Identification	**Subject**	**CMS 240:** Computer Organization- 6ECTS
	Department	Computer Science
	Program	Computer Science and Engineering (Undergraduate)
	Term	Spring, 2024
	Instructor	Hafiz Muhammad Azeem Akram
	E-mail:	a.akram@khazar.org
	Classroom/hours	Location: Neftchilar Campus Classroom: N401 Day: Thursday Time: 8:30-11:40
Prerequisites	English proficiency	
Language	English	
Compulsory/Elective	Required	
Required Textbooks	1. William Stallings. Computer Organization and Architecture, 11th Edition, Pearson; ISBN-13: 978-1-292-42010-3 2. David A. Patterson, John L. Hennessy. Computer Organization and Design, 6th Edition, Pearson; ISBN-13: 978-012820109	
Course Description	This course introduces the fundamental principles and concepts underlying computer organization. Toics include the basics of digital logic, assembly language programming, CPU design, memory hierarchy, input/output organization, computer arithmetic, system interconnection and communication.	
Course objectives	1. To Understand the principles of digital logic and data representation as foundational elements of computer organization. 2. To Explore the design and functionality of the central processing unit (CPU) 3. To Analyze and optimize memory systems, including cache hierarchy and virtual memory, for enhanced computer performance. 4. To Investigate input/output organization mechanisms	
Learning outcomes	1. Demonstrate a comprehensive understanding of CPU design principles, including instruction set architecture and microprogramming concepts. 2. Evaluate and optimize memory hierarchies, utilizing cache systems and virtual memory, to enhance overall computer system performance. 3. Implement effective input/output organization strategies, considering device interfaces, interrupts, and Direct Memory Access (DMA) for seamless data transfer. 4. Critically assess system interconnection and communication mechanisms, exploring bus systems, interconnection networks, and communication protocols.	

	Lecture	x

<table>
<tr><td></td><td colspan="2">Group discussion</td><td>x</td></tr>
<tr><td></td><td colspan="2">Experiential exercise</td><td>x</td></tr>
<tr><td></td><td colspan="2">Simulation Lab</td><td>x</td></tr>
<tr><td></td><td colspan="2">Course paper</td><td>x</td></tr>
<tr><td rowspan="7">Evaluation</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td></td><td>30</td></tr>
<tr><td>Final Exam</td><td></td><td>35</td></tr>
<tr><td>Quizzes</td><td></td><td>15</td></tr>
<tr><td>Assignments</td><td></td><td>15</td></tr>
<tr><td>Class Participation</td><td></td><td>05</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Policy</td><td colspan="3">Preparation for class
The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems.

• Withdrawal (pass/fail)
This course strictly follows grading policy of the School of Engineering and Applied Science. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.

• Cheating/plagiarism
Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead topaper cancellation. In this case, the student will automatically get zero (0), without any considerations.

• Professional behavior guidelines
The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited.

• Ethics
Students should not arrive in late to class.
All cell phones must be turned off and stowed away before entering class.
Use of any electronic devices is not allowed in the classroom and violators will be punishedaccordingly.</td></tr>
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WK	Date/Day (tentative)	Topics	Recommended Readings
1	15/02/24	• Organization and Architecture • Structure and Function • The IAS Computer • The Evolution of the Intel x86 Architecture • Embedded Systems	Lecture Slides Readings:1.1-1.5
2	22/02/24	• Designing for Performance • Multicore, MICs, and GPGPUs • Ahmdahl's Law and Little's Law • Basic Measures of Computer Performance	Lecture Slides Readings:2.1-2.4
3	29/02/24	• Computer Components • Computer Function: Instruction Fetch and Execute Interrupts I/O Function • Interconnection Structures • Bus Interconnection	Lecture Slides Readings:3.1-3.4
4	07/03/24	• Principle of Locality • Characteristics of Memory Systems • The Memory Hierarchy • Performance Modeling of a Multilevel Memory Hierarchy	Lecture Slides Readings: 4.1-4.4
5	14/03/24	• Cache Memory Principles • Elements of Cache Design • Intel x86 Cache Organization • Cache Performance Models	Lecture Slides Readings: 5.1-5.3,5.5
6	21/03/24		No Working Day
7	28/03/24	• Semiconductor Main Memory • Error Correction • DDR DRAM • eDRAM • Flash Memory • Newer Nonvolatile Solid-State Memory Technologies	Lecture Slides Readings:6.1-6.6
8		**Midterm Exam**	
9	11/04/24	• Magnetic Disk • RAID • Solid State Drives • Optical Memory • Magnetic Tape	Lecture Slides Readings:8.1-8.3
10	18/04/24	• External Devices • I/O Modules • Programmed I/O	Lecture Slides Readings: 8.4-8.8

11	25/04/24	• Interrupt-Driven I/O • Direct Memory Access • Direct Cache Access • I/O Channels and Processors • External Interconnection Standards	Lecture Slides Readings:9.1-9.4
12	02/04/24	• Operating System Overview • Scheduling • Memory Management • Intel x86 Memory Management	Lecture Slides Readings:13.1-13.3 14.1-14.3
13	09/05/24	• Machine Instruction Characteristics • Types of Operands • Types of Operations • Addressing Modes • Instruction Formats	Lecture Slides Readings:16.1-16.3
14	16/05/24	• Processor Organization • Register Organization • Instruction Cycle • Instruction Pipelining • Processor Organization for Pipelining	Lecture Slides Readings: 16.4-16.5
15	23/05/24	• Micro-operations • Control of the Processor • Hardwired Implementation • Microprogrammed Control	Lecture Slides Readings: 19.1-19.4
		Final Exam	

Note: This syllabus is a guide for the course and any modifications to it will be announced in advance.