	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
Digital Systems	5520203085	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	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**
	Program Objectives (PO)
	PLO-PO Matrix

P.O

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

Short Course Description	This course discusses the basic concepts of digital systems as the main components in computers, as well as analysis and design of simple digital systems. Understanding of analog and digital concepts, number systems, logic circuit analysis using Boolean algebra, simplification of Boolean functions, logic circuit design, flip-flops, arithmetic circuits, combinational circuits, Synchronous Sequential Logic, Registers, Counters, Memory, Algorithmic State Machines (ASM) and Asynchronous Sequential Logic (ASL)..
References	**Main :**

1. Malvino, A.Paul. 1989. Elektronika Komputer Digital , Pengantar Mikrokomputer. Penerbit Erlangga.
2. Mano, Morris. 1988. Computer System Architecture, Second Edition. Prentica-Hall of India. New Delhi.
3. Tocci, Ronald J., Widmer, Neal S. 2011. Digital Systems Principles and Applications , 11th Edition. Prentice-Hall.

Supporters:	
Supporting lecturer	Aditya Prapanca, S.T., M.Kom.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Describe digital systems and analog systems	1. Describe the differences between analog and digital systems. 2. Explain the application of digital systems in everyday life	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Assignment and questions and answers 2 X 50	Assignments and questions and answers	**Material:** analog and digital systems **References:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	5%

2	Calculating number conversions	1. Calculating the conversion of decimal to binary, octal, hexadecimal 2. Calculating the conversion of binary, octal, hexa-decimal, to decimal	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Assignment and discussion 2 X 50		**Material:** number conversion **Reader:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	0%
3	Basic gates (logic gates)	1. Calculating the conversion of decimal to binary, octal, hexadecimal 2. Calculating the conversion of binary, octal, hexa-decimal, to decimal	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Assignment and discussion 3 X 50	Assignments and discussions	**Material:** Basic gates (logic gates) **References:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	0%
4	Analyze the properties of logic gates	1. Describe the properties of logic gates (logic gates) 2. Simplify logic circuits using Boolean algebra	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Presentation, discussion 3 X 50	Presentations, discussions	**Material:** logic gates **Reference:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	5%
5	Analyzing the properties of logic gates, KMap and Boolean Algebra	1. Describe the properties of logic gates (logic gates) 2. Simplify logic circuits using Boolean algebra	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Presentation, discussion 3 X 50	Presentations, discussions	**Material:** logic gates, KMap and Boolean Algebra **References:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	0%
6	Calculating with arithmetic logic	Describe how circuits work using arithmetic logic	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Discussion and assignment 3 X 50	Discussions and assignments	**Material:** arithmetic logic **Reader:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	5%
7	Designing a circuit using the Karnaugh Map method	Simplify circuits with the Karnaugh Map	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Discussion and assignment 3 X 50	Discussions and assignments		5%
8	UTS	Simplify circuits with the Karnaugh Map	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Discussion and assignment 3 X 50	Discussions and assignments		10%

9	Analyze the properties of FLIP FLOP	1. Describe the characteristics of the types of Flip Flop 2. Analyze the circuit	**Criteria:** According to the assessment rubric	Practice questions and give assignments 2 X 50	Practice questions and assignments	**Material:** FLIP FLOP **Reference:** *Mano, Morris. 1988. Computer Systems Architecture, Second Edition. Prentica-Hall of India. New Delhi.*	0%
10	Analyze counter and register circuits	1. Describe the properties of counter and register circuits. 2. Design a counter application circuit	**Criteria:** According to the assessment rubric	Discussion and assignment 2 X 50	Discussion and assignment	**Material:** counters and registers **Bibliography:** *Mano, Morris. 1988. Computer Systems Architecture, Second Edition. Prentica-Hall of India. New Delhi.*	0%
11	Analyzing multiplexer and seven segment circuits	1. Describe the properties of multiplexer and seven segment circuits 2. Design multiplexer and seven segment application circuits	**Criteria:** According to the assessment rubric	Discussion and assignment 2 X 50	Discussion and assignment	**Material:** multiplexer and seven segments **References:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	0%
12	Analyze the properties of FLIP FLOP	1. Explaining FLIP FLOP2. Analyze the properties of FLIP FLOP	**Criteria:** According to the assessment rubric	Demonstration of 3 X 50 digital tasks	Demonstration of digital tasks	**Material:** FLIP FLOP **Bibliography:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	0%
13	Analyze the properties of FLIP FLOP	1. Explaining FLIP FLOP2. Analyze the properties of FLIP FLOP	**Criteria:** According to the assessment rubric **Form of Assessment** : Participatory Activities	Demonstration of 3 X 50 digital tasks	Demonstration of digital tasks	**Material:** FLIP FLOP **Bibliography:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	10%
14	Application of logic gates in digital circuits	1. Explaining Register Circuits 2. Applying in circuits	**Criteria:** According to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment	Demonstration of 3 X 50 digital tasks	Demonstration of digital tasks	**Material:** logic gates **References:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	10%
15	Application of logic gates in digital circuits	1. Explain the Registers circuit. 2. Apply the Register circuit	**Criteria:** According to the assessment rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Demonstration of 3 X 50 digital tasks	Demonstration of digital tasks	**Material:** logic gates in digital circuits **Reference:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	20%

16	UAS	1. Explain the Registers circuit. 2. Apply the Register circuit	**Criteria:** According to the assessment rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Demonstration of 3 X 50 digital tasks	Demonstration of digital tasks	**Material:** logic gates in digital circuits **Reference:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	43.33%
2.	Project Results Assessment / Product Assessment	53.33%
3.	Practical Assessment	3.33%
		99.99%

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** ability in the process and student learning outcomes are specific and measurable statements that identify the ability 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.