



Course Specifications

Course Title:	Computer Organization and Architecture
Course Code:	213CNET-3
Program:	Bachelor in Computer and Network Engineering Bachelor in Computer Science Bachelor in Information Technology
Department:	Computer and Network Engineering
College:	College of Computer Science and Information Technology
Institution:	Jazan University

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A. Course Identification

1. Credit hours: 3 hours
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level-5/year-3
4. Pre-requisites for this course (if any): None
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	52	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	22
3	Tutorial	-
4	Others (specify)	8
	Total	52

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description:

This course is about the structure and basic function of computers. Its purpose is to present, as clearly and completely as possible, the nature and characteristics of modern-day computer systems. This course covers all aspects of computer, from the underlying integrated circuit technology used to construct computer components, to the increasing use of parallel organization concepts. This course also focuses on different elements of Computer Organization and Major components which include processor, memory, I/O, control unit, registers, ALU, discussion of cloud computing and instruction execution unit. This course will introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

2. Course Main Objective:

1. Analyze and understand the architecture and organization of computing systems and electronic computer.
2. Provide an introduction to computer processor and memory architectures, and to the design of personal computer systems
3. Describe basics of cloud computing and point-to-point interconnection.
4. Examine the major components of a computer and their interconnections, with both each other and the outside world.
5. Differentiate different types of newer Non-Volatile Solid state memories.
6. Study the program execution, instruction format and instruction cycle.
7. Measure various internal architectures and organizations of the processor.
8. Provide an understanding of the architectural features of modern high performance computers.
9. Understand the fundamentals of Operating Systems and the main components of an OS & their functions.
10. Understand the working of an OS as a resource manager, file system manager, Process manager, memory manager and I/O manager and methods used to implement the different parts of OS.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Explain the various concepts related with functions of operating system, evolution of computers.	K1
1.2	Explain various designing concepts and criteria for performance evaluation for processors.	K2
1.3	Describe various components, functions, interconnection structure, and I/O module techniques of a computer system based on latest trends.	K3
2	Skills :	
2.1	Analyze various memory storage and access techniques based on performance criteria and different approaches of file organization.	S5
2.2	Demonstrate different page replacement algorithms based on page fault calculations, differences between process and thread.	S2
2.3	Apply programs based on various microprocessor concepts in Assembly language.	S2
3	Values:	
3.1	Function to work as a team member and take responsibility for successful completion of group assignment.	V1

C. Course Content

No	List of Topics	Contact Hours
1	<p>Chapter1-Introduction To Computer Organization & Architecture</p> <ul style="list-style-type: none"> • Introduction to computer Organization and Architecture • Structure and function • Structural components of computer • History and generations of computers • Moore's Law and consequences of it. • General and Expanded structure of computers • IAS Memory formats and structure of IAS computer • Cloud Computing (Basic concepts, Cloud Services (SaaS,IaaS,PaaS) • Architecture and organization of operating system • Operating system services and • system calls 	4T + 4P
2	<p>Chapter 2-Computer functions and interconnections</p> <ul style="list-style-type: none"> • Computer components • Instruction fetch and execute • Interrupts • Multiple Interrupts • Interrupt Instruction Cycle • Interconnection building • Bus Interconnection • QPI • Point-to-point interconnect 	4T + 4P
3	<p>Chapter3 -Cache memory and Memory Management</p> <ul style="list-style-type: none"> • Computer Memory System • Characteristics of memory system • Memory hierarchy • Characteristics of memory hierarchy • Cache memory principles • Elements of cache design • Cache memory Mapping • Replacement algorithms • High performance computing • Cache organization • Segmentation and Paging 	4T + 4P
4	<p>Chapter-4- Internal memory</p> <ul style="list-style-type: none"> • Semiconductor main memory • Semiconductor main memory • Main Memory Cell Organization • Semiconductor memory types • RAM • DRAM and SRAM • ROM • Types of ROM • DDR DRAM 	4T + 4P

	<ul style="list-style-type: none"> • Newer Non-Volatile Solid state memory 	
5	Chapter 5-External memory and storage management <ul style="list-style-type: none"> • Magnetic disc and Disk management • Data organization and formatting • Disk performances • Raid • Different RAID levels • RAID comparison • Optical storages • Solid state drives • File concept, Access methods • File sharing. 	2T + 2P
6	Chapter6- Input-output , Protection and Security <ul style="list-style-type: none"> • Peripheral devices • Input-Output Technique • Programmed I/O • Interrupt driven I/O • Direct memory access • DMA Operation • I/O modules • External Interconnection standards • Goals and principles of protection. • Access Control • Implementing Security defenses. 	4T + 4P
7	Final Exam	4T+4P
Total		52

Online Study Topics

- History and generations of computers
- General and Expanded structure of computers
- Interrupts
- QPI
- Computer Memory System
- Replacement algorithms
- Semiconductor memory types
- Disk performances
- Input –output Techniques
- I/O hardware, Application I/O interface.
- Wireless Network Protocols and Implementing security defenses.
- Basics of network services associated with windows server operating systems.

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Explain the various concepts related with functions of operating system, evolution of computers.	Visual & Verbal [Lectures / Presentations]	Assignment -1 Midterm Exam Final Exam
1.2	Explain various designing concepts and criteria for performance evaluation for processors.	Visual & Verbal [Lectures / Presentations]	Assignment -1 Midterm Exam Final Exam
1.3	Describe various components, functions, interconnection structure, and I/O module techniques of a computer system based on latest trends.	Visual & Verbal [Lectures / Presentations]	Assignment -2 Final Exam
2.0	Skills		
2.1	Analyze various memory storage and access techniques based on performance criteria.	Visual & Verbal [Lectures / Presentations]	Assignment -2 Exam-2 Final Exam
2.2	Demonstrate different page replacement algorithms based on page fault calculations.	Visual & Verbal [Lectures / Presentations]	Assignment -2 Midterm Exam Final Exam
2.3	Apply programs based on various microprocessor concepts in Assembly language.	Visual & Verbal [Lectures / Presentations]	Assignment -2 Final Exam
3.0	Values		
3.1	Function to work as a team member and take responsibility for successful completion of group assignment.	Visual & Practical [Lab exercise / Presentations]	Lab Exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignment/Mini Project	4th Week	20%
2	Mid-Term Exam	6th week	20%
3	Lab Exam	11th Week	20%
5	Final Exam	12th week	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice.

Department have an arrangement for “Academic Counseling and Support” for each student. The Academic Advising Committee nominates faculty members for “Student Academic Advisor” every semester. These “Academic Advisors” are responsible for student counseling and advising to a group of fix number of students (around 10-15 students) and maintaining students’ files. At the beginning of every semester and at time of course registration all students take counseling from Academic Advisor according to his previous grades and coverage of pre-requisite course and follow-up.

Also, students with GPA below 2.00 are remained under deep observation and continuous meetings with respective course teachers about their performance are arranged to help and support the students. The course teacher is to be associated with this course provide a proper guidance for students who are looking to focus on their future career based on their intellectual interests, identify better opportunities related to this course and connections in their academic fields.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	William Stallings, “ Computer Organization and Architecture-Designing for Performance ”, Pearson Publication, 10 th edition, 2016, ISBN-13 : 978-0134101613
Essential References Materials	M. Morris R. Mano, “Computer System - Modern Computer Architecture and Organization Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers” by Jim ledin, Edition (April 30, 2020), Packt Publication.
Electronic Materials	http://williamstallings.com/ComputerOrganization/
Other Learning Materials	Emulator emu8086

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and Lab equipped with workstation Computers and Seating Capacity for 30-40 students along with projectors.
Technology Resources (AV, data show, Smart Board, software, etc.)	The practical should be placed in a lab with the following requirements: <ul style="list-style-type: none"> • Computer connected to projector.

Item	Resources
	<ul style="list-style-type: none"> • 30-40workstations • emu8086 software
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	---

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Sufficiency of resources and facilities for students	Students	Course evaluation survey form
Effectiveness of teaching / learning process	Students	Course evaluation survey form
Effectiveness of teaching / learning process	QAU / HoD	Course reports / result analysis
Quality of learning Resources	Track leaders	Review meetings and star rating with suggestions for further modification and improvements
Quality of learning Resources	Track leaders	Review meetings and star rating with suggestions for further modification and improvements
Verifying standards of student achievement / evaluation	HoD / committee nominated by HoD	Random re-checking of evaluated answer sheets
Achievement of course learning outcomes	Course Teachers / QAU	CLO assessment template that is further verified at course coordinator, Track leader and QAU level.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	