



Al-AI Bayt University
 Prince Hussein bin Abdullah Faculty of Information Technology
 Computer Science Department

Course Syllabus

Course Title	Advanced Computer Architecture	Course Code	901780
Coordinator	Dr. Najah Al-shanableh	Prerequisite(s)	
E-mail	Najah2746@aabu.edu.jo	Credit Hours	3
Office Hours	Sunday and Tuesday : 9:30 -11:00 am Monday and Wednesday: 11:00 am – 12:00 pm		
Course Is	<input checked="" type="checkbox"/> Required		<input type="checkbox"/> Elective

Course Description:

This course provides the basic knowledge necessary to understand the hardware operation of digital computers and covers the three subjects associated with computer hardware. Topics include quantitative principles of computer architecture design, instruction set design, processor architecture: pipelining and instruction level parallelism, cache and virtual memory, multiprocessors, multi-computers and interconnection network, message passing, wormhole routing, and case studies.

Course Learning Outcomes (CLO):

By the end of this course, the student is expected to be familiar with the organizational paradigms which determine the capabilities and performance of computer systems, and to understand the interactions between the computer's architecture and its software so that future software designers (compiler writers, operating system designers, database programmers?) can achieve the best cost-performance trade-offs and so that future architects understand the effects of their design choices on software applications.

Textbook(s)

Title	Computer Architecture: A Quantitative Approach*		
Author(s)	J. L. Hennessy and D. A Patterson	Publisher	Morgan Kaufman
Edition	5th Edition	Year	2012

References	
Book Titles (Author(s), Title, Edition, Publisher, Year)	Website URL (if available)
Computer System Architecture, by M. Morris Mano 3rd Edition, Pearson Education, 1993	

Course Calendar with Handouts				
Note: Tentative, schedule subject to change!				
Week #	Date	Lecture	Readings 5th Edition	Assignments/Readings
1	Wed Feb 6	Introduction, Early Machines Simple Machine Implementations, Microcoding	Ch. 1, App. A	
2	Wed Feb 13	Pipelining	App. C.1-C.3	
3	Wed Feb 20	Memory Hierarchy	App. B.1-B.2, Ch. 2.1-2.3 App. B.3	CS252 Readings Discussion "The Case for the Reduced Instruction Set Computer" , Patterson, Ditzel, 1980 Comments on the "The Case for the RISC" , Clark, Strecker, 1980 "Performance from architecture: comparing a RISC and CISC with similar hardware organization" , Bhandarkar, Clark, 1991
4	Wed Feb 27	Address Translation and Protection , Virtual Memory	App. B.4-7	
5	Wed March 6	Complex pipelines, out-of-order issue, register renaming	Ch. 3.1,3.4-3.5	
6	Wed March 13	Out-of-order execution	Ch. 3.6, 3.8	"IBM's Single-Processor Supercomputer Efforts" , Smotherman, Spicer, CACM, 53(1), 2010 "Implementation of Precise Interrupts in Pipelined Processors" , Smith, Pleszkun, ISCA, 1985 (IEEE Trans. Computer Journal version) "Parallel Operation in the Control Data 6600" , Thornton, Proceedings of the Fall Joint Computers Conference, vol 26, pp. 33-40, 1964
7	Wed March 20	Branch Prediction and Advanced Out-of-Order Superscalars		
8	Wed March 27	Advanced Superscalars and VLIW	Ch. 3.2,3.7	
9	Wed April 3	Multithreading	Ch. 3.12	
10	Wed April 10	Vectors	Ch. 4.1-4.3 (App. G)	Readings Discussion "Combining Branch Predictors" , McFarling, DEC WRL Technical Note TN-36, 1993

				<p>"Dynamic Branch Prediction with Perceptrons", Jimenez, Lin, HPCA 2001</p> <p>" A case for (partially) TAgged GEometric history length branch prediction ", Sez nec, Michaud, Journal of Instruction Level Parallelism (JILP), 2006</p>
11	Wed April 17	Cache Coherence	Ch. 5.1-5.4	
12	Wed April 24	Synchronization and Memory Consistency Models	Ch. 5.5-5.6	
13	Wed May 1	Labor's Day – No lecture		
14	Wed May 8	Synchronization Primitives and course wrap- up		

Evaluation	
Assessment Tool	Marks
- Mid-term Exam*	30
- Assignments (Reports, Quiz, Seminar, Tutorial, etc.) - Discipline, presence and participation	30
- Final Examination	40

Academic Misconduct
<p>The Student Code of Conduct defines academic misconduct, non-academic misconduct and the consequences or penalties for each. The Student Code of Conduct is available in the AABU Student Handbook online: https://www.aabu.edu.jo/student/current.jsp Academic misconduct is explained here: https://www.aabu.edu.jo/legalaffairs/special_law/law19.doc</p>

Plagiarism
<p>Plagiarism, the passing off of others' words or ideas as your own, is unacceptable in this course and at this university. While it may be naive, I tend to think that most people end up plagiarizing because they are unfamiliar with APA or other formatting guidelines for citations and references. This course emphasizes using citations and references in the APA format to avoid plagiarism.</p>