	Universitas Negeri Surabaya Vocational Faculty, D4 Electrical Engineering Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Electrical Materials	20401020091	Compulsory Study Program Subjects	T=0	P=0	ECTS=0	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Mahendra Widyartono, S.T., M.T.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-6	Able to identify, formulate, search for references or standards, analyze and solve problems in energy conversion work and generation systems as well as utilization of low voltage and medium voltage electric power using analytical tools for the field of electric power engineering technology.
	Program Objectives (PO)	
	PO - 1	Students can design analog systems to solve a problem
	PO - 2	Students can define a problem and how to solve it
	PO - 3	Students can design digital systems to solve problems
	PO - 4	Students can apply analog and digital systems practically
	PO - 5	Understanding Conductor Concepts
	PO - 6	Understanding the Concept of Energy Bands
	PLO-PO Matrix	

P.O	PLO-6
PO-1	
PO-2	
PO-3	
PO-4	
PO-5	
PO-6	

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																
PO-5																
PO-6																

Short Course Description	Understanding and studying the concepts, theories and applications of electrical materials including: conducting materials, insulating materials, resistance materials, electrical contact materials, magnetic materials, special materials and electrical structure materials.

References	**Main :**	
	1. Suhadi, dkk. 1994. Bahan-bahan Listrik. Surabaya: Unipress IKIP Surabaya 2. Kapur, P.L. 1984. A Textbook of Electrical Enginnering Materials. New Delhi: Khanna Publisher 3. Chhalotra. 1980. Electrical Enginnering Materials. Delhi: Khanna Publisher	
	Supporters:	
Supporting lecturer	Widi Aribowo, S.T., M.T. Reza Rahmadian, S.ST., M.EngSc. Aditya Chandra Hermawan, S.ST., 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	- Describe the nature of logic gates (logic gates) - Simplify logic circuits using Boolean algebra Assemble logic circuits	**Criteria:** 1. The assessment criteria are carried out by looking at aspects: 2. 1. Participation: carried out by observing student activities (weight 2) 3. 2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4. 3. UAS: carried out every semester to measure all indicators (weight 3) 5. 4. Task: carried out on each indicator (weight 3) 6. Student Final Grade: 7. Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10. **Form of Assessment** : Participatory Activities	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Logic Gates **Bibliography:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	1%

2	Analyze the properties of logic gates	- Describe the nature of logic gates (logic gates) - Simplify logic circuits using Boolean algebra Assemble logic circuits	**Criteria:** 1. The assessment criteria are carried out by looking at aspects: 2. 1. Participation: carried out by observing student activities (weight 2) 3. 2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4. 3. UAS: carried out every semester to measure all indicators (weight 3) 5. 4. Task: carried out on each indicator (weight 3) 6. Student Final Grade: 7. Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10. **Form of Assessment** : Participatory Activities	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Logic Gates **Bibliography:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	1%
3	Analyze the properties of logic gates	- Describe the nature of logic gates (logic gates) - Simplify logic circuits using Boolean algebra Assemble logic circuits	**Criteria:** 1. The assessment criteria are carried out by looking at aspects: 2. 1. Participation: carried out by observing student activities (weight 2) 3. 2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4. 3. UAS: carried out every semester to measure all indicators (weight 3) 5. 4. Task: carried out on each indicator (weight 3) 6. Student Final Grade: 7. Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10. **Form of Assessment** : Participatory Activities	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Logic Gates **Bibliography:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	1%

4	Simplifying digital circuits using KMAP	- Describe KMAP Simplify logic circuits with KMAP	**Criteria:** The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignment: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10 **Form of Assessment** : Practice / Performance	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Kmap **Bibliography:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	3%
5	Simplifying digital circuits using KMAP	- Describe KMAP Simplify logic circuits with KMAP	**Form of Assessment** : Participatory Activities	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Kmap **Bibliography:** *Malvino, A. Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	1%
6	Analyzing Encoders	- Describe the Encoder - Assemble the encoder Create a report about the encoder	**Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Encoder **Reader:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	5%
7	Analyzing Encoders	- Describe the Encoder - Assemble the encoder Create a report about the encoder	**Criteria:** The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignment: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10 **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Encoder **Reader:** *Malvino, A.Paul. 1989. Digital Computer Electronics, Introduction to Microcomputers. Erlangga Publishers.*	1%
8	UTS		**Criteria:** null **Form of Assessment** : Test	null 2 X 50			16%

9	Analyzing decoders	- Describe the decoder - Assemble the decoder Create a report about the decoder	**Criteria:** The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignment: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experimentation, group discussion, and reflection	**Material:** decoder **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local* **Material:** decoder **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	10%
10	Analyzing decoders	- Describe the decoder - Assemble the decoder Create a report about the decoder	**Criteria:** The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignment: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10 **Form of Assessment** : Participatory Activities	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** decoder **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	1%
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	**Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** multiplexer and seven segments **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	10%
12	Analyze the properties of FLIP FLOP	- Describe the characteristics of the types of Flip Flop - Analyze the circuit	**Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** flip flop **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	10%
13	Analyze the properties of FLIP FLOP	- Describe the characteristics of the types of Flip Flop - Analyze the circuit	**Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** flip flop **Reader:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	5%

14	Analyzing register circuits	- Describe the properties of register circuits. Design register application circuits	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** Bibliography **:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	5%
15	Analyze the counter circuit	- Describe the properties of the counter circuit. Design the counter application circuit.	**Form of Assessment** : Project Results Assessment / Product Assessment	Experiments, group discussions and reflections 2 X 50	Experiments, group discussions and reflections 2 X 50	**Material:** COUNTER **Bibliography:** *Prapanca, Aditya. 2015. Diktat on Digital Systems, UNESA Informatics Engineering. Local*	5%
16	UAS		**Form of Assessment** : Test				25%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	8%
2.	Project Results Assessment / Product Assessment	48%
3.	Practice / Performance	3%
4.	Test	41%
		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** 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.