**ECE 3250 Embedded Systems**

**Catalog Description**

**ECE 3250 Embedded Systems (4)**

Introduce embedded systems. Cover embedded concepts, NI sbRIO embedded system devices, LabVIEW RT and FPGA modules, combinational and sequential logic circuits design, finite state machines, memory and storage, sensor and motor interface.

**Prerequisite:** ECE 3070 and ECE 3200.

**Prerequisite by topic:**

VHDL

Analog Circuits

Electronics

Digital Circuits

**Units and Contact Time:** 4 semester units: 3 units lecture (150 minutes), 1 unit lab (150 minutes).

**Type:** Required for CE. Selected elective for EE.

**Required Textbook:**

Embedded Systems: Introduction to Arm(r) Cortex -M Microcontrollers. (4th Edition) Jonathan W Valvano. Createspace. ISBN 13: 9781477508992 | ISBN 10: 1477508996. This book is available in the CSUB Bookstore and at retail and Internet bookstores.

**Recommended Textbook and Other Supplemental Materials:**

Additional material will be provided by the instructor.

**Coordinator(s)**

Wei Li

**Student Learning Outcomes**

This course covers the following ACM/IEEE Body of Knowledge student learning outcomes:

CE-DIG: Digital Logic

CE-CAO: Computer Architecture and Organization

CE-ESY: Embedded System

ABET Outcome Coverage

The course maps to the following performance indicators for Computer Science (CAC/ABET) and Computer Engineering (EAC/ABET) and Electrical Engineering (EAC/ABET):

1. Analyze a problem, and identify and define the computing requirements and specifications appropriate to its solution (CAC 3b and EAC 3b).
2. Write a professional project report that presents the outcomes of the project and present these findings to the class (CAC 3i and EAC 3g).

3. Use modern engineering tools such as LabVIEW, NI Embedded System Devices, and Virtual Digital Instruments, to complete the assigned project (EAC 3k)

**Lecture Topics and Rough Schedule**

Week 01 Introductory NI sbRIO Embedded Devices

Week 02 Introduction to LabVIEW: Tools, Palettes, Front Panel, and Block Diagram

Week 03 LabVIEW Programming: Loop Structure, Case Structure, and Arrays

Week 04 LabVIEW RT and FGPA Modules

Week 05 Combinational Logic Circuit Design

Week 06 Complex Combinational Logic Circuit Design

Week 07 Flip-Flops and Related Devices Design

Week 08 Sequential Logic Design: Counters

Week 09 Sequential Logic Design: Shift Registers

Week 10 Memory and Storage

Week 11 Temperature Sensor Interface

Week 12 Chemical Sensor Interface

Week 13 Motor Control Interface

Week 14 Finite State Machines

Week 15 Final Project

**Grading Policy**

 A 93%

A- 90%

 B+ 87%

 Lab/Hw Assignments ....35% B 83%

 Midterm 1 ......................20% B- 80%

 Midterm 2 ......................20% C+ 77%

 Final Project....................25% C 73%

 C- 70%

 D+ 67%

 D 63%

 D- 60%

 F below 60%

**Prepared By**

Wei Li on June 9, 2014

**Approval**

Approved by CEE/CS Department on July 30, 2014

**Effective Fall 2016**