NATIONAL UNIVERSITY

NATIONAL UNIVERSITY
COLLEGE OF COMPUTING AND INFORMATION TECHNOLOGIES

DOCUMENT: **SYLLABUS**	COURSE CODE: **CCOMPORG**	COPIES ISSUED TO: **College of Computing and Information Technologies Faculty**
DATE OF EFFECTIVITY: **AY 2024-2025**	COURSE TITLE: **COMPUTER ORGANIZATION AND ARCHITECTURE**	

VISION

We are National University, a dynamic private institution committed to nation building, recognized internationally in teaching and research.

MISSION

Guided by the core values and characterized by our cultural heritage of Dynamic Filipinism, National University is committed to providing relevant, innovative, and accessible quality education and other development programs.

We are committed to our:

STUDENTS, by molding them into life-long learners, ethical and. Spiritual citizens and self-directed agents of change.

FACULTY and EMPLOYEES, by enhancing their competencies, stimulating their passions, cultivating their commitment, and providing a just and fulfilling work environment.

ALUMNI, by strengthening their sense of pride through engagement, loyalty, and love for their alma mater.

INDUSTRY PARTNERS and EMPLOYERS, through active collaborations, providing them Nationalians who will contribute to their growth and development.

COMMUNITY, by contributing to the improvement of life conditions and well-being of its members.

CORE VALUES

1. Integrity 2. Compassion 3. Innovation 4. Resilience 5. Patriotism

GRADUATE ATTRIBUTES INTENDED FOR NATIONALIANS (GAINs)	INSTITUTIONAL LEARNING OUTCOMES (ILO)
1. Leadership and Teamwork	a. Exhibit moral, ethical, and competent leadership.
	b. Collaborate effectively in teams of different cultures.
2. Responsible Citizenship	c. Participate actively in community-oriented advocacies that contribute to nation-building.
3. Innovative, Creative, and Critical Thinking	d. Develop an entrepreneurial mindset.
	e. Provide solutions to challenges in various fields of specialization and society in general.
4. Academic and Professional Competence	f. Demonstrate mastery of foundational skills and specific areas of specialization.
5. Effective Communication	g. Express ideas meaningfully, accurately, and appropriately in multicultural and multidisciplinary contexts.
6. Whole Person Character	h. Practice NU Core Values in personal and professional life.
7. Life and Career Skills Orientation	i. Engage in continuing personal and professional development.
	j. Exemplify the capacity for self-reflection.
	k. Demonstrate adaptability, flexibility, productivity, and accountability in diverse settings.
8. Technological Literacy	l. Exhibit mastery in navigating various technological tools and techniques.

Program Educational Objectives (PEO) After 3 to 5 years on the job, BS Information Technology graduates of NU are expected to:	ILO											
	A	B	C	D	E	F	G	H	I	J	K	L
1. Our graduates have professional careers in industry or academe or are engaged in advanced studies.				✓	✓	✓	✓		✓		✓	✓
2. Our graduates continue to seek knowledge to thrive in an increasingly globalized society.						✓			✓		✓	✓
3. Our graduates are successful team members or team leaders.	✓	✓						✓		✓		
4. Our graduates conduct themselves with integrity and incorporate proper ethical considerations in development and administration of computing-based systems that contribute to nation building.	✓		✓					✓		✓	✓	

Program Outcomes (PO) At the time of graduation, the student must be able to:	PEO 1	PEO 2	PEO 3	PEO 4
1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	✓			
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	✓			✓
3. Communicate effectively in a variety of professional contexts.	✓	✓	✓	✓
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.		✓		✓
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.			✓	
6. Identify and analyze user needs and to take them into account in the selection, creation, integration, evaluation, and administration of computing-based systems.		✓		✓

COURSE DESCRIPTION

The course covers the general introduction to the computer organization and architecture concept. The key concepts on RISC-based instruction set, pipeline and pipeline hazard, performance measure, and Amdahl's law will be discussed. It also covers design issues of computer architecture, specifically set design and instruction level parallelism.

PRE-REQUISITE(S)

CCDISTR1 DISCRETE STRUCTURES 1

CCOBJPGL OBJECT-ORIENTED PROGRAMMING

COURSE OUTCOMES (CO)

At the end of the course, the student must be able to:	PROGRAM OUTCOMES (PO)					
	1	2	3	4	5	6
1. Identify key concepts in computer organization and architecture, performance issues and measures in CPU Design, arithmetic operations, and digital logic.	I					
2. Understand the fundamentals of different instruction set architectures, pipeline, and pipeline hazards.	I					

I – Introduce R – Reinforced D - Demonstrate

CREDIT

3 Units

TIME ALLOTMENT

4 hours Laboratory every week

COURSE REQUIREMENTS

Assessment Tasks (Activity, Assignment, Exercise) Long Exam Departmental Exam

CLASS POLICIES

1. Attendance is necessary for each student to obtain maximum benefits for instruction, 80% attendance or 69 hours for one trimester is required.
2. Failure to wear complete uniform will be considered an absence and the student will not be allowed to take any examination.
3. Special examination is only given for excused absences. Excuse letter duly signed by the parents/guardian or a medical examination (in case of sickness) is required.
4. Students may bring their cellular phones to class provided these are placed on silent mode. These should not be used during class hours except during extreme necessities. Cellular phones should be switched off during examinations.
5. Students should be in complete uniform and exam permit should be presented during major examinations.
6. Any form of cheating will not be tolerated.
7. Students are expected to wait for 15 minutes for a one (1) hour class and 20 minutes for a one and a half (1½) hour class before leaving if the instructor is not around. However, the class president is expected to check with any CCIT professor if a substitute professor will take over.

GRADING SYSTEM

Assessment Task 35%
Attendance 5%
Long Exam 30%
Departmental Exam 30%

100%

Grade Equivalent

Grade Range (%)	Grade Point
96 – 100	4.0
90 – 95	3.5
84 – 89	3.0
78 – 83	2.5
72 – 77	2.0
66 – 71	1.5
60 – 65	1.0
59 and below	R

COURSE CONTENTS

WEEK	COURSE OUTCOMES	TOPIC OUTCOMES	TOPICS	METHODOLOGY	RESOURCES	ASSESSMENT
1		At the end of the lesson(s), students must be able to: ▪ Familiarize with the Course	**Orientation on National University VMGs, Core Values, GAINs and Class Policies** **COURSE OVERVIEW**	Brainstorming Group Dynamics Class Discussions	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	
2-3		At the end of the lesson(s), students must be able to: ▪ Identify the differences between computer organization and computer architect. ▪ Identify general functions and structure of a digital computer. ▪ Identify the evolution of computer technology. ▪ **Identify the evolution of a bus system**	**INTRODUCTION TO COMPUTER ORGANIZATION AND ARCHITECTURE** Organization and Architecture Structure and Function Brief History of Computers **Von Neuman Architecture** **Harvard architecture**	Brainstorming Group Dynamics Class Discussions	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	
4-5		At the end of the lesson(s), students must be able to: ▪ Understand the key performance issues that relate to computer design. ▪ Describe the difference between Amdahl's Law and Little's Law. ▪ Measure computer performances using various performance metrics.	**CPU PERFORMANCE ISSUES** Designing for Performance Amdahl's Law Little's Law Basic Measures of Performance	Brainstorming Group Dynamics Class Discussions Assignment/Exercise	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	

WEEK	COURSE OUTCOMES	TOPIC OUTCOMES	TOPICS	METHODOLOGY	RESOURCES	ASSESSMENT
6-7	CO1	At the end of the lesson(s), students must be able to: ▪ Understand the distinction between the way in which numbers are represented and the algorithms used for the basic arithmetic operations. ▪ Perform basic arithmetic operations.	**COMPUTER ARITHMETIC AND LOGIC UNIT** Review on Number System Character Representation Integer Representation and Arithmetic Floating-Point Representation and Arithmetic Digital Logics	Brainstorming Group Dynamics Class Discussions Assignment/Exercise	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	Long Exam
8-9		At the end of the lesson(s), students must be able to: ▪ Identify essential characteristics of machine instructions. ▪ Describe the types of operands used in typical machine instruction sets. ▪ Describe the types of operands supported by typical machine instruction sets.	**INSTRUCTION SET ARCHITECTURE** Machine Instruction Characteristics Types of Operands RISC versus CISC **Machine Language**	Brainstorming Group Dynamics Class Discussions Assignment/Exercise	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	
10-11		At the end of the lesson(s), students must be able to: ▪ Describe the MIPS Architecture. ▪ Interpret various MIPS instruction set.	**MIPS ARCHITECTURE AND MIPS64 INSTRUCTION SET** MIPS Architecture MIPS64 Instruction Set	Brainstorming Group Dynamics Class Discussions Assignment/Exercise	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	
12-13		At the end of the lesson(s), students must be able to: ▪ Discuss the principle behind instruction pipelining and how it works in practice. ▪ Compare and contrast the various forms of pipeline hazards.	**PIPELINING AND PIPELINE HAZARD** Pipelining Strategy Pipeline Performance Pipeline Hazards	Brainstorming Group Dynamics Class Discussions	Multimedia Resource, PowerPoint slides (Others: Pens, Laptop, Projector, Speaker)	
13.5	CO2	Departmental Examination				Departmental Exam

RESOURCES

[1] Ledin, J. (2022). Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers (2nd ed.).
[2] Chien, A. (2022). Computer Architecture for Scientists: Principles and Performance.
[3] Plantz, R. (2022). Introduction to Computer Organization: An Under the Hood Look at Hardware and x86-64 Assembly.
[4] Stallings, W. (2021). Computer Organization and Architecture, Global Edition.
[5] Gregg, B. (2020). Systems Performance (Addison-Wesley Professional Computing Series) (2nd ed.).

PREPARED:	CHECKED:	RECOMMEDED FOR APPROVAL:	APPROVED :
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