The University of Jordan

School of Engineering

Computer Engineering Department

Spring Term – A.Y. 2022-2023

Course	Computer Architecture and Organization (1) – 0917335 (3 Cr. – Core Course)
Catalog Description	Introduction to computer organization. Computer instruction set. Machine language. Data processing. Arithmetic and logic unit, Carry look-ahead adders, multipliers and dividers. Floating-point number representation and arithmetic. Data path design. Control unit design. Microprogramming. Pipelining.
Prerequisites by Course	Digital Logic (0907231)
Prerequisites by Topic	Students are assumed to have had sufficient knowledge pertaining to digital computers and their internal and external components, the design and analysis of digital logic circuits; combinational and sequential.
Textbook	Patterson and Hennessy. Computer Organization & Design RISC-V Edition: The Hardware/Software Interface, 2nd ed., Morgan Kaufmann, 2020.
References	1. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, 6th ed., Morgan Kaufmann, 2017. 2. J. Hayes. Computer Architecture and Organization, 3rd ed., McGraw-Hill, 1998. 3. M. Mano. Computer System Architecture, 3rd ed., Prentice Hall, 1993.
Course Website	MS Teams
Schedule & Duration	15 Weeks: (32 lectures, 75 minutes each / 45 lectures, 50 minutes each)
Student Material	Text book, class handouts, some instructor keynotes, and access to a personal computer and the internet.
College Facilities	Classroom with whiteboard and projection display facilities, library, and computer laboratory.
Course Objectives	This course introduces the students to the basic concepts of computer organization at a number of different levels; this includes: 1. Understanding how data is represented and manipulated inside computers. 2. Basic organization of instruction sets, language translation, and program execution. 3. Analyzing and designing the basic datapath and control units of the processor. 4. Assessing and evaluating processor performance and its factors. 5. Identifying and understanding the difference and operation of single-cycle, multi-cycle, and pipelined processors.

Course Outcomes and Relation to ABET Program Outcomes

Upon successful completion of this course, a student should be able to:

1. Understand simple machine architecture and the reduced instruction set computers [1].
2. Write simple RISC-V assembly language programs [1].
3. Understand basic data flow through the CPU (interfacing and internal communications) [1].
4. Build, analyze, and modify simple processor datapath and control (Single-Cycle, Multi-Cycle, and Pipeline) [1].

Course Topics

1. Computer Abstractions and Technology (Sections 1.1–1.4 and 1.6)
2. RISC-V Instruction set (Sections 2.1–2.11)
3. Computer Arithmetic (Appendix A.5, Appendix A.6, and Sections 3.1–3.5)
4. The Processor Control and Datapath (Sections 4.1–4.9)

Computer Usage

Practical aspects of the course are covered in Computer Design Lab 0907439.

Policies

- Attendance is required. Class attendance will be taken every class and the university's polices will be enforced in this regard. **(Maximum allowed absences = 15% of all classes)**.
- All submitted work must be yours
- Cheating will not be tolerated
- Check department announcements at: http://www.facebook.com/pages/Computer-Engineering-Department/369639656466107 for general department announcements.

Assessments

Quiz, Assignment, and Exams

Grading policy

Quizzes/Assignment	20%
Midterm Exam	30%
Final Exam	50%

Instructors

Dr. Waleed Dweik, w.dweik@ju.edu.jo

Office Hours: Sun, Tue and Thu: 10:30 – 11:30 AM
Mon and Wed: 12:00 – 1:00 AM

Class Time

Section 1:	Sun, Tue and Thu:	9:30 AM – 10:30 AM
Section 2:	Mon and Wed:	10:00 AM – 11:30 AM

Program Outcomes (PO)

1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	an ability to communicate effectively with a range of audiences
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.