1. **Course number and name:** CMSE222, Introduction to Computer Organization

2. **Credits and contact hours, and categorization:** 4 credit hours, two 2-houre lecture per week; 2-houres lab per week, enginereeeing topic

3. **Course instructor:** Prof. Dr. Omar Ramadan

4. **Text books:**
   - Digital Design: Principles and Practices, Prentice-Hall, J. F. Weakerly, 2006
   - Computer Organization and Design: The Hardware/Software Interface, 5th, Morgan Kaufmann, D.A. Patterson and J.L. Hennessy, 2014.

   a. **Other supplemental materials:**
   - Digital Design Essentials, Prentice-Hall, Richard S. Sandige, 2002.
   - Computer Architecture: A Quantitative approach, 3rd Ed., Morgan Kaufmann, J.L. Hennessy and D.A. Patterson, 2003.

5. **Specific course information**

   a. **Catalog description:**

   The main concern of this course is to provide a comprehensive overview of digital logic circuit design and computer architecture with specific emphasis on the following topics: Numbering systems, Boolean Algebra, Simplification of Boolean functions. Combinatorial logic. Synchronous sequential logic, registers, and counters. Introduction to computer organization with specific emphasis on design of reduced instruction set computers. Describe the instruction set architecture of a processor, Analyze, write, and test assembly language programs, understanding the machine language instructions, Design the datapath and control of a single-cycle CPU

   b. **Prerequisite:** MATH163 (Discrete Mathematics)

   c. **Required/elective/ selected elective:** required course

6. **Specific goals for the course**

   a. **Course outcomes:**

   After successfully completing this course, students will be able to:

   1. Learn and represent numbers in various numbering systems like binary, octal, and hexadecimal numbering systems

   2. Understand the basic identities of Boolean algebra and perform algebraic manipulations of Boolean expressions.

   3. Use K-map to simplify Boolean functions.

   4. Analyze and design combinational circuits and find their functions.

5. Understand the difference between Combinational logic circuit and synchronous sequential logic.

6. Understand the concept of latch memory, flip-flop, registers, Memory.

7. Learn the fundamentals of computer instruction set architecture, including machine-level instruction formats and addressing modes

8. Describe the difference between RISC and CISC instruction sets

9. Write, to encode, and to run a simple assembler program on a MIPS processor.

10. Perform the basic structure and organization of a MIPS processor data-path and control (single cycle approach).

b. Student outcomes listed in Criterion 3

ABET Outcome:

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

7. Topics covered

- Numbering systems
- Boolean Algebra, Boolean functions, Simplification of Boolean functions, K-map.
- Combinatorial logic circuits analysis and design
- Introduction to synchronous sequential logic, registers, Memory.
- Introduction to computer organization
- Introduction to MIPS assembly language, Machine language instructions.
- Introduction to processing unit design: data path and control (single cycle approach).

8. Grading

	Method	Percentage
Assessment (Tentative)	Midterm Exam	25%
	Quiz(s)/HW(s)	20
	Labs	15 % (5% attendance , 5% Lab work, 5% Quiz)
	Final Examination	40%
Policy on makeups: For eligibility to take a makeup exam, the student should bring a medical report within 3 working days of the missed exam. You will have only one make-up for Midterm or Final.		
Policy on cheating and plagiarism: Any student caught cheating at the exams or assignments will automatically fail the course and may be sent to the disciplinary committee at the discretion of the instructor.		
Policy on NG grades: NG grade will be given in case of missing any exam without an acceptable excuse. NG will also be given in case of poor Lab attendance.		