



Course Specification

Course Name: [Computer Architecture and Organization]

Course Code: [CS322]

I. Basic Course Information

Major or minor element of program: [Both Major and Minor]
Department offering the course: [Computer Science Department]

Academic level: [300 Level]

Semester in which course is offered: [First (Fall) Semester]

Course pre-requisite(s): [CS221 Logic Design]

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	0.0	1.5	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: [September 2014]

II. Overall Aims of Course

- 1- To teach the basic design concepts of computing systems.
- 2- To teach the hardware design concepts necessary for programmers and software engineers.
- 3- To teach the software design concepts necessary for computer designers and architects.
- 4- To teach what it means and requires to be a computer architect.
- 5- To teach the interface and overlap between the hardware and software of a computer system.

III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K5,K18,K19]	[I3,I4,I5,I11]	[P1,P7,P9]	[G2,G8,G9]



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Define the basic blocks of a computing system.
- K.2 Explain the functionality and connectivity of each block.
- K.3 Interpret the machine code and corresponding executing units.
- K.4 Recognize the performance of a computer.]

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Analyze and assess the performance of a computing system.
- I.2 Development of solutions to enhance performance.
- I.3 Modify a computer design.
- I.4 Compare the design and instruction set architecture of different processors.
- I.5 Design a partial Instruction Set Architecture]

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Program the MIPS R2000 processor in Assembly and machine code.
- P.2 Architect an Instruction Set.
- P.3 Design solutions for the processor design given a complete or partial instruction set architecture.]

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Gain Work and Time Organization Skills.
- G.2 Gain the General Professional and Academic Ethics.
- G.3 Focus on Science and Technology Ethics.
- G.4 Think Logically.]

V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	[Introduction (Computer Abstractions and Technology]	[1]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[]	[G1,G2,G3,G4
2-	[Instruction Set Aarchitecture]	[2]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[P1,P2,P3	[G1,G2,G3,G4
3-	[Arithmetic for Computers]	[1]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[]	[]
4-	[Assessing and Understanding Performance]	[1]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[]	[G1,G2,G3,G4
5-	[Processor Design]	[4]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[P1,P2,P3	[G1,G2,G3,G4
6-	[Memory Hierarchy and Operation]	[2]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[P1,P2,P3	[G1,G2,G3,G4
7-	[Multiprocessor Systems]	[2]	[K1,K2,K3,K4	[I1,I2,I3,I4,I5	[P1,P2,P3	[G1,G2,G3,G4
	Net Teaching Weeks	13				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	Computer Abstractions and Technology	2.5	2.5	
2	Instruction Machine Representation	4	2.5	1.5
3	Instruction Design and Addressing	4	2.5	1.5
4	Arithmetic for Computers	4	2.5	1.5
5	Assessing and Understanding Performance	4	2.5	1.5
6	Data path and Control Single Cycle	4	2.5	1.5
7	Midterm Exam			
8	Data path and Control Multi Cycle	4	2.5	1.5
9	Pipelining	4	2.5	1.5
10	Pipelining Hazards	4	2.5	1.5
11	Memory Hierarchy and Operation	4	2.5	1.5
12	Memory Design and Performance	4	2.5	1.5
13	Parallel Computing Paradigms	4	2.5	1.5
14	Multiprocessor Architectures	4	2.5	1.5
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	X	K1,K2,K3,K4			G1,G2,G3,G4
Tutorials	X		I1,I2,I3,I4,I5		
Computer lab Sessions	X			P1,P2,P3	
Practical lab Work	X		I1,I2,I3,I4,I5	P1,P2,P3	
Reading Materials					
Web-site Searches					
Research & Reporting					
Problem Solving / Problem-based Learning					
Projects					
Independent Work					
Group Work	X		I1,I2,I3,I4,I5		
Case Studies					
Presentations					
Simulation Analysis					
Others (Specify):					



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	<input checked="" type="checkbox"/>	[1,2,3,4]	[1,2]	[]	[]	[20%]	7
Final Exam	<input checked="" type="checkbox"/>	[1,2,3,4]	[1,2]	[]	[]	60%	15
Quizzes	<input checked="" type="checkbox"/>	[1,2,3]	[1, 2,3,4,5]	[]	[]	[10%]	[]
Course Work	<input type="checkbox"/>	[]	[]	[1,2,3]	[1,2,3]	[]	[]
Report Writing	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]
Case Study Analysis	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]
Oral Presentations	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]
Practical	<input checked="" type="checkbox"/>	[]	[]	[]	[]	[10%]	[]
Group Project	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]
Individual Project	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]
Others (Specify):	<input type="checkbox"/>	[]	[]	[]	[]	[]	[]

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> • [Patterson and Hennessy: Computer Organization and Design: The Hardware/Software Interface, 4th Ed.]
Course notes	<ul style="list-style-type: none"> • []
Recommended books	<ul style="list-style-type: none"> • []
Periodicals, Web sites, etc ...	<ul style="list-style-type: none"> • []

X. Facilities required for teaching and learning

<ul style="list-style-type: none"> • [Computer Laboratories • Software (SPIM Simulator, Assembler, and Compiler) • Projector • Computer.]
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Course coordinator: [Dr. Ahmed Shawky]

Head of Department: Prof. Abeer El Korany

Date: [September 2014]