Addis Ababa Institute of Technology

Center of Information Technology and Scientific Computing

Computer architecture and organization course outline

Course Title:	Computer architecture and organization		
Course Code:	ITSE-3252	Level	3rd Year
Course Mode:	Theoretical with substantial laboratory content		
Course Prerequisites:	ITSE-1261	Prerequisite	Digital Logic
Lecture:	Room 107		
Lab:	Brown/Orange Lab		
Duration:	A Semester	ECTS	6
Text Book	William Stallings, Computer Organization and Architecture, 8th Edition		
Instructor: Email:	Abebe A (MSc. Computer Science) abia58@gmail.com		
Course Description	This course covers basic topics about computer architecture and organization. The course provides the study of the structure, characteristics and operation of modern-day computer systems including a basic background on the computers evolution, its design process and its internal characteristics which includes processor components, control unit architecture, memory organization and system organization. All internal components of a computer including processors, cache memories, random access memories, magnetic disks, optical memories and input/output connections are considered from an architectural perspective. Integer and floating-point representation in arithmetic logic unit (ALU) with arithmetical operations are explained. Operating system principles and are also described.		
Weekly Schedule			
Week1	Distinction Between Computer Organization and Computer Architecture		
Week 2	History of Computers and the Evolution of Intel Microprocessors		
Week 3	Working principles of microprocessor and Implementation of Interrupts		
Week 4	Computer Interconnection Structures, Bus Interconnection, PCI		
Week 5	Computer Memory System Overview, Cache Memory, Design Elements and Principles of Cache Design		
Week 6	Semiconductor Memories, Random Access Memory, Read Only Memory		
Week 7	Error Detection and Correction in Semiconductor Memories, Advanced DRAM Organization		
Week 8	Midterm Examinations		
Week 9	External Memories, Magnetic Disk, RAID, Optical Memory, Magnetic Tape		
Week 10	External Devices, I/O Modules, I/O Processors, Direct Memory Access, Different External Interfaces		
Week 11	Operating System Overview, Scheduling of Processes		
Week 12	Operating System Memory Management		
Week 13	Arithmetic Logic Unit, Binary Integer Representation, Binary Integer Arithmetic		
Week 14	Binary Floating-Point Representation		
Week 15	Final Examinations		
LAB Session			
Lab 1	Introduction to MARS		
LAB 2	Introduction to MIPS Assembly Language Programming		
LAB 3	Integer Arithmetic		
LAB 3	Reading Inputs		
LAB 4	Flow Control		
LAB 5	Arrays and Files		
LAB 6	MIPS Functions and the Stack Segment		

General Learning Outcomes	On successful completion of this course students should be able to: • Describe computer architecture and organization, computer arithmetic, and CPU design. • Describe how numbers and characters are represented in a computer. • Describe I/O system and interconnection structures of computer. • Draw a block diagram, including interconnections, of the main parts of a computer. • Describe how a computer stores and retrieves information to/from memory and hard drives. • Identify high performance architecture design. • Explain how the cache memory is implemented. • Explain a wide variety of memory technologies both internal and external. • Define the terms: bus, handshaking, serial, parallel, data rate. • Describe various data representations and explain how arithmetic and logical operations are performed by computers.
References:	1. M. Morris Mano, Computer System Architecture, Prentice Hall of India Pvt Ltd, Third edition,2002. ISBN: 81-203-0855-7. 2. Nicholas Carter, Schaum's outline of Computer Architecture, Tata McGraw Hill, 2006.
Course Assessment:	Quiz, Laboratory, Attendance, Participation 10% Midterm Exam 30% Project 20% Final Exam 30%
Attendance Policy:	♣ Each student can have only one make-up exam. ♣ One who misses an exam should provide a medical report or a valid excuse within 3 days after the missed exam. ♣ The make-up exam is done at the end of the term and covers all the topics. ♣ No make-up exam is given for the quizzes/Lab tests. ♣ Students who fail to attend the lectures regularly may be given NG grade. ♣ Once the grades are announced, the students have only one week to do objection about their grades.
Academic Integrity:	Students are expected to be honest and to submit their own work on quizzes, exams and assignments. Cheating during an exam results dismissal from the exam room; as well as a strong penalty from the academic committee.