University Of California, Berkeley
Department of Mechanical Engineering

ME 135: Design of Microprocessor-Based Mechanical Systems (4 units)

Undergraduate Required/Undergraduate Elective/Graduate Course

Syllabus

CATALOG DESCRIPTION:

This course provides preparation for the conceptual design and prototyping of mechanical systems that use microprocessors to control machine activities, acquire and analyze data, and interact with operators. The architecture of microprocessors is related to problems in mechanical systems through study of systems, including electro-mechanical components, thermal components and a variety of instruments. Laboratory exercises lead through studies of different levels of software.

COURSE PREREQUISITES:

Engineering 7

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

Student edition of LabVIEW

COURSE OBJECTIVES

Have the students develop an understanding of the role microprocessors play in mechanical systems. Course lecture covers topics including but not limited to:

- Microprocessor Architecture
- Real time Operating System
- Real time programming methodology
- Introduction to LabVIEW
- Introduction to sensors and their use
- Introduction to electromechanical actuators and their use
- Basic introduction to feedback control using PID
- Design using microprocessors, sensors, and actuators within the context of a mechanical system

DESIRED COURSE OUTCOMES

For each student in the context of designing mechanical system using microprocessors to be able to:

- Assess the relative difficulty of a problem
- Outline a solution to it
- Estimate the resources to solve the problem
- Develop and document a design
- Identify critical safety issues
- Implement a prototype solution
- Test and evaluate the solution
- Work as part of a team

TOPICS COVERED

- Microprocessor Architecture
- Real time Operating System
- Real time programming methodology
- Introduction to LabVIEW
- Introduction to sensors and their use
- Introduction to electromechanical actuators and their use
- Basic introduction to feedback control using PID
- Design using microprocessors, sensors, and actuators within the context of a mechanical system

CLASS/LABORATORY SCHEDULE

Three hours of lecture and three hours of laboratory per week

CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT

Students will learn to Design, Prototype, and Test their design. Learn to use LabVIEW which is widely use in industry and National Laboratory as a language for test and data acquisition.

RELATIONSHIP OF THE COURSE TO ABET PROGRAM OUTCOMES

a. An ability to apply knowledge of mathematics, science, and engineering

c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d. an ability to function on multi-disciplinary teams

e. an ability to identify, formulate, and solve engineering problems

f. an understanding of professional and ethical responsibility

g. an ability to communicate effectively

h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i. a recognition of the need for, and an ability to engage in life-long learning

j. a knowledge of contemporary issues

k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

30%: 3-5 graded laboratory programming exercises
10%: Progress report by students regarding progress on their design project
60%: Final project presentation and demonstration by students

PERSON(S) WHO PREPARED THIS DESCRIPTION
George Anwar
03/15/2011

ABBREVIATED TRANSCRIPT TITLE (19 SPACES MAXIMUM): DES MPRC-BD MEC SYS
TIE CODE: LECS
GRADING: Letter and/or P/NP
SEMESTER OFFERED: Fall and/or Spring
COURSES THAT WILL RESTRICT CREDIT: ME 235
INSTRUCTORS:
DURATION OF COURSE: 14 Weeks
EST. TOTAL NUMBER OF REQUIRED HRS OF STUDENT WORK PER WEEK: 10-12 Hrs
IS COURSE REPEATABLE FOR CREDIT? No.
CROSSLIST: None