COURSE SYLLABUS
CSC10009 – COMPUTER SYSTEMS

1. GENERAL INFORMATION

Course name:	Computer Systems
Course name (in Vietnamese):	Hệ thống máy tính
Course ID:	CSC10009
Knowledge block:	Major
Number of credits:	2
Credit hours for theory:	30
Credit hours for practice:	0
Credit hours for self-study:	Unlimited
Prerequisite:	
Prior-course:	Introduction of Information Technology, Discrete Mathematics, Introduction of Programming
Instructors:	

2. COURSE DESCRIPTION

This course covers computer system hardware organization and the factors influencing the design of hardware and software elements of a computer system , the programmer interface with the goal of improving students' abilities to reason about the execution of their programs, enhance the performance of their program.

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
G1	Be able to understand the specialized English terminology about information technology	2.4.3, 2.4.5

G2	Understand basic machine organization, including processors, memory hirachical, and input/output architecture	1.2.3 1.3.3 2.3.1, 2.3.2, 2.4.2
G3	Translate bit strings to numbers using unsigned, 2's complement, and IEEE standard floating-point representation system	1.1.1 1.2.2 2.1.3
G4	Distinguish instruction set architectures: RISC vs CISC, especially MIPS-32bit & x86-32 bit	1.3.3,1.3.7, 2.1.1, 2.1.5
G5	Simulate digital circuit at logic level by simulation tool (combinational circuit)	1.1.3, 1.3.3, 5.1.1, 4.1.2, 5.2.2

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Be able to understand specialized English terminology	T
G1.2	Understand English materials related to lectures.	U
G2.1	Describe the structure and operating principles of personal computer components, significant CPU functions, input and output devices, and internal memory.	I, T
G2.2	Describe the structure and organization of cache memory.	I, T
G3.1	Be able to understand the math of number systems (integer, floating-point) and how to store different type of data on the computer	I, T
G4.1	Explain the MIPS-32bit architecture design point of view. Compare MIPS-32 bit and x86-32 bits platform as well as RISC and CISC architecture	I, T
G4.2	Illustrate CPU process-design (logic level) and how machine instruction/program running on CPU logic circuit with emphasis on 32-bit MIPS-CPU	I, T

G4.3	Be able to understand assembly language of MIPS-32 bit and x86-32 bits	T, U
G5.1	Apply simulation software to design some typical digital circuits in logical level	T, U

5. TEACHING PLAN

ID	Topic	Course outcomes	Teaching/Learning Activities (samples)
1	Overview of computer knowledge, data represented on the computer	G1.1, G1.2, G3.1	**Prepare:** • Watching videos about the number systems **Activities:** • Discussion • Practice
2	Microprocessor's organization and operation	G1.1, G1.2, G2.1	**Activities:** • Teaching • Discussion
3	MIPS-32 bit architecture	G1.1, G1.2, G4.1, G4.2, G4.3	**Prepare:** • Watching video about how to write a simple assemly program by using MARS **Activities:** • Teaching • Case study

			• Discussion
4	Basic MIPS-32 bit implementation	G1.1, G1.2, G4.2, G5.1	**Activities:** • Teaching • Simulating a CPU by using Procsim • Discussion
5	X86-32 bit architecture (Extend IA32 to 64 bits)	G1.1, G1.2, G4.1, G4.3	**Prepare:** • Watching video about how to write an assembly program by using NASM **Activities:** • Teaching • Case study • Discussion
6	Running program on a system	G1.1, G1.2, G4.1, G4.3	**Activities:** • Teaching • Illustrating about static/dynamic linking • Discussion
7	Circuit logic: design combination circuit, ALU design way, application of sequence sequence	G1.1, G1.2, G5.1	**Activities:** • Teaching • Discussion
8	Memory Hierarchy	G1.1, G1.2, G2.1, G2.2	**Activities:** • Teaching

			• Discussion
9	I/O System	G1.2, G1.2, G2.1	**Prepare:** • Reading documents **Activities:** • Discussion
10	Review	G2.1, G3.1, G4.1, G4.2, G4.3, G5.1	**Activities:** • Discussion • Practice

For the practical laboratory work, there are 10 weeks which cover similar topics as it goes in the theory class. Each week, teaching assistants will explain and demonstrate key ideas on the corresponding topic and ask students to do their lab exercises either on computer in the lab or at home. All the lab work submitted will be graded. There would be a final exam for lab work.

6. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
EX	**Exercise**			**Up to 30%**
EX#1	Digital data representation on the computer	Conversion of system numbers. Principles of representation, real numbers Calculated on integers	G1.1, G1.2, G3.1	30% / #EX
EX#2	Learn MIPS instruction set	Read and understand a simple MIPS assembly language program	G4.1, G4.3	30% / #EX

EX#3	Learn X86 assembly language	Read and understand a simple X86 assembly language program	G4.3	30% / #EX
EX#4	Design combinational circuits MIPS CPU	Design circuit according to bool algebraic function or given true table Describe how MIPS CPU work	G5.1, G4.2	30% / #EX
Exam	**Midterm Exam**	Quiz/ Writing	G3.1, G4.1, G4.3	**Up to 30%**
Exam	**Final Exam**	Quiz/ Writing	G2.1, G2.2 G3.1, G4.1, G4.2, G4.3, G5.1	**70% to 100%**

7. RESOURCES

Textbooks

- ***Computer Organization and Design: The Hardware/Software Interface (5th ed),*** *D. A. Patterson and J. L. Hennessy, 2014*
- ***Computer Systems A Programmers Perspective (3rd ed),*** *Prentice.Hall.2016*

Others

- ***Kiến trúc máy tính, Nguyễn Minh Tuấn,*** *ĐHKHTN TpHCM, 2007*
- ***PC Assembly Language****, Paul A. Carter, 2019*
- ***Computer Organization and Architecture (10th ed)****, W. Stallings, Prentice Hall, 2016*
- ***Computer Organization: A Quantiative Approache (6th ed),*** *Patterson and J. L. Hennessy, 2017*

8. GENERAL REGULATIONS & POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.
- Students who are absent for more than 3 theory sessions are not allowed to take the exams.
- For any kind of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.
- Students are encouraged to form study groups to discuss on the topics. However, individual work must be done and submitted on your own.
- Students prepare lessons, preview documents according to regulations
- Students need to actively interact in online discussion environments
- All online accounts must be registed by student eamail, using the student-ID and full name, the real avatar in online workspace.
- The number of assignments may vary depending on the classroom situation