



**FACULTY OF APPLIED SCIENCES**  
**BACHELOR OF SCIENCE IN COMPUTING**  
**LEARNING MODULE OUTLINE**

Academic Year	2024/2025	Semester	2
Module Code	COMP1123		
Learning Module	Computer Organization		
Pre-requisite(s)	Nil		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Erli Lyu	Email	erlilyu @mpu.edu.mo
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**MODULE 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.

**MODULE INTENDED LEARNING OUTCOMES (ILOS)**

On completion of this learning module, students will be able to:

M1.	Apply and analyze the important components of a computing system; (C1, C2)
M2.	Analyze how an operating system functions are supported by computer hardware; (C4, C5)
M3.	Describe the concept of an instruction set architecture; (C1, C2)
M4.	Interpret and apply basic cache design for a given purpose; (C4, C5)
M5.	Describe the concepts of GPU, acceleration, parallel computing, multi-processor (C1)



These ILOs aims to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs	M1	M2	M3	M4	M5
P1. Select and apply proven methods, tools and techniques to the effective and efficient implementation of information systems on common platforms, including the Internet platform;	✓	✓	✓	✓	✓
P2. Acquire essential knowledge in specific fields of computing disciplines including networking, artificial intelligence and security;					
P3. Apply necessary mathematical techniques to model, analyse and devise solutions to complex problems;	✓		✓		✓
P4. Work independently to develop an understanding of, and the knowledge and skills associated with the general support and mitigation of security risks of computer systems and networks;					
P5. Design and implement relational database, with an emphasis on how to organise, maintain, retrieve and analyse information;					
P6. Distinguish the fundamental and operational issues of computer systems, with considerations of user, business, ethical, societal and environmental needs;					
P7. Evaluate, prepare and communicate effectively on technical information to both technical and non-technical audience;					
P8. Work as an effective member of a team in the analysis, design and development of software systems, with recognition of requirement to support equality, diversity and inclusion;					
P9. Use project planning, risk management and quality management techniques in solutions to complex problems;					
P10. Build the capacity and desire for lifelong learning and to learn advanced and emerging technologies on one's own;					
P11. (For Business Intelligence specialization) Gain an in-depth knowledge of technologies related to data analysis and management of information to support business processes in enterprises;					
P12. (For Gaming Technology specialization) Acquire the general and advanced knowledge of current technologies and operating environment for the development of the gaming and tourism industry;					
P13. (For Computer Education specialization) Acquire general and practical knowledge of computer education and its practicing environment in secondary education.					

#### MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1	Basic Concepts and Computer Evolution	3
	Organization and Architecture	



	The Evolution of Computers	
	Arm Architecture and Embedded System	
2-3	Computer Function and Interconnection	6
	2.1 Computer Components	
	2.2 Computer Function	
	2.3 Interconnection Structures of CPU	
	2.4 Bus Interconnection and PCI	
	2.5 Registers Organizations and GPU	
4-5	Cache Memory	6
	Overview of Computer System Memory	
	Cache Memory Principles	
	Elements of Cache Memory	
	Principles of Cache Design	
6-7	Internal Memory and External Memory	6
	Internal Memory	
	External Memory	
8	Input/Output	3
	I/O Modules	
	Memory-mapped I/O	
	DMA	
9-12	The Central Processing Unit	12
	Instruction Sets: Characteristics and Functions	
	Addressing Modes	
	Processor Structure and Function	
	Instruction-Level Parallelism and Superscalar Processors	
13-15	Parallel Organizations	9
	Parallel Computing	
	Multicore Computers	
	General-purpose Graphic Processing Units	



## TEACHING AND LEARNING ACTIVITIES

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	M1	M2	M3	M4	M5
T1. Lectures	✓	✓	✓	✓	✓
T2. In-class exercises	✓	✓	✓	✓	✓

## ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Bachelor's Degree Programmes of the Macao Polytechnic University. Students who do not meet the attendance requirements for the learning module shall be awarded an 'F' grade.

## ASSESSMENT

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	Weighting (%)	AHEP4 LOs	ILOs to be Assessed
A1. Assignment / Classwork	30%	C1, C2, C4, C5	M1, M2, M3, M4, M5
A2. Tests	30%	C1, C2, C5	M1, M2, M3, M4, M5
A3. Examination	40%	C1, C2, C5	M1, M2, M3, M4, M5

The assessment will be conducted following the University's Assessment Strategy (see [www.mpu.edu.mo/teaching\\_learning/en/assessment\\_strategy.php](http://www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php)). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

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.

## REQUIRED READINGS

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

## REFERENCES

1. Hamacher, C. & Vranesic, E. & Zaky, S. (2012). *Computer Organization* (6<sup>th</sup> 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.

## **STUDENT FEEDBACK**

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

## **ACADEMIC INTEGRITY**

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at [www.mpu.edu.mo/student\\_handbook/](http://www.mpu.edu.mo/student_handbook/).