1. **Course number and name:** ECE 2510: Introduction to Microprocessors I

2. **Credits and contact hours:** 4 credits and 6 hours

3. **Course coordinator:** Fahad Saeed, Assistant Professor


5. **Course Information**
   b. Prerequisites: ECE 2500 and CS 1110; with a grade of “C” or better in all prerequisites.
   c. This is a required course for electrical engineering.

6. **Specific goals for the course**
   a. **specific outcomes of instruction**
   
   [1] The student will understand components of the computers, microprocessors and microcontrollers (a,b,c,e,k)
   
   [2] The student will learn role of CPU, registers, and modes of operation of Motorola 68HC12/HS12/IA-32 (a,b,c,e,k)
   
   [3] The student will understand concept of memory mapping (a,c,e,k)
   
   [4] The student will learn addressing modes (Immediate, direct, extended, indexed, indexed-indirect, inherent and relative addressing modes) (a,b,c,e,k)
   
   [5] The student will learn Motorola 68HC12/HC12/HS12/IA-32 instruction sets (Load, store, transfer, move, arithmetic logic conditional and unconditional branch, loop, condition code, interrupt instructions) (a,b,c,e,k)
   
   [6] The student will learn how to write program in assembly language using HC12/HS12 assembler and debugging (a,b,c,e,k)
   
   [7] The student will learn assembly-programming styles, structured assembly language programming (a,b,c,e,k)
   
   [8] The student will learn if-then-else decision, while-do and do-while repetitions (a,b,c,e,k)
   
   [9] The student will learn and program parallel input/output ports of M68HC12 (a,b,c,e,k)
   
   [10] The student will learn Motorola 68HC12/HC12/HS12/IA-32 memory system design, memory capacity, and control signs, memory technologies, linear memory expansion, memory layout design, timing analysis and electrical compatibility, memory paging (a,b,c,e,k)
   
   [11] The student will learn interrupt vectors, interrupt process, interrupt priorities, external and advanced interrupts (a,b,c,e,k)

   b. **ABET list of topics to be covered:** This course contributes to the attainment of the following student learning outcomes $a, b, c, e, h,$ and $k$. ABET learning outcomes $h, i$ and $k$ are directly assessed in this course.

7. **Brief list of topics to be covered**

   1. Introduction to the microprocessors, microprocessors and basic definitions
   2. Introduction to Motorola 68HC12 and HC12/HS12/IA-32 hardware, instruction set, and addressing modes
3. Assembly language programming, Motorola 68HC12/HC12/HS12 instruction set as well as IA-32 instruction set
4. The debug, a software development program, ICC12 IDE environment and DBug12 V.4.4
5. Programs for HC12/HS12 in assembly, and structured assembly language programming
6. MC68HC812A4, MC68HC912B32, and MC9S12DP256 parallel input output interfaces, and Real-time Synchronization
7. MHC12/HS12 interrupts, interrupts vectors, interrupt priorities, nonmaskable interrupt, external interrupt sources, advanced interrupts
8. M68HC12 Memory Map, MC68HC912B32 Flash EEPROM, Flash EEPROM hardware interlocks, expansion memory and interfacing to the external bus
9. MHC12/HS12 timers, basic timer, sixteen-bit free-running TCNT Register, real-time interrupt external interrupts using timer interrupts.