering, Materials engineering, Physics, Calculus, Heat transfer, Project management; Product development and production; Quality control, reliability, safety; Market survey and sales.

Course Learning Outcomes:

1. Acquire practicing skills, competencies, and points of view needed for engineering professionals.
2. Acquire skill in working with others as a member of a team.
3. Analyze and critically evaluate ideas
4. Develop skills in expressing oneself orally and in writing.

How Course Outcomes are Assessed:
Project Proposal: 25% (due the last week of class before spring break)
Project Involvement (Project Work, Weekly Updates & Peer Evaluation): 25%
Final Project Report: 25% (due last week of class)
Final Project Presentation: 25% (last day of class)
Grading is primarily based on overall team performance. However the peer evaluation from individual group members will decide the final grade of each student. For example: under special circumstances, it is possible for a student to get an "A" even though the group received "B" and vice-versa.

Relation to EE/CSE/EPE Outcomes

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	M	Analyze systems

N = none
M = moderate
H = high

Basic disciplines in Electrical Engineering	M	Design circuits
Depth in Electrical Engineering	H	Trouble shoot circuits
Basic disciplines in Computer & Sys. Eng.	N	
Depth in Computer and Systems Eng.	M	Automation
Electromagnetics, electromechanics, power semiconductors	M	Circuit design
Power system behavior	N	
Electrical energy conversion	N	
Conduct experiments and interpret data	M	Testing circuits
Identify, formulate and solve problems	M	Design systems
Design a system, component or process	H	Project design
Communicate in written and oral form	H	Report writing and presentation
Function as part of a multi-disciplinary team	H	Design and evaluate complementary system performances (heat transfer, electric power, motion control, etc.)
Preparation for life-long learning	M	Continued learning as technology advances
Ethical issues; safety, health, public welfare	M	Requirements for consumer based products, environmental pollution, intellectual property, etc.
Humanities and social sciences	N	
Laboratory equipment and software tools	M	Use test beds to evaluate designed circuits and systems
Variety of instruction formats	M	Team discussions, presentations, laboratory testing, design and test circuits using commercial design softwares, report writing, peer evaluation.

Topics Covered:
(number of hours or classes for each)

1. Temperature controllers, programmers and indicators (2 hours).
2. Power supply modules for the high temperature furnaces (2 hours).
3. Stepper motor controllers and power supplies (2 hours).

Computer Usage:

For B2Spice simulation of circuits, preparing project proposal, presentation and final report.

Laboratory Experiences:

Designing circuits and testing them with existing test beds such as furnaces, linear slides (for stepper motors).

Design Experiences:

1. Design temperature controller for high temperature electric furnaces.
2. Design power supply for high temperature electric furnaces.
3. Design stepper motor controller

Independent Learning Experiences:

1. Weekly project reporting as a team.
2. Reading technical journals, magazines, web-based articles for project ideas.
3. Project management.
4. Managing milestones and deadlines
5. Market survey
6. New applications with the course design project

Class/Lab Schedule:

Monday & Thursday: 4.00-5.20 PM

Contribution to the Professional Component:	(a) College-level mathematics and basic sciences:	0 credit hours
	(b) Engineering Topics (Science and/or Design):	3 credit hours
	(c) General Education:	0 credit hours

Prepared by:	Partha Dutta
Date:	2/20/2006