

Macao Polytechnic University
Faculty of Applied Sciences
Bachelor of Science in Computing
Module Outline

Academic Year 2022/2023 Semester 2

Learning Module	Computer Architecture		Class Code	COMP121
Pre-requisite(s)	MATH111-Essential Computer Mathematics			
Medium of Instruction	English		Credit	3
Lecture Hours	30 hrs	Lab/Practice Hours	15 hrs	Total Hours 45 hrs
Instructor	Dr. Phillip Cheong		E-mail	ncheong@mpu.edu.mo
Office	M520, Meng Tak Building, Main Campus		Telephone	8599-3333

Description

This module is concerned with the study of the structures and behaviour of computers. It traces the evolution of computers and considers the functional organization of a computer. Major components of a computer are discussed in this module and an overview of microcomputer technologies is provided.

Learning Outcomes

After completing the module, students will be able to:

1. Understand the important components of a computing system; (SM1p)
2. Explain basic operations of digital logic circuits; (EA1p, D1p)
3. Analyze how certain operating system functions are supported by computer hardware; (SM1p, EA1p)
4. Explain the implementation of computer arithmetic; (EA1p, D1p, D2p)
5. Interpret and apply basic cache design for a given purpose; (SM1p, EA1p)
6. Identify the micro-program level, assembly language, addressing modes. (EA1p, D1p)

Content

1. Introduction (3 hours)
 - 1.1 Computer Evolution
 - 1.2 IAS computer
 - 1.3 Moore's Law
2. Digital Logic Circuits and Computer Components (9 hours)
 - 2.1 Boolean Algebra and Logic gates
 - 2.2 Implementation of Boolean Function
 - 2.3 Combinational Circuits
 - 2.4 Sequential Circuits
 - 2.5 Registers and Memory Organization
 - 2.6 Computer Components
3. Processors Structure and Function (6 hours)
 - 3.1 CPU organization
 - 3.2 Instruction Execution and Instruction Cycle
 - 3.3 Parallel Processing
4. Computer Arithmetic (6 hours)
 - 4.1 Arithmetic and Logic Unit
 - 4.2 Integer Arithmetic
 - 4.3 Floating-Point Arithmetic
5. Internal Memory and External Memory (3 hours)
 - 5.1 Internal Memory
 - 5.2 Words and Memory Addresses
 - 5.3 External Memory
6. Cache Memory (6 hours)
 - 6.1 Cache Memory Principles
 - 6.2 Elements of Cache Design
7. Input/Output (3 hours)
 - 7.1 Types of Bus
 - 7.2 Memory-mapped I/O and I/O-mapped I/O

8. Instruction Set: Address Modes and Formats (9 hours)
- 8.1 Instruction Formats
 - 8.2 Address Modes
 - 8.3 RISC and CISC

Teaching Method

Lectures and tutorials

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes” of Macao Polytechnic University. Students who do not meet the attendance requirements for the module will not be permitted to sit the final or re-sit examination and shall be awarded an ‘F’ grade.

Assessment

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

Item	Description	AHEP3 LO	Percentage
1. Assignments	Home-based exercises	SM1p, EA1p, D1p, D2p	30%
2. Test	Knowledge assessment	SM1p, EA1p, D1p	20%
3. Examination	3-hour written examination	SM1p, EA1p, D1p	50%
Total Percentage:			100%

Students with an overall score of less than 35 in the coursework must take the re-sit examination even if the overall score for the module is 50 or above.

Students with a score of less than 35 in the final examination must take the re-sit examination even if the overall score for the module is 50 or above.

Students with an overall final grade of less than 35 are NOT allowed to take the re-sit examination.

Teaching Material

Textbook(s)

1. William Stallings (2018). *Computer Organization and Architecture Designing for Performance* (11th ed.). Englewood Cliffs, New Jersey: Pearson.

Reference

Reference book(s)

1. Hamacher, C. & Vranesic, E. & Zaky, S. (2012). *Computer Organization* (6th ed.). New York: McGraw-Hill.
2. Tanenbaum, A. S. (2012). *Structured Computer Organization* (6th ed.). Englewood Cliffs, New Jersey: Prentice-Hall.
3. Morris, M. M. (2007). *Computer System Architecture* (3rd ed.). Englewood Cliffs, New Jersey: Prentice-Hall.