MINISTRY OF EDUCATION AND TRAINING
HO CHI MINH CITY OPEN UNIVERSITY

COURSE SYLLABUS

I. GENERAL INFORMATION

1. Course title in Vietnamese: **KIẾN TRÚC MÁY TÍNH**

2. Course title in English: **COMPUTER ARCHITECTURE**

3. Knowledge / skills categorization:

☐General knowledge ☐Specialized knowledge

☒ Basic knowledge ☐Supplementary knowledge

☐ Professional knowledge ☐Graduate project / thesis

4. Number of credits

Total	Theory	Practice	Self-study
3	3	0	3(3,0,6)

5. In charge of subjects

a) Faculty / Department / Sub-Department: Information Technology

b) Lecturer: MSc. Bui Thanh Hieu

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II. COURSE INFORMATION

1. Course description

The course of Computer Architecture provides students with the basic knowledge about the structure and operation of computers. The course content includes: Introduction to computer architecture, logic circuits, clock and bus, processor, memory, instruction set. Mastering knowledge of computer architecture as the foundation for students to continue to study systems subjects such as Operating System, Computer Networks.

2. Course conditions

#	Course conditions	Course code
1.	Prerequisites	
	None	

2.	Previous courses	
	Programming techniques	ITEC1401
3.	Parallel courses	
	None	

3. Course objectives (COs)

The course will provide students with ability to:

Course objectives (CO)	Description	Related Program Learning Outcomes (PLO)
CO1 (Knowledge)	- Understand the structure and operation of the processor. - Understand the operation of the memory. - Understand the basic principles of instruction sets. - Explain computer structure and operation through processor components, memory, bus, main input/output devices (magnetic disks, monitors, printers).	PLO3.1
CO2 (Skills)	- Explain the main technical parameters of the computer. - Describe the structure, the process of installing computers through a simulation.	PLO3.2
CO3 (Attitude)	- Being aware of the importance of the course - Being aware of the meaning for each content of the course	PLO3.3

4. Course learning outcomes (CLOs)

After completing this course, students are able to:

Course objectives (CO)	Course learning outcomes (CLO)	Description
O1	PO1.1	- Explain the structure and operation of the computer
	PO1.2	- Explain the structure and operation of the microprocessor
	PO1.3	- Explain the operation of the memory
	PO1.4	- Explain the operation of the input/output devices
	PO1.5	- Manipulate the instructions of the microprocessor
O2	PO2.1	- Explain the main technical parameters of the computer
	PO2.2	- Manipulate the structure, the process of installing computers through a simulation
O3	PO3.1	- Improve self-study, independent problem solving by self

Matrix of Course Learning Outcomes (CLOs) and Program Learning Outcomes (PLOs):

CLOs	PLO3.2	PLO4.5	PLO5.9	PLO13.1	PLO13.2	PLO13.3
PO1.1	**2**	**2**	**2**			
PO1.2	**3**	**3**	**3**			
PO1.3	**3**	**3**	**3**			
PO2.1			**3**			
PO2.2			**4**			
PO2.3			**4**			
PO3.1				**4**	**3**	**3**

1: Not supported
2: Partially supported
3: Supported
4: Highly supported
5: Totally supported

5. Course materials

a) *Textbooks*

[1] William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson, 2016.

b) *Reference materials*

[1] David A. Patterson, Computer Architecture: A Quantitative Approach, Elsevier, 2012.

[2] A.S. Tanenbaum, Structured Computer Organization, Pearson, 2013.

6. Course assessment

Components	Assessment	Timing	Course learning outcomes (CLO)	Rate (%)
(1)	(2)	(3)	(4)	
A1. Process assessment	A1.1 Classwork and homework		PO1.1, PO1.2, PO1.3, PO2.1, PO2.2, PO3.1	50%
	Total: 01			50%
A2. Final term assessment	A2.1 Essay test		PO1.1, PO1.2, PO1.3, PO2.1, PO2.2, PO3.1	50%
	Total: 01			50%
Total				100%

7. Rubrics

a) Midterm assessment rubric (50%)

Students take the midterm test within 60 minutes. This test is not acceptable for using materials and includes 3 chapters:

- Chapter 2: Digital Circuit.
- Chapter 3: Bus System.
- Chapter 5: Memory.

Criteria	CLO	Weight	Excellent 10 - 9	Good 8 – 7	Fair 6 - 5	Poor 4 - 0	Point
Chapter 2	**CLO1.1**	**50%**					**5.0**
Use Karnaugh graph to simplify the boolean circuit.		25%	Use Karnaugh graph to identify the output.	Miss the ordinary of variables in Karnaugh graph.	Do not know about Karnaugh but know to use the logic laws to simplify the expressions.	Do not know about Karnaugh, use the logic law but wrong in part of it.	2.5
Draw the logic circuit.		25%	Correctly draw the logic circuit.	Miss some gates / gates' notation.	Correctly draw a part of the circuit.	Draw incorrectly.	2.5
Chapter 3	**CLO1.1**	**25%**					**2.5**
Data transfer.		25%	Correctly calculate the results as step by step.	Only show the correct results without any steps.	Correctly calculate a few of steps, but the result is incorrect. Maybe due to the unit conversion.	Only one step is correct. The rests are incorrect.	2.5
Chapter 5	**CLO1.3**	**25%**					**2.5**

Alternative page methods		25%	Correctly calculate the alternative page methods.	Correctly calculate LRU or FIFO or a part of the methods.	Only LRU or FIFO is correct.	Only a part of LRU or FIFO is correct.	2.5
	Total	**100%**					**10**

b) Final term assessment rubric (50%)

Students take the final test within 60 minutes. This test is not acceptable for using materials and includes 4 chapters:

- Chapter 3: Bus System.
- Chapter 4: CPU.
- Chapter 5: Memory.
- Chapter 6: Data types.

Criteria	CLO	Weigh t	Excellent 10 - 9	Good 8 – 7	Fair 6 - 5	Poor 4 - 0	Point
Chapter 3	**CLO1.1**	**20%**					**2.0**
Data tranfers		20%	Correctly calculate the result step by step.	Only show the correct results without any steps.	Correctly calculate a few of steps, but the result is incorrect. Maybe due to the unit conversion.	Only one step is correct. The rests are incorrect.	2.0
Chapter 4	**CLO1.2**	**20%**					**2.0**

CPU		20%	Correctly draw 4 steps of pipelines with 12 commands.	Correctly draw 4 steps of pipelines but more than 12 commands.	Correctly draw 4 steps of pipelines but less than 12 commands.	Correctly draw a part or cannot draw.	2.0
Chapter 5	**CLO1.3**	**30%**					**3.0**
Memory		10%	Correctly calculate the bit qty to represent the virtual address and physical address.	Correctly calculate the bit qty to represent the virtual address or physical address. The rest one is nearly correct.	Correctly calculate the bit qty to represent the virtual address or physical address.	The bit qty is almost correct to represent the virtual address or physical address, or cannot calculate.	1.0
		20%	Correctly calculate the physical addresses in binary.	Correctly calculate a part of the physical addresses in binary	Correctly calculate the physical addresses in decimal.	Correctly calculate a few physical addresses or cannot calculate.	2.0
Chapter 6	**CLO1.1**	**30%**					**30**
Data types		30%	Correctly calculate these figures: CPI, MIPS, T and $MIPS_A/MIPS_B$	Correctly calculate 3 in these figures: CPI, MIPS, T and $MIPS_A/MIPS_B$	Correctly calculate 2 in these figures: CPI, MIPS, T and $MIPS_A/MIPS_B$	Correctly calculate 1 in these figures: CPI, MIPS, T and $MIPS_A/MIPS_B$; or cannot calculate.	3.0
	Total	**100%**					**10**

8. Teaching plans

Teaching plans for theory (4.5 class-time unit per session)

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
1. Week 1/ Theory Session 1	Chapter 1: Introduction to Computer Architecture 1.1 Introduction 1.1.1 Definition 1.1.2 Structure and function of computer. 1.2 Operation of the computer. 1.2.1 Classification of electronic computer 1.2.2 General diagram of the computer. 1.2.3 Operation of the computer 1.3 Organization 1.3.1 Physical organization 1.3.2 Booting 1.3.3 Overview of software	PO1.1 PO2.1 PO2.2 PO3.1	Faculty: + Introducing detailed outlines. + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	
2. Week 2/ Theory Session 2	Chapter 1 (cont.) 1.4 Some peripheral devices 1.4.1 Magnetic disk 1.4.2 CD and DVD disk 1.4.3 Monitor 1.4.4 Printer Chapter 2: Circuit Logic 2.1 Introduce 2.2 Boolean algebra and logic gate 2.2.1 Boolean algebra 2.2.2 Logic gate	PO1.1 PO2.1 PO2.2 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge.	A1.1 A2.1	Click or tap here to enter text.

			+On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.		
3. Week 3/ Theory Session 3	Chapter 2 (cont.) 2.3 Combination circuit 2.3.1 Plus circuit 2.3.2 Minus circuit 2.4 Sequential Circuits 2.5 Register 2.5.1 Parallel registers 2.5.2 Shift register	PO 1. 1 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	Click or tap here to enter text.
4. Week 4/ Theory Session 4	Chapter 3: Clock and bus 3.1 Introduction. 3.2 Clock and bus 3.2.1 Overview of clock 3.2.2 Speed 3.2.3 Overview of bus 3.2.4 Architecture of bus	PO1.1 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice	A1.1 A2.1	

			questions, participate in discussions on the forum.		
5. Week 5 / Theory Session 5	Chapter 3 (cont.) 3.3 Structure of bus 3.3.1 Structure of Core i 3.3.2 Norm I/O (IDE, SATA, USB). 3.3.3 Bus PCI & PCI Express. 3.3.4 I/O Method 3.4 Introduction to analog and digital signal	PO1.1 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	
6. Week 6/ Theory Session 6	Chapter 4: Processors 4.1 Structure 4.1.1 General structure 4.1.2 Registers 4.1.3 An arithmetic and logic unit. 4.1.4 Control unit 4.2 Enhancement the performance of processors 4.2.1 Clock impact 4.2.2 Pipelines 4.2.3 Executing instruction parallel. 4.2.4 Using cache memory.	PO1.2 PO1.5 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	

7. Week 7/ Theory Session 7	Chapter 4 (cont.) 4.3 Multithreading and Chip Multiprocessors Chapter 5: Memory 5.1 Memory Hierarchy.	PO1.2 PO1.5 PO1.3 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	
8. Week 8/ Theory Session 8	Chapter 5 (cont.) 5.2 Internal memory 5.2.1 Bit memory 5.2.2 Organization 5.2.3 Categories	PO1.3	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	
9. Week 9/ Theory Session 9	Chapter 5 (cont.) 5.3 Virtual memory 5.3.1 Definition 5.3.2 Paging	PO1.3 PO1.4 PO3.1	Faculty: + Preaching + Ask questions, exercises.	A1.1 A2.1	

	5.3.3 Alternative page methods Chapter 6 (3 lessons): Instruction sets 6.1 Introduction 6.2 Characteristics		+ Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.		
10. Week 10/ Theory Session 10	Chapter 6 (cont.) 6.3 Data types (integer, float,...). 6.4 Addressing methods. Immediate. Direct. Indirect Register Register indirect Displacement Stack	PO1.4 PO3.1	Faculty: + Preaching + Ask questions, exercises. + Emphasize the main points. + Specify the requirements for the next class. Students: + Study in class: listen to lectures, answer questions, solve poses, take notes. + Study at home: watch lectures, draw on the central knowledge, learn related knowledge. +On the LMS system: answer theoretical multiple-choice questions, participate in discussions on the forum.	A1.1 A2.1	

9. Course regulations

- Regulations on the submission of assignments and tests: Students who do not submit their homework and report assignments on time on the LMS, are deemed not to submit

their works.

- Attendance regulations: students are requested to attend all classes
- Exam regulations banning:
- Class rules: students are asked to keep order and participate in answering questions and doing classwork.

DEAN OF FACULTY	**EDITOR**
(Sign and specify full name)	*(Sign and specify full name)*
Dr. Le Xuan Truong	MSc. Bui Thanh Hieu