**EEL 4742: Advanced Microprocessor-Based System Design**

**Curriculum Designation:** Elective for EE majors. Required course for CpE majors.

**Course (Catalog) Description:** Advanced concepts in microprocessor-based system design. Topics include microprocessor architectures, hardware/software synchronization, interrupts, interface protocols, power management, and introduction to real-time operating systems.

**Prerequisite:** EEL4746 and EEL4746L

**Co-Prerequisite:** EEL4742L

**Text and/Required Material:** *Programmable Microcontrollers: Applications on the MSP432 Launchpad* by Cem Ünsalan, H. Deniz Gürhan, and M. Erkin Yücel.

**Course Objectives:**
1. Analyze microprocessor architecture for various applications.
2. Use a modern IDE (integrated development environment) to design and test software in an embedded system.
3. Use interface standards to connect peripherals to the microprocessor.
4. Use debugging techniques to effectively design working embedded systems.
5. Design synchronization techniques for hardware and software.
6. Demonstrate the ability to acquire, interpret and apply technical documentation to the design of embedded microprocessor systems.
7. Design a simple embedded system using a real-time operating system.

**Topics covered:**
1. MSP432 Architecture and Organization
2. MSP432 Assembly Language Instruction Set
3. GPIO Interfacing
4. SysTick Timer
5. Debugging real-time systems
6. Interfacing displays and motors
7. Timers
8. Real-time Systems
9. Use of Real-Time Operating Systems
10. Data acquisition systems

**Class Schedule:** Three 50 minute to two 75 minute lectures per week (3 credit hours).

**Subject Area:** Engineering

**Significant Design:** Yes

**Relationship to Assessed ABET Student Outcomes:** 7(a-d) (CpE only)

**Last Updated by:** R.J. Perry  
**Date:** 4/30/2021