Course Name (English)	COMPUTER ARCHITECTURE AND ORGANIZATION `APPROVED`
Course Code	CSC710

MQF Credit	3

Course Description	This course examines how a computer operates at the machine level by studying the design and operation of computing system components. Topics include the functional components of a computer, memory organization, auxiliary storage, system interconnection, input and output systems and future trends of computer organization

Transferable Skills	Demonstrate ability to identify and articulate self skills, knowledge and understanding confidently and in a variety of contexts Demonstrate ability to manage personal performance to meet expectations and demonstrate drive, determination, and accountability. Demonstrate ability to communicate clearly and confidently, and listen critically Demonstrate the ability to dream, imagine and visualize Demonstrate analytical skills using technology.

Teaching Methodologies	Lectures, Blended Learning, Discussion

CLO	CLO1 Compare and contrast past and present components in computer architecture and organization. CLO2 Integrate social responsibilities in promoting present computer architecture and organization to the society CLO3 Accommodate lifelong learning skills in integrating modern computer architecture and organization into industrial applications.

Pre-Requisite Courses	No course recommendations

Topics
1. Overview of Computer organization and architecture 1.1) Organization and Architecture 1.2) Structure and Function
2. Computer Evolution and Performance 2.1) A Brief History of Computers 2.2) Designing for Performance 2.3) Multicore, MICs, and GPGPUs 2.4) The Evolution of the Intel x86 Architecture 2.5) Embedded Systems and the Arm 2.6) Performance Assessment
3. Top-level view of computer components and functions 3.1) Computer Components 3.2) Computer Function 3.3) Interconnection Structures 3.4) Bus Interconnection 3.5) Point-To-Point Interconnect 3.6) PCI Express
4. Internal memory, DRAM organization, External Memory and Mass Storage 4.1) Computer Memory System Overview 4.2) Cache Memory Principles 4.3) Elements of Cache Design 4.4) Pentium 4 Cache Organization 4.5) Arm Cache Organization 4.6) Semiconductor Main Memory 4.7) Error Correction

4.8) Advanced Dram Organization
4.9) Raid
4.10) Solid State Drives
4.11) Optical Memory
4.12) Magnetic Tape

5. Architecture and Techniques of I/O and Bus
5.1) External Devices
5.2) I/O Modules
5.3) Programmed I/O
5.4) Interrupt-Driven I/O
5.5) Direct Memory Access
5.6) I/O Channels and Processors

6. Computer Arithmetic and Data Representation
6.1) The Decimal System
6.2) Positional Number Systems
6.3) The Binary System
6.4) Converting Between Binary and Decimal
6.5) Hexadecimal Notation
6.6) Computer Arithmetic
6.7) The Arithmetic and Logic Unit
6.8) Integer Representation
6.9) Integer Arithmetic
6.10) Floating-Point Representation
6.11) Floating-Point Arithmetic

7. Instruction set characteristics and functions Instruction set address
7.1) Intel x86 and Arm Data Types
7.2) Types of Operations
7.3) Intel x86 and ARM Operation Types
7.4) Addressing Modes
7.5) x86 and ARM Addressing Modes
7.6) Instruction Formats
7.7) x86 and ARM Instruction Formats
7.8) Assembly Language

8. Social Responsibility visit
8.1) n/a

9. CPU organization and functions
9.1) Processor Organization
9.2) Register Organization
9.3) Instruction Cycle
9.4) Instruction Pipelining
9.5) The x86 Processor Family
9.6) The Arm Processor

10. Reduced instruction set computers
10.1) Instruction Execution Characteristics
10.2) The Use of a Large Register File
10.3) Compiler-Based Register Optimization
10.4) Reduced Instruction Set Architecture
10.5) RISC Pipelining
10.6) MIPS R4000
10.7) Sparc
10.8) RISC Versus CISC Controversy

11. Networking and Communication
11.1) n/a

12. Performance measurement and comparison
12.1) Hardware Performance Issues
12.2) Software Performance Issues

13. Test 2
13.1) n/a

14. Project Presentation
14.1) n/a

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Community Service	Social Responsibility Visit Assignment	50%	CLO2
	Group Project	Collaborative learning	30%	CLO3
	Test	Test 1	10%	CLO1
	Test	Test 2	10%	CLO1

Reading List	Recommended Text	• **William Stallings 2015, *Computer Organization and Architecture*, Prentice Hall [ISBN: 0134101618]**
	Reference Book Resources	• **David A. Patterson,John L. Hennessy 2013, *Computer Organization and Design*, 2 Ed., Morgan Kaufmann [ISBN: 9780124077263]**
		• **Andrew S. Tanenbaum,Todd Austin 2013, *Structured Computer Organization*, Prentice Hall [ISBN: 0132916525]**
		• **Sajjan G. Shiva 2013, *Computer Organization, Design, and Architecture, Fifth Edition*, CRC Press [ISBN: 9781466585546]**
		• **Null, L., & Lobur, J. 2013, *The essentials of computer organization and architecture*, Kindle Edition Ed.**
		• **John D. Carpinelli 2001, *Computer Systems Organization & Architecture*, Addison Wesley [ISBN: 0201612534]**
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	