

The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2023/2024



Course: Microprocessor Systems & Languages – 0903232 (3 Cr. – Required Course)

Instructor: Dr. Hani Jamleh

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Office Hours: Will be posted soon

Platform: Moodle (<https://elearning.ju.edu.jo/>)

Catalog description: Microprocessor organization, architecture and software model. Modern architectures and their evolution: Intel x86 architecture, ARM architecture, RISC-V architecture, etc. Memory hierarchy: Cache memory, main memory and external memory. Cache organization. Instruction set architecture. Complex instruction set computer (CISC) versus reduced instruction set computer (RISC). Machine language and program execution. Data representation. Microprocessor memory addressing modes. Assembly language fundamentals. Data Transfer Instructions. Arithmetic and logic instructions. String comparisons. Program control instructions. Jump instructions. Stacks and subroutines. Software interrupts. Development of simple assembly programs. Using the assembler/linker. Microprocessor arithmetic and logic unit (ALU): adders, subtractors, multipliers and dividers. Binary representation of floating-point numbers and their arithmetic. Control unit. Data path design. Processor cycles and pipelining. Introduction to branch prediction and speculative execution. Basics of processor performance evaluation. The microprocessor bus architecture. Introduction to memory and I/O interfacing. Introduction to DMA-controlled input/output, and modern system buses: PCI, USB, etc.

Prerequisites by course: CE0907231 Digital Logic (pre-requisite)

Prerequisites by topic: Students are assumed to have a background in the following topics:
• Computer programming, numbering systems, binary arithmetic & logic operations.

Textbook: Computer Organization and Design RISC-V Edition by David A. Patterson and John L. Hennessy, Morgan Kaufmann, 1st Edition, 2017.

- References:**
1. Modern X86 Assembly Language Programming by Daniel Kusswurm, Apress, 2nd Edition, 2018.
 2. Computer Organization and Architecture by William Stallings, Pearson, 10th Edition, 2015.
 3. The Essentials of Computer Organization and Architecture by Linda Null and Julia Lobur, Jones & Bartlett Learning, 5th Edition, 2018.
 4. Computer Architecture: A Quantitative Approach by John L. Hennessy and David A. Patterson, Morgan Kaufmann, 6th edition, 2017.
 5. Computer Organization and Design ARM Edition by David A. Patterson and John L. Hennessy, Morgan Kaufmann, 1st Edition, 2016.
 6. Modern Computer Architecture and Organization by Jim Ledin, Packt Publishing; 1st edition, 2020.
 7. Assembly Language for x86 Processors by Kip Irvine, Pearson, 7th Edition, 2014.
 8. Intel Microprocessors: Architecture, Programming and Interfacing by Barry B. Brey, Prentice Hall, 8th Edition, 2008.

Schedule: Online [16 Weeks, 42 lectures (50 minutes each) including exams]

Course goals: The overall objective is to introduce the student to the fundamentals of computer architecture including: instruction set architecture, memory addressing modes, assembly programming, computer organization and microprocessor system design.