King Abdullah II School of Engineering
كليـــــة الملك عبد الله الثاني للهندســـة

COURSE OUTLINE

Course Code	22541		
Course Title	Computer Architecture		
Course Prerequisite(s) /	22242 Computer Organization and Assembly		
Credit Hours	3 credit hours		
Course Type	Lecture		
Course Delivery Method	Face to Face		
Required or Elective	Required for Computer Science		
Semester	Fall 2022/2023		
Instructor Name	Dr. Awos Kanan		
Instructor's email	a.kanan@psut.edu.jo		
Instructor's Office Number	EE 453		
Course Schedule	1:30 p.m. –3:00 p.m.(M, W)		
Office Hours	11:00 a.m. -12:00 p.m.(S,T, Th),12:30 p.m. -1:30 p.m.(M,W)		
Assessment Tools & Grading Policy	**Assessment Tool**	**Weight**	**Additional Information**
	First Exam	25%	
	Second Exam	25%	
	Final Exam	40%	
	Quizzes	10%	3 Quizzes
Catalog Description	Computer Evolution, Computer Performance, Reduced Instruction Set Computers (RISCs) architecture. A RISC assembly language. Single Cycle and Pipelined Processors. Pipelining Hazards. Memory & Storage Hierarchy: caches & performance, memory organization and virtual memory. Parallel Processing. SMPs, clusters, and NUMA systems.		
General Course Objectives	This course introduces advanced topics in CPU design and operation. Students will learn the state-of-the-art techniques used in modern CPU designs. In addition, it will introduce the modern trends in parallel computing. Students will also learn the fundamentals of memory hierarchy especially caches and virtual memory, basic storage and I/O concepts.		
Textbook and Related Course Materials	1- Computer Organization & Design RISC-V Edition: The Hardware/Software Interface, 2nd Ed. David Patterson & John Hennessy, Morgan Kaufmann, 2020. 2- PSUT e-learning site: http://www.elearning.psut.edu.jo/		
Topics Covered and Level of Coverage	Computer Evolution + Computer Performance		Week 1
	Computer Performance + MIPS Architecture		Week 2
	MIPS assembly language -Part I		Week 3
	MIPS assembly language -Part II + Floating-Point		Week 4
	CPU Design + Single Cycle Processors		Week 5
	Single Cycle Processors – Basic building blocks		Week 6
	Single Cycle Processors – Data path Construction		Week 7
	Pipelined Cycle Processors – Pipeline Stages		Week 8
	Pipelined Cycle Processors – Pipeline Construction		Week 9
	Pipelining Hazards + Memory & Storage		Week 10
	Memory Organization		Week 11
	Cache Performance		Week 12
	Virtual Memory		Week 13
	Parallel Processing + SMPs + GPUs		Week 14
Expected Level of	Mathematics	Good	
	Physics	N/A	

Proficiency for Students Entering the Course	Technical writing	N/A		
	Computer programming	Good		
Materials Available to Instructor, Students &Department at End of Course		Students	Department	Instructor
	Course Outline	✔	✔	✔
	Lecture Notes	✔	✔	✔
	Samples of Students' Work		✔	✔
	Course Assessment by Students (CAS)		✔	✔
	Course Assessment by Faculty (CAF)		✔	✔

No	Course Learning Outcomes (CLOs)	Student Outcomes (SOs)
1	Evaluate computer performance.	1
2	Analyze the execution of high-level code by CPUs	1
3	Learn fundamentals of pipelined CPU design	1, 2
4	Analyze the performance of memory hierarchy	1
5	Understand the basics of parallel computing	1

ABET – Student Outcomes (1-7)

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.