COURSE SYLLABUS
CS365: Introduction to Computer Organization and Architecture

COURSE DESCRIPTION

Credit points	3 credits (45 hrs)
Level	Undergraduate
Instructor	Nguyen Dinh Han, PhD Department of Computer Engineering, Faculty of Mathematics and Informatics Hanoi University of Science and Technology
Teaching time Location	6/10/2025 – 24/1/2026 Hanoi University of Science and Technology
Prerequisites	CS310: Foundation of Computer Science
Recommended background knowledge	Digital Logic, C programming language
Subject description	This course is an introduction to computer architecture for students in IT-related fields. In this course, students will study: (1) Computer organization: the arrangement of computer components (CPU, memory, peripherals (I/O) and system bus) and their relationship. (2) The instruction set architecture (ISA). (3) The CPU structure (ALU, registers, decoder), pipelining technique. (4) Memory and I/O system.
Objectives & Out-come	- Basic knowledge of the architecture and operation inside a computer. - Understanding of the relationship between hardware and software, and the basic laws for computer performance evaluation. - Understanding of MIPS instruction set architecture, and the ability to write MIPS programs to solve computing problems. - Ability to understand and analyse the design concept of microprocessor for modern computer architecture. - Team work and communication skill to discuss and solve assignments

Assessment/ Evaluation		
	Attendance/Attitude	10%
	Assignment(s)	20%
	Group presentation	20%
	Mid-term exam	20%
	Final exam	30%

Prescribed Textbook(s)	Computer Organization and Design, 5th Edition, David A. Patterson and John L. Hennessy, MK Pub, 2014.

COURSE CONTENTS & SCHEDULE

Class No.	Contents	Lect.	Exr.	Prc.	Ref./Resources	Assignment(s)
		No. of Hours				
1	**Course Introduction and orientation** **Chapter 1: Introduction** 1.1 Computer Abstraction and Technology - Computer history - Computer anatomy - Computer program - Hardware and software 1.2 Performance evaluation and Benchmarking - Performance measurement - Enhancing performance (hardware, software…) *Group project registration*	2	1		Chapter 1 [Textbook]	Assignment 1
2	**Chapter 2: Instruction Set Architecture** 2.1 Overview 2.2 MIPS operands 2.3 MIPS instruction set	3			Chapter 2 [Textbook]	
3	2.3 MIPS instruction set (cont.) 2.4 Basic programming patterns with MIPS instruction set 2.5 Procedures	3			Chapter 2 [Textbook]	
4	Exercise and in-class assignment		3			Assignment 2
5	**Chapter 3: Computer Arithmetic** 3.1 Integer arithmetic 3.2 Floating point arithmetic	3			Chapter 3 [Textbook]	
6	Practice and in-class assignment		3			Assignment 3
7	**Chapter 4: CPU** 4.1 Introduction 4.2 Simple CPU implementation	3			Chapter 4 [Textbook]	
8	Practice and in-class assignment		3			Assignment 4
9	Mid-term exam Exam solution		3			

10	4.3 Enhancing performance with pipelining - Overview of pipelining - MIPS pipeline - Pipeline performance - Hazards				Chapter 4 [Textbook]	
11	**Chapter 5: Memory** 5.1 Memory hierarchy 5.2 Cache - Overview of cache - Operation - Cache performance - Improving cache performance 5.3 Virtual memory 5.4 Virtual machine	3			Chapter 5 [Textbook]	
12	**Chapter 6: I/O System** 6.1 Introduction to I/O system 6.2 Storage 6.3 Interfacing with I/O system 6.4 I/O performance	3			Chapter 6 [Textbook]	
13	**Chapter 7: Multicore and multiprocessors** 7.1 Introduction 7.2 Shared memory multiprocessors 7.3 Introduction to GPU	3			Chapter 6 [Textbook]	
14	**Group presentation**		3			
15	**Final exam** Exam solution		3			

Notes:

- Abbreviation: Lect. (lecture), Exr. (Exercise), Prc. (Practise).

- Exercises may include assignment, reports, student's presentation, homework, class exercises...
for each class sessions.

- Practical mostly refer to Lab-work or outside practice such as field trip.

- Assignments may include assignments, practical work, reports, exercises ...for each class sessions

Reference Literature:

[1]. Computer Organization and Design, 5th Edition, David A. Patterson and John L. Hennessy, MK Pub, 2014.

[2]. Computer Architecture: A Quantitative Approach, 6th Edition, John L. Hennessy and David A. Patterson, Elsevier, Inc., 2019.

[3]. Computer Architecture and Organization, 10th Edition, William Stallings, Pearson Education, Inc., 2016.

Teams code: **rqheh2g**