	Universitas Negeri Surabaya Faculty of Engineering, Undergraduate Study Program in Informatics Engineering	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Computer Architecture and Organization	5520203006	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Aditya Prapanca, S.T., M.Kom.	Aditya Prapanca, S.T., M.Kom.	Aditya Prapanca, S.T., M.Kom.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

PLO-2	Able to design and simulate multi-platform technology applications that are relevant to the needs of industry and society using theoretical concepts in the field of computer science/informatics knowledge (KNO-02)
PLO-4	Have the ability to work in a team (SKI-01)

Program Objectives (PO)

PO - 1	2Students are able to describe the architecture and organization of the processor (CPU) on a computer.
PO - 2	Students are able to describe the architecture and organization of computer systems

PLO-PO Matrix

P.O	PLO-2	PLO-4
PO-1		
PO-2		

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																

Short Course Description	This course teaches about modern computer architecture and organization comprehensively by emphasizing the basic concepts of computer systems including Bus Systems, Internal and External Memory and Input/Output. Furthermore, this course studies the main role of each component that makes up computing such as Computer Arithmetic, Instruction Set, CPU Structure and Function, and Control Unit Operations.

References

Main :

1. Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice-Hall.
2. Carl Hamacher, Zvonko Vranesic dan Safwat Zaky. 2012. Computer Organization and Embedded Systems Sixth Edition. McGraw-Hill.
3. John L Hennessy dan David Patterson. 2012. Computer Architecture A Quantitative Approach. Morgan Kaufman
4. Tanenbaum, Andrew S. 2007. Structured Computer Organization. India: Prentice-Hall India.

Supporters:

1. John L Hennessy dan David Patterson. 2012. Computer Architecture A Quantitative Approach. Morgan Kaufman

Supporting lecturer	Aditya Prapanca, S.T., M.Kom. I Made Suartana, S.Kom., M.Kom. Ronggo Alit, M.M., M.T.

Week-	Final abilities of each learning	Evaluation	Help Learning, Learning methods, Student Assignments, [Estimated time]	Learning materials	Assessment Weight (%)

	stage (Sub-PO)	Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)	[References]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students are able to identify the functions of computer systems and the history of computer development	1.Explain the terms in computer systems 2.Details the functions of a computer system 3.Describe the structure of a computer system 4.Examines the evolution of computer systems	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion, and problem-based learning 50	**Material:** computer systems **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	5%
2	Students are able to formulate the components of a computer system	1.Identify the concept of Von Neumann computer components 2.Examining the basic components of a computer system	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion, and problem-based learning 50	**Material:** Von Neumann's concept of computer components **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	5%
3	Students are able to apply Arithmetic and Logic operations.	1.Performing calculations with arithmetic operations, 2.addition of multiplication in binary 3.Perform calculations of logical operations.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning 1 x 50	**Material:** calculations using arithmetic operations **Reference:** *Tanenbaum, Andrew S. 2007. Structured Computer Organization. India : Prentice-Hall India.*	5%
4	Students are able to identify the working principles of the memory system in a computer.	1.Explain the different types of memory in a computer system 2.Explain the working system of internal memory technology 3.Explain the working system of external memory technology 4.Diagram the memory addressing process	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning 1 x 50	**Material:** types of memory in computer systems **Reference:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	5%
5		characteristics of a computer's Instruction Set	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 x 50	Scientific approach, presentation, question and answer, discussion, and problem-based learning 1x 50	**Material:** characteristics of computer Instruction Sets **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	5%

6	Students are able to explain the CPU work process	1. Details the characteristics of a computer's Instruction Set 2. Details the function of a computer's instruction set 3. Explain the principles of machine instructions	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** characteristics of computer Instruction Sets **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%
7	Students are able to explain the CPU work process	1. Details the characteristics of a computer's Instruction Set 2. Details the function of a computer's instruction set 3. Explain the principles of machine instructions	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Materials:** Computer Instruction Set **Bibliography:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	5%
8	Students are able to explain the CPU work process	1. Details the characteristics of a computer's Instruction Set 2. Details the function of a computer's instruction set 3. Explain the principles of machine instructions		Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Materials:** Computer Instruction Set **Bibliography:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%
9	Students are able to understand how I/O and DMA work in computers	1. Identify I/O modules 2. Explain how Direct Memory Access works 3. Explain the concept of I/O Channels and Processors 4. Explain the Complex Instruction process	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values	Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** Identifying I/O modules **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%
10	Students are able to understand how I/O and DMA work in computers	1. Identify I/O modules 2. Explain how Direct Memory Access works 3. Explain the concept of I/O Channels and Processors 4. Explain the Complex Instruction process	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values	Scientific approach, presentation, question and answer, discussion and problem-based learning 4 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** Identifying I/O modules **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%

11	Students are able to understand the working principles of Computer Interconnection Structures	1. Explains how Structure Interconnection works 2. Describes the transfer process between memory, I/O, CPU 3. Explain the working concept of PCI Bus	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** how structural interconnections work **Library:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%
12	Students understand the concept and function of Reduced Instruction Set Computer (RISC)	1. Describes the RISC process in computer architecture 2. Identify the uses of RISC in modern computer architecture	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** RISC in modern computer architecture **Reference:** *Tanenbaum, Andrew S. 2007. Structured Computer Organization. India : Prentice-Hall India.*	0%
13	Students understand the concept and function of pipelines.	1. Students can explain the concept and function of pipelines 2. Distinguishing processor performance from pipelines	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** pipeline concepts and functions **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%
14	Students are able to understand the concepts of multi-processor and parallel processing	1. Can explain the concept of multiprocessing 2. Distinguish between single processor and multi processor processes 3. Mention the advantages of multiprocessors 4. Explain the concept of parallel processing	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** process between single processor and multi processor **Reference:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	15%
15	Students are able to analyze the application of computer architecture concepts with case studies of the Intel 8085 and Intel 8086 microprocessors.	Linking architectural concepts and implementation in organizations	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Project Results Assessment / Product Assessment	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** architectural concepts and application in organizations **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	55%

16	Students are able to analyze the application of computer architecture concepts with case studies of the Intel 8085 and Intel 8086 microprocessors.	Linking architectural concepts and implementation in organizations	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Project Results Assessment / Product Assessment	Scientific approach, presentation, question and answer, discussion and problem-based learning 2 X 50	Scientific approach, presentation, question and answer, discussion and problem-based learning	**Material:** architectural concepts and application in organizations **References:** *Stalling, Williams. 2010. Computer Organization and Architecture: Designing for Performance Eighth Edition. United States: Pearson Prentice Hall.*	0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	45%
2.	Project Results Assessment / Product Assessment	55%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.