Hashemite University
College of Engineering
Department of Computer Engineering
Fundamentals of Computer Architecture
(3 Credit Hours/Dept. Compulsory)

Instructor

Dr. Khalil Yousef	
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Office hours:	Posted on the course Moodle Page

Grading info

Midter Exam	30%
Quizzes	30%
Final	40%

Class Info

Days	Sec1:Sun/Tus/Thus
Time	Sec1: 09:00-10:00 AM
Location	E 2013

Course

Course Number:	110408343
Prerequisite:	Computer Design and Organization (110408240)
Textbook:	**"Computer Organization and Architecture: Designing for Performance"**, 8th, 9th, 10th and 11th Editions, William Stallings, published by Prentice Hall. http://williamstallings.com/ComputerOrganization/COA11e/ https://media.pearsoncmg.com/ph/esm/ecs_stallings_coa11e/cw/
Course Description:	This is an introductory course on Computer and Processor Architectures. The course will cover a range of topics in the area of computer architecture with the objective of providing an exposure to current and emerging trends in Computer Architectures, focusing on the performance and the hardware/software interface. The emphasis is on studying and analyzing fundamental issues in architecture design and their impact on performance. The course will have a mix of theory, hardware, and software --- it will not conduct in-depth case studies of different architectures.
Specific Outcomes of Instruction (Course Learning Outcomes)	1. **List** components and principles of computer architecture and the computer evolution. Also being able to understand and list some examples of existing computer architectures (CISC and RISC). SO(1) 2. **Discuss**, explain, and evaluate different performance metrics of computer systems in terms of space and time tradeoffs, and possible performance speed-up gain. SO(1) 3. **Compare** between different classes of computers using CPU execution time. SO(1) 4. **Determine** possible speed-up gain obtained from using some sort of parallel processing (Amdahl's law). SO(1) 5. **Analyze** a memory hierarchy in addition to interfacing processors and peripherals. SO(1) 6. **Understand** and analyze the mapping of the cache memory system. SO's (1, 4) 7. **Distinguish** between different I/O techniques for performing the I/O operations. SO's (1, 4) 8. **Understand** the needs for having the RISC architecture and distinguish between hardware and software techniques to exploit parallelism. SO's (1, 4) 9. **Understand** and analyze the Superscalar architecture and its main operations and employed techniques. SO's (1, 4) 10. **Know** about the control unit and its importance of how things get to be performed on the computer (e.g. the execution of instructions). SO's (1, 4)
Important material	- Lecture notes - References - Internet resources

References:

- **Computer Organization and Design: The Hardware-Software Interface**, Fifth Edition, David Patterson and John Hennessy, 2013.
- **Computer Architecture: A quantitative approach: Fifth Edition**, D. A. Patterson and J. L. Hennessy, Morgan Kaufmann, 2011.

Major Topics Covered and Schedule in Weeks:

Topic	# Weeks	# Contact hours*
Introduction to Computer Organization and Architecture	2	6
Computer Evolution and Performance	2	6
Memory Systems - Cache Memory	2	6
Input/Output	2	6
Reduced Instruction Sets Computers	2	6
Instruction-Level Parallelism and Superscalar Processors	2	6
Control Unit	2	6
Total	**14**	**42**

Course Policy

- The course will follow selected subjects as listed on the course schedule. Additional lecture notes and examples will be given and discussed in class as much as time permits.
- Students are responsible for the reading assignments from the text and handouts
- Students are responsible for following up the lecture materials
- Students are responsible for reading additional information and examples in order to understand the materials discussed in the lectures.
- If you miss class, there won't be a makeup test, quiz, etc. and you WILL get a zero unless you have a valid excuse.
- Cheating and plagiarism are completely prohibited.
- If you miss more than 15% of classes, you will automatically fail the class.

ABET Student Outcomes (SO) Addressed by the Course:

#	*Outcome Description*	*Contribution*
General Engineering Student Outcomes		
(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. *(Previously SO's (a, e, k))*	***H***
(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. *(Previously SO's (c, k))*	
(3)	An ability to communicate effectively with a range of audiences. *(Previously SO (g))*	
(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. *(Previously SO's (f, h, j))*	***H***
(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. *(Previously SO (d))*	
(6)	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. *(Previously SO's (b, k))*	
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. *(Previously SO (i))*	

H=High, **M**= Medium, **L**=Low

Prepared By: Dr. Khalil Yousef **Date: 10/10/2020**