

The University of Jordan
School of Engineering
Computer Engineering Department



Academic Year:	2026 / 2027
Semester:	Fall
Course:	0917432 Computer Architecture and Organization (2) 3 Credits / Dept. Obligatory
Catalog Description:	Exploiting instruction level parallelism, hardware and software approaches. Pipelined, Super scalar, and VLIW processors. Predication, Branch Prediction, and Control and Data Speculation. Case Studies of Modern Processors. Hierarchical Memory Design. Virtual memory. Input/Output Interfacing and System Integration.
Prerequisite(s):	0917335 Computer Architecture and Organization (1)
Co-requisite(s):	None
Background:	Students are assumed to have had sufficient knowledge pertaining to digital logic design, RISC-V instruction set architecture, computer arithmetic, processor datapath and control design, single-cycle and multi-cycle, implementations of processors.
Textbooks:	1. Patterson and Hennessy. Computer Organization & Design RISC-V Edition: The Hardware/Software Interface, Second ed., Morgan Kaufmann, Elsevier Inc., 2021.
References:	2. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, 7th ed., Morgan Kaufmann, Elsevier Inc., 2025. 3. J. P. Shen and M. H. Lipasti. Modern Processor Design: Fundamentals of Superscalar Processors, Mc Graw Hill, 2005. 4. D. Culler and J.P. Singh with A. Gupta. Parallel Computer Architecture: A Hardware/Software Approach, Morgan Kaufmann, 1998. 5. J. Hayes. Computer Architecture and Organization, 3rd ed., McGraw-Hill, 1998. 6. Course Slides
Course Website:	https://www.abandah.com/gheith/?page_id=3332 Microsoft Teams
Schedule & Duration:	16 Weeks, 42 lectures, 50 minutes each; or 32 lectures, 75 minutes each (including exams)
Student Material:	Text book, class handouts, some instructor keynotes, and access to a personal computer and the internet.
Facilities:	Classroom with whiteboard, smart board, projector, library, and computer laboratory.

- Course Objectives:**
1. Introduce students to the technological changes in designing and building processors and computers.
 2. Introduce students to the advanced techniques used in modern processors including pipelining, branch prediction, dynamic and speculative execution, multiple issue, and software optimizations.
 3. Introduce the students to the basic concepts and technologies used in designing memory and storage systems including cache, main memory, virtual memory and secondary memory.

Course Outcomes and Relation to ABET Program Outcomes:

- Upon successful completion of this course, a student should be able to:
1. Understand and analyze the performance of single-processor architectures [SO1].
 2. Understand and analyze the performance of memory hierarchy levels [SO1].
 3. Understand the technological improvements and the effect of these improvements on modern computers [SO4].
 4. Survey research papers that describe contemporary issues in computer design [SO3, SO4, SO7].

Course Topics:

1. Introduction
2. Computer Technology and Performance (Sections 1.2, 1.5, 1.7–1.9)
3. Processor: Instruction-Level Parallelism (Sections 4.6–4.12, 4.15–4.16)
4. Selected Topics from Parallel Processors (Sections 6.3 and 6.4)
5. Memory Hierarchy (Sections 5.1–5.11, 5.13, 5.16–5.17)

Computer Usage:

Practical aspects of the course are covered in Computer Organization Lab 0917439.

Policies:

- Attendance is mandatory. Be ready to participate in solving class problems.
- All submitted work must be your own; cheating, plagiarism, unauthorized AI-generated work, or improper use of AI tools will result in academic penalties.
- Professional conduct, timely communication, and adherence to assessment schedules are expected throughout the course.
- The use of any electronic or communication device, including but not limited to calculators, smartwatches, mobile phones, tablets, laptops, wearables, or any other electronic gadgets, is strictly prohibited during exams.
- Refer to the relevant student bylaws on <https://units.ju.edu.jo/ar/LegalAffairs/Regulations.aspx>

Assessment Tools & Grading:

☐ First Exam	0%	☒ Midterm Exam	30%
☒ Final Exam	50%	☒ Quizzes	6%
☒ Assignments	4%	☐ Projects	0%
☒ Other: 10% Technology Trends Research Assessment			

Instructor(s):

Prof. Gheith Abandah (abandah@ju.edu.jo)

Homepage: <https://www.abandah.com/gheith>

Office Hours: Sun Tue Thu 10:00–11:00, Mon 12:00–13:00, Wed 8:30–9:30

Section(s):

Section 1: CPE 001, Sunday, Tuesday and Thursday 08:30 – 9:30

Important Dates	Date	Event
	Sun 11/10/2026	First Lecture
	Sun 1/11/2026	Homework 1 Due
	Tue 3/11/2026	Quiz 1 and Announcement of the Research Topic
	Sun 29/11/2026	Homework 2 Due
	Tue 1/12/2026	Midterm Exam
	Sun 27/12/2026	Homework 3 Due
	Tue 29/12/2026	Quiz 2 and Research Assessment
	Sun 10/1/2027	Homework 4 Due
	Tue 12/1/2027	Last Lecture
	Wed 13/1/2027	Last Date to Withdraw
	Sun 17/1 – Thu 28/1/2027	Final Exam Period

Student Outcomes (SO)

- SO1.** An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- SO2.** 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.
- SO3.** An ability to communicate effectively with a range of audiences.
- SO4.** 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
- SO5.** 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.
- SO6.** An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- SO7.** An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Last modified: [October 8, 2026]