	Universitas Negeri Surabaya **Faculty of Engineering** **, Electrical Engineering Education Undergraduate Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Advanced Digital Electronics	8320102253	Compulsory Study Program Subjects	**T=2**	**P=0**	**ECTS=3.18**	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Nur Kholis, S.T., M.T.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-5	Able to align the electrical and electronics engineering training curriculum in vocational education that is relevant to the demands of global industrial development (Education).
	PLO-7	Able to apply applied research to innovate vocational learning methods, optimize production process technology and electrical engineering services relevant to industry (Education).
	PLO-10	Have a responsible character and be committed to professional ethics (General/SSC4.6).
	PLO-13	Able to design circuits, devices and products in the electrical and electronics engineering expertise program (SSC3.1).
	PLO-14	Able to become a practitioner who can apply his knowledge and skills to develop products in a comprehensive electrical engineering and electronics engineering skills program (SSC4.1)
	Program Objectives (PO)	
	PO - 1	Able to work together in solving digital circuit design and implementation problems
	PO - 2	Able to apply digital circuits to general knowledge, social and humanities
	PO - 3	Able to align the electronics engineering training curriculum in vocational education that is relevant to the demands of global industrial development
	PO - 4	Have extensive knowledge in the fields of mathematics, science and electrical engineering so that you can solve digital circuit problems in the electronics engineering program by following scientific writing rules
	PLO-PO Matrix	

P.O	PLO-5	PLO-7	PLO-10	PLO-13	PLO-14
PO-1					
PO-2					
PO-3					
PO-4					

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																
PO-3																
PO-4																

Short Course Description	Examines the basic concepts of digital engineering, logic gates, Flip-Flops, Boolean Algebra, combinatorial circuit design, sequential circuits, counters and registers, as well as their applications in everyday life.	
References	**Main :**	

	1. Barmawi, 1991. Rangkaian dan Sistem Analog dan Digital. Jilid 2. Jakarta: Erlangga 2. Leach, Donald. 1997. Digital Principles and Applications. Fifth Edition. New York: McGraw-Hill 3. Nur, Mohamad. 1977. Sistem Digital: Prinsip dan Pemakaian. Surabaya: Unipress IKIP Surabaya 4. Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice-Hall.
	Supporters:
Supporting lecturer	Dr. Meini Sondang Sumbawati, M.Pd. Dr. Nur Kholis, S.T., M.T. Dr. Lilik Anifah, S.T., M.T. Sayyidul Aulia Alamsyah, S.T., M.T.

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	Analyze the properties of logic gates	1.- Describe the properties of logic gates (logic gates) 2.- Simplify logic circuits with Boolean algebra 3.-Assembling logic circuits	**Criteria:** 1.-Able to explain logic gates 2.-Able to simplify logic circuits **Form of Assessment** : Participatory Activities	Lectures, group discussions and reflections 2 X 50		**Material:** logic gates and circuit simplification **References:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	0%
2	Able to design combinational circuits	Students can carry out simulations regarding combinational circuits	**Criteria:** The simulated circuit results are in accordance with the applicable theory **Form of Assessment** : Project Results Assessment / Product Assessment	Experiment, Discussion, question and answer 2x50		**Material:** network simplification **References:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	0%
3	Get the standard form of the truth table	1.Students can explain the standard form of digital circuits 2.Students can formulate standard forms of truth tables	**Criteria:** 1.Students can explain the standard form of digital circuits 2.Students can formulate standard forms of truth tables **Form of Assessment** : Participatory Activities, Portfolio Assessment	Lectures, Discussions, Questions and Answers		**Material:** Standard form POS and SOP **References:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	0%
4	Simplify digital circuits using KMAP	1.- Describe KMAP 2.-Simplify logic circuits with KMAP	**Criteria:** Successfully simplified logic circuits with KMAP **Form of Assessment** : Participatory Activities	Experiment, group discussion, and reflection 4 X 50			0%

5	Simplify digital circuits using KMAP	1.- Describe KMAP 2.-Simplify logic circuits with KMAP 3.-Simulate simplified logic circuits with KMAP	**Criteria:** The simulation was successful **Form of Assessment** : Project Results Assessment / Product Assessment	Experiment, group discussion, and reflection 4 X 50		**Material:** KMAP **Reference:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	10%
6	Students are able to design combinational circuits with real components to create seven segments	Combinational Circuit Design	**Criteria:** The design can be successfully simulated **Form of Assessment** : Project Results Assessment / Product Assessment	Experiment, group discussion, and reflection 4 X 50		**Material:** seven segments **References:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	10%
7	Students are able to design combinational circuits with real components to create seven segments	Active in assembling components	**Criteria:** Actively discussing and assembling components **Form of Assessment** : Project Results Assessment / Product Assessment	Experiment, group discussion, and reflection 4 X 50		**Material:** seven segments **References:** *Tocci, Ronald J. & Widmer, Neal S. & Moss, Gregory L. 2011. Digital Systems: Principles and Application. New Jersey: Prentice Hall.*	10%
8	UTS	1.The combinational circuit worked according to theory 2.able to explain the circuit used	**Criteria:** 1.assessment of project results 2.activeness in presentation **Form of Assessment** : Project Results Assessment / Product Assessment	experiment, project presentation 2 X 50			10%
9	Analyzing Encoders	1.- Describe the Encoder 2.- Assembling encodersCreate reports about encoders		Experiment, group discussion, and reflection 4 X 50			0%
10	Analyzing decoders	- Describe the decoder - Assemble the decoder Create a report about the decoder		Experiment, group discussion, and reflection 4 X 50			0%
11	Analyzing Multiplexers and sevensegments	- Describe the multiplexer and seven segments - Assemble the multiplexer and seven segments Make a report about the multiplexer and seven segments		Experiments, group discussions and reflections 2 X 50			0%

12	Analyze the properties of FLIP FLOP	- Describe the characteristics of the types of Flip Flop - Analyze the circuit		Experiment, group discussion, and reflection 4 X 50			0%
13							0%
14	Analyzing register circuits	- Describe the properties of register circuits. Design register application circuits		Experiments, group discussions and reflections 2 X 50			0%
15	Analyze the counter circuit	- Describe the properties of the counter circuit. Design the counter application circuit.		Experiments, group discussions and reflections 2 X 50			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Project Results Assessment / Product Assessment	40%
		40%

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.