COURSE SYLLABUS
CSC10009 – COMPUTER SYSTEM

1. GENERAL INFORMATION

Course name:	Computer System
Course name (in Vietnamese):	Hệ thống máy tính
Course ID:	CSC10009
Knowledge block:	Basic professional knowledge
Number of credits:	2
Credit hours for theory:	30
Credit hours for practice:	0
Credit hours for self-study:	Unlimited
Prerequisite:	Introduction of Information Technology, Discrete Mathematics, Introduction of Programming
Prior course:	
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, assembly language programming. The programmer interface with the goal of improving students' abilities to reason about the execution of their programs, enhance the performance of their program. After this course, the student should be able to understand what happens inside a computer when it executes a program, how the software and hardware interact

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
G1	Use the specialized English terminology about information technology	2.4.3, 2.4.5

G2	Identify basic machine organization, including processors, memory hierarchical, and input/output architecture	1.3.3
G3	Translate bit strings to numbers using unsigned, 2's complement, and IEEE standard floating-point representation system	1.1.1, 1.2.2
G4	Apply instruction set architectures: RISC vs CISC, especially MIPS-32bit & x86-32 bit in building an assembly program	1.2.1, 1.3.3, 1.3.7, 2.1.1, 2.2.1, 2.2.4, 2.3.2
G5	Illustrate digital circuit at logic level by simulation tool (combinational circuit)	1.3.7, 1.1.3, 1.3.3, 5.1.1, 5.2.2

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Use specialized English terminology	T
G1.2	Explain English materials related to lectures	U
G2.1	Identify the structure and operating principles of personal computer components, significant CPU functions, input and output devices, and internal memory	I, T
G3.1	Explain 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-32 bit architecture design point of view. Classify 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) with emphasis on 32-bit MIPS-CPU	I, T
G4.3	Use assembly language to program in MIPS-32 bit and x86-32 bits platform	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)	Assessments
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	• Quiz • EX#1 • HW#1
2	Microprocessor's organization and operation	G1.1, G1.2, G2.1	**Activities:** • Teaching • Discussion	**HW#2**
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	• EX#1 • HW#3
4	Basic MIPS-32 bit implementation	G1.1, G1.2, G4.2, G5.1	**Activities:** • Teaching	• HW#4

			• 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	• EX#3 • HW#5
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	• EX#4
8	Memory Hierarchy	G1.1, G1.2, G2.1	**Activities:** • Teaching • Discussion	• HW#6

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	

6. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
EX	**Exercise**			**20%**
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	5%
EX#2	Learn MIPS instruction set	Read and understand a simple MIPS assembly language program	G4.3	5%
EX#3	Learn X86 assembly language	Read and understand a simple X86 assembly language program	G4.3	5%

EX#4	Design combinational circuits	Design circuit according to bool algebraic function or given true table	G5.1	5%
HW	**Homework**			**30%**
HW#1	Explore Integer and floating-point representation on computer	Write a program to make clear how an integer / floating-point number is represented	G1.1, G1.2, G3.1	5%
HW#2	Explore about the processor	Explore about the processor of PC, Server, Mobile, Embedded System	G1.1, G1.2, G2.1	5%
HW#3	MIPS assembly programming	Basic operations (arithmetics/logic, data transfer, branch), system call, stack in advanced	G4.3	5%
HW#4	Compare the processor implementation types	Comparison Table: Single-Cycle, Multi-Cycle, Pipelining	G4.2	5%
HW#5	X86 assembly programming	Basic operations (arithmetics/logic, data transfer, control), interrupt, stack in advanced	G4.3	5%
HW#6	Cache memory accessing		G1.1, G1.2, G2.1	5%

Exam	**Final Exam**	Quiz/ Writing	G2.1, G3.1, G4.1, G4.2, G4.3, G5.1	**50%**

7. RESOURCES

Textbooks

[1]. Hennessy, John L., author. Alexander, Perry, contributor. (2014). ***Computer Organization and Design: The Hardware/ Software Interface*** **(5th ed.). Oxford: Morgan Kaufmann.**

[2]. Randal E. Bryant, David R. O'Hallaron. (2016). ***Computer systems : a programmer's perspective*** **(3rd ed.)**. Boston, Mass. ; London: Pearson.

References

[3]. Nguyễn Minh Tuấn , 2007***, Kiến trúc máy tính,*** ĐH KHTN TpHCM

[4]. *Paul A. Carter* ***, 2019, PC Assembly Language***

[5]. *W. Stallings, Prentice Hall, 2018.* ***Computer Organization and Architecture: Design for performance (11th ed),*** NewYork: Pearson

[6]. Patterson, David A., author. Asanović, Krste, contributor. (2019). ***Computer Architecture: A Quantitative Approach*** **(6th ed.).** Cambridge, MA: Morgan Kaufmann

Tools

[7]. Visual Studio .NET

[8]. MARS

[9]. Logisim

[10]. Procsim

[11]. Zoom

[12]. Kahoot

[13]. Slack

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 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 registered by student email, using the student-ID and full name, the real avatar in online workspace.
- The number of assignments may vary depending on the classroom situation