

# EE-308 Microprocessor Based System Design

Spring 2021-2022

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**Catalog Data:** EE 308 Microprocessor Based System Design (4 cr.) Prerequisites: CS 303. Introduction to hardware and software design of microcomputer systems. Basic working principles of microprocessors, memory and I/O devices, bus interconnections, assembly language programming, integration of hardware and software design. Serial communications, parallel interfacing, interrupts and interrupt handlers, timing analysis and delay handling in microcomputer circuits. A term project involving the design and implementation of a self-contained microcomputer system for a specific purpose (i.e., embedded system) will be assigned, in addition to regular software/hardware lab assignments.

## Reference Material:

- PIC24FJ256GB110 Family Data Sheet
- MPLAB<sup>®</sup> Assembler, Linker and Utilities for PIC24 MCUs User's Guide
- dsPIC30F/33F Programmer's Reference Manual
- PIC24 Family Reference Manuals (contains detailed peripheral information)
- MPLAB<sup>®</sup> XC16 C Compiler User's Guide
- R. Reese, J. W. Bruce, B. A. Jones, *Microcontrollers: From Assembly Language to C Using the PIC24 Family*, Course Technology, 2009.

**Computer Usage:** Assembler and C in MPLAB<sup>®</sup> X IDE.

## Course Information and Software Resources:

- EE308 Course Web Page : <http://acoustics.sabanciuniv.edu/ee308/>
- Microchip Website : <http://www.microchip.com>
- Mississippi State ECE3724 Page : <http://sites.google.com/site/ece3724/Home>

**Goals:** To develop the engineering skills of the students to design microprocessor based systems.

## Prerequisites by Topic:

- Analysis and design of logic circuits.
- Basic computer organization, number representations and basic computing algorithms.
- Register transfer microoperations, datapaths, sequencing and control.
- C programming.

## Weekly Schedule:

01	28/02–04/03	Basic microcomputer structure	
02	07/03–11/03	Microcomputer programming: basics	
03	14/03–18/03	Microcomputer programming: memory management	
04	21/03–25/03	Microcomputer programming: I/O management	Lab#1
05	28/03–01/04	Microcomputer programming: data structures	
06	04/04–08/04	Interrupt interfacing and management I	Lab#2
07	11/04–15/04	Interrupt interfacing and management II	
08	18/04–22/04	Device driver design	Lab#3
09	25/04–29/04	Keypad, ADC/DAC and display device interfacing	MIDTERM
10	09/05–13/05	Serial interfacing: asynchronous protocols	Lab#4
11	16/05–20/05	Serial interfacing: synchronous protocols	
12	23/05–27/05	Sensor Interfacing: protocols and physical layer	Lab#5
13	30/05–03/06	DC Motor interfacing.	
14	06/06–10/06	DC Motor interfacing.	Project

## General Rules

- Homework and lab assignments are announced one week before the deadline.
- Submission deadlines and exams are never postponed.
- Shuffling of project groups and lab sessions are not allowed.
- No lab make-ups. Midterm make-up one week after the exam, the latest.
- Midterm to be held during lab hours.
- Cheating and late submissions are severely penalized.

**Grading:** Midterm 30%; Lab work & Project 35%; HWs 5%; Final 30%.