1. **Course Number and Course Title:**

   COE 241– Microcontrollers: Programming and Interfacing

2. **Credit Hours:**

   3-3-4

3. **Prerequisites and/or Co-Requisites:**

   Prerequisite: CMP 120 (Programming I) and COE 221 (Digital Systems) and ELE 211 (Electric Circuits I) or ELE 225 (Electrical circuits and devices)

4. **Name and Contact Information of Instructor:**

   Dr. Abdul-Rahman Al-Ali

5. **Course Description (Catalog Description):**

   Examines the basic hardware building blocks, addressing modes and instruction sets of microprocessors and microcontrollers. Introduces selection criteria for microcontrollers. Covers digital and analog input/output, timers, interrupts and serial communications, programming and interfacing.

6. **Textbook and other Supplemental Material:**

   Textbook:
   - Available in AUS library as ebook: (Free softcopy, one chapter at a time):

     Microcontrollers: From Assembly Language to C Using the PIC24 Family, by Robert B. Reese, J. W. Bruce, and Bryan A. Jones, 2nd edition, 2014:
     http://aus.libguides.com/c.php?g=477078&p=3262100

   Supplemental material:
   - Class Notes are enough and will be uploaded in advance to ilearn.

7. **Course Learning Outcomes:**

   Upon completion of the course, students will be able to:
   1. Describe the selection criteria for microcontrollers and the programming model of a generic microprocessor and microcontroller.
   2. Program a microcontroller using a high-level language
   3. Utilizing microcontroller digital I/O and analog I/O ports for interfacing applications.
   4. Implement interrupts/timers operations and utilize them for interfacing applications.
   5. Use microcontroller for serial communication.
   6. Interface a real-time process to a microcontroller and program the later to monitor, control, and operate such process.
   7. Analyze various types of addressing modes and develop assembly based programs.

8. **Teaching and Learning Methodologies:**

   Methods include lectures, labs, homework, quizzes, exams and class discussions.

9. **Course Topics and Schedule:**

Topic	Weeks
Examine the basic hardware building blocks of microprocessors and microcontrollers and their selection criteria.	1st week of classes

Data organizations, data types	2nd week of classes
Programming and interfacing microcontroller using high-level language	3rd & 4th weeks of classes
Digital input and output ports programming and interfacing	5th week of classes
Analog inputs programming and interfacing	6th, 7th, 8th weeks of classes
Timers programming and interfacing	9th & 10th week of classes
Introduction to interrupts and memories	11th week of classes
Serial communications programming	12th week of classes
Addressing modes and instruction sets	13th week of classes
Programming and interfacing microcontroller using low-level language (Assembly Language).	14th & 15th weeks of classes
Review	16th week of classes
Total:	**16**