

COURSE OUTLINE

1. COURSE NAME: COMPUTER ORGANIZATION AND ARCHITECTURE

2. CODE: CSC2215

3. 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 include processor components, control unit architecture, memory organization and system organization.

4. COURSE OBJECTIVES

The course covers the basic principles of computer organization, operation and performance. It also deals with embedded systems, peripheral devices, memory management, and processor family evolution patterns. The course discusses the role of pipelining and multiple functional units in processor design.

5. LEARNING OUTCOMES

On successful completion of this course students should be able to:

- Describe computer architecture and organization, computer arithmetic, and CPU design.
 - Describe I/O system and interconnection structures of computer.
 - Identify high performance architecture design.
 - Explain how the cache memory is implemented.
 - Explain a wide variety of memory technologies both internal and external.
- Explain characteristics and functions of instruction sets and addressing modes and formats

6. COURSE OUTLINE

1. Introduction

- Organization and Architecture, Structure and Function.

2. Computer Evolution and Performance

- A Brief History of Computers, Designing for Performance, The Evolution of the Intel x86 Architecture.

3. A Top-level View of Computer Function and Interconnection

- Computer Function.
- Interconnection Structures, Bus Interconnection, PCI.

4. Cache Memory

- Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design.

5. Internal Memory

- Semiconductor Main Memory.
- Error Correction, Advanced DRAM Organization.

6. External Memory

- Magnetic Disk, RAID, Optical Memory, Magnetic Tape.

7. Input/output

- External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors, The External Interface

8. Operating System Support

- Operating System Overview, Scheduling.
- Memory Management.

9. Instruction Sets: Characteristics and Functions

- Machine Instruction Characteristics, Types of Operands, Intel x86 and ARM Data Types, Types of Operations

7. COURSE ASSESSMENT:

Coursework will account for 40%

Final examination 60%

RECOMMENDED TEXTBOOKS:

- i. Stallings, William *Computer Organization and Architecture - Designing for Performance*, (9th Ed) Pearson Higher Education, 2012.
- ii. C. Hamacher, Z. Vranesic and S. Zaky, *Computer Organization* McGraw-Hill, 2002.
- iii. Hennessy, John and Patterson, David *Computer Architecture: A Quantitative Approach* (4th Ed) Morgan Kaufmann Publishers, 2006.

COURSE INSTRUCTOR: Martin Ngoby (FCI- Department of Computer Science)

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CONSULTATION TIME: On Appointment.

LECTURE TIME: MONDAY 14hrs – 16hrs & TUESDAY 17hrs – 18hrs.

COURSE VENUE: ICS lab 1