King Saud University
College of Engineering **Fall 2024**
Electrical Engineering Dept.

EE353 Introduction to Microprocessors

Instructor:

Dr. Mohammad Siraj, Office G134, siraj@ksu.edu.sa

Office hours: Sunday and Tuesday (12:30 PM – 1:30 PM)
Note: (Meetings can be arranged for only urgent matters if possible)

Text Book:

"Microcontrollers: From Assembly Language to C Using the PIC24 Family" By Jones, B.A., Reese, R.B. and Bruce, J.W., 2nd Edition, Course Technology/Cengage Learning, 2015.

Course outline:

Topic	Chapters
Number System and Digital Logic Review	1
The Stored Program Machine	2
Introduction to the PIC24 Microcontroller Family	3
Unsigned 8/16-Bit Arithmetic, Logical, and Conditional Operations	4
Extended Precision and Signed Data Operations	5
Pointers and Subroutines	6
The PIC24HJ32GP202: System Startup and Parallel Port I/O	8
Interrupts and a First Look at Timers	9

Grading Policy:

Mid-Term Exams: One Mid Term	30%
Quizzes (weekly) + Home Works	25% + 5%
Final Exam	40%

Note: The grading policy may be updated later and will be announced.

Exams Grading Policy (midterm and final exams):

- The answer must be well organized! I will not follow unorganized answers!
- You have to show me how you get the answer (steps). Otherwise, it will be graded as incorrect!
- You have to use pens (not pencils), *only*!

Mid-term Exams Dates:

To be announced

Notes:

1. *If you miss any mid-term exam, there will be no makeup test for any given reasons*

Attendance Policy:

Attendance will be taken at every lecture. Students with less than 75% attendance will be forbidden from entering the final exam. In addition, all students who are late more than five minutes for the lectures will not be allowed to enter the classroom.

Cheating Policy:

Cheating and plagiarism of any kind will not be tolerated. This includes giving answers as well as taking them. This applies to any course work, tests, quizzes and homework. Each person's answers to an assignment should be his alone and should not be identical to another student's work. Cheating will result in a grade of "F" for all persons involved, if convicted.

Weekly Teaching Plan:

Subjects	Week
Chapter 1- Number System and Digital Logic Review Binary Data Unsigned Number Conversion Binary and Hex Arithmetic Combinational Logic Functions Combinational Building Blocks Sequential Logic Sequential Building Blocks Encoding Character Data **Memory Design**	Week 1 1st, 2nd, and 3rd Lectures
Chapter 2- The Stored Program Machine Finite state machine design A Stored Program Machine Modern Computers	Week 2: 1st, 2nd, and 3rd Lectures
Chapter 3- Introduction to the PIC24 Microcontroller Family Introduction to Microprocessors and Microcontrollers The PIC24 Microcontroller Family Data Transfer Instructions and Addressing Modes Basic Arithmetic and Control Instructions A PIC24 Assembly Language Program The Clock and Instruction Execution	Week 3: 1st, 2nd, and 3rd Lectures

Chapter 4- Unsigned 8/16-Bit Arithmetic, Logical, and Conditional Operations Bitwise Logical Operations, Bit Operations The Status Register Shift and Rotate Operations Mixed 8-Bit/16-Bit Operations, Compound Operations Conditional Execution Using Bit Tests Unsigned Conditional Tests Complex Conditional Expressions Looping	Week 4: 1st, 2nd, and 3rd Lectures
Chapter 8- The PIC24HJ32GP202: System Startup and Parallel Port I/O High-Level Languages versus Assembly Language C Compilation for the PIC24 μC PIC24HJ32GP202 Startup Schematic Parallel Port Operation LED/Switch I/O and State Machine Programming	Week 5: 1st, 2nd, and 3rd Lectures
Chapter 6- Pointers and Subroutines An Introduction to C Pointers PIC24 Indirect Addressing Modes Arrays and Pointers in C Subroutines The Stack and Call/Return, Push/Pop Implementing Subroutines in Assembly Language Stack Frames for Function Parameters and Local Variables	Week 6: 2nd, and 3rd Lectures
Chapter 9- Interrupts and a First Look at Timers Interrupt Basics PIC24 μC Interrupt Details ISR Functions in C Change Notification Interrupts INTx External Interrupts, Remappable Pins Periodic Timer Interrupts	Week 7: 1st, 2nd, and 3rd Lectures
Chapter 5- Extended Precision and Signed Data Operations Extended Precision Operations Signed Number Representation Operations on Signed Data Branch Instruction Encoding	Week 8: 1st, 2nd, and 3rd Lectures