

METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

REGULAR COURSE SYLLABUS

College of: Professional Studies

Department: Engineering and Engineering Technology

Prefix & Course Number: CPE 4390 Crosslisted With*: _____

Course Title: Embedded System Design II

Transcript Course Title (30 characters): Embedded System Design II

Check All That Apply: Required for Major: X Required for Minor: _____ Specified Elective: _____

Required for Concentration: _____ Elective: Service Course: _____

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:
(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward to the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 3 (2+2) Schedule Type: B Grade Mode: L

Face-to-Face or Equivalent Hours per course:

Lecture 30 Lab 30 Internship _____ Practicum _____ Other (please specify type and hours): _____

Additional Student Work Hours per course: 90

Variable topics umbrella course: No X Yes _____ If yes, number of credits/repeats allowed _____

Specified repeatable course: No X Yes _____ If yes, number of credits/repeats allowed _____

Prerequisite(s): CPE 4370 with a grade of "C" or better

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced Coding:

Prerequisite(s): CPE 4370 with a grade of "C" or better

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Registration restrictions: Level _____ Class _____ Program/Major _____ Student attribute _____

Catalog Course Description:

This course is a continuation of CPE 4370 and will cover embedded system design by interfacing with computers, peripherals, and other digital circuits. It provides the knowledge of designing microcontroller-based embedded computer systems by using *assembly* and *C* programs. In addition, the course will also examine the Real-time Operating Systems and their impact on performance. Computer engineering applications will also be emphasized.

Specific Variable Topics Course Description (if applicable, umbrella course description included above):

Required Reading and Other Materials will be equivalent to:

Huang, Han-way. (2004). *PIC Microcontroller: An Introduction to Software & Hardware Interfacing*, or latest edition. Clifton Park, NY: Thompson Delmar Learning.

Specific, Measurable Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to:

1. Implement embedded systems using different peripheral devices, input, and communications devices
2. Develop programs controlling embedded systems using quick and efficient methods
3. Design an embedded system (including hardware and software) that meet a written set of requirements
4. Identify, design, and implement an embedded system (including hardware and software) that solves a real world problem using engineering processes
5. Use hardware and software development techniques, skills, and computer tools to solve a real-world problem

Detailed Outline of Course Content or Outline of Field Experience/Internship (experience, responsibilities and supervision):

- I. Timer and CCP Modules
- II. Addressable Universal Synchronous Asynchronous Receiver Transceiver
- III. Serial Peripheral Interface
- IV. Interintegrated Circuit Interface

- V. Analog-to-Digital Converter
- VI. Controller Area Network
- VII. Internal and External Memory Programming and Expansion
- VIII. System Configuration and Protection
- IX. Application Examples

Evaluation of Student Performance:

1. Examinations
2. Written Assignments
3. Design Demonstrations/ Lab reports