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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Electrical Power Engineering	2130202028		T=2	P=0	ECTS=3.18	5	July 17, 2024

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

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Students can determine by analyzing the components of an electric power system
PO - 2	Students can make determinations by analyzing components and systems of electrical machines

PLO-PO Matrix

P.O
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	Understanding the study of the use of electrical terms, electrical resistance, power work and electrical power, usability or efficiency, accumulators, Kirchhoff's second law, electric charge, electric power generation systems, the concept of electromagnetic induction, various types of AC/electric motors, AC/DC generators , transformer

References

Main :

1. Suryatmo .F,Dasar-Dasar Teknik Listrik, Rineka Cipta, Jakarta, 1992.Berahim, Hamzah,Teknik Tenaga Listrik Dasar, Jakarta, Graha Ilmu, 2011.Bird, J. O. and A. J. C. May,1989,Electrical and ElectronicPrinciples 3 Checkbook 2nd ed.,BH Newnes: Oxford.Bird, J. O., 2014,Electrical and Electronic Principles andTechnology 5th ed., Routledge: London.Robertson, C. R., 2008,Fundamental Electrical and Electronic Principles3rd ed., Elsevier.
2. Berahim,Hamzah,TeknikTenagaListrikDasar,Jakarta,GrahaIlmu,2011.
3. Bird,J.O.,2014,ElectricalandElectronicPrinciplesandTechnology5thed.,Routledge:London.
4. Robertson,C.R.,2008,FundamentalElectricalandElectronicPrinciples3rded.,Elsevier.

Supporters:

1. Modul Reknik Tenaga Listrik
2. Power point

Supporting lecturer	Iskandar, S.T., M.T. Diah Wulandari, 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	Able to understand types of electric current and their characteristics	Students can explain the types of electric current and their characteristics	**Form of Assessment** : Participatory Activities	lectures and discussions 2 X 50			2%
2	Understand the system and distribution of electrical energy	Students can understand the system and distribution of electrical energy	**Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2 X 50			2%
3	Able to install 1 phase and 3 phase electrical systems	Students can install 1 phase and 3 phase electrical systems	**Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2 X 50			2%
4	Understand the working principles of 1 phase and 3 phase transformers	Students can explain the working principle of a transformer	**Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2 X 50			2%
5	Skilled in testing the performance of 1 phase and 3 phase transformers	Students can test the performance of 1 phase and 3 phase transformers	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers and practicum 2 X 50			2%
6	Understand the principles of DC generators and their components	Students can explain the working principles of DC generators and their components	**Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2 X 50			2%
7	Understand the principles of AC generators and their components	Students can explain the working principles of AC generators and their components	**Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2 X 50			3%
8	UTS		**Form of Assessment** : Project Results Assessment / Product Assessment	2 X 50			25%
9	Skilled in measuring DC generator performance with loading	Students can measure the performance of DC generators with loading	**Form of Assessment** : Practice / Performance	Lectures, discussions, questions and answers and practicum 2 X 50			2%
10	1. Skilled in synchronous generator measurements 2. able to analyze the performance of synchronous generators	1. students can carry out measurements of synchronous generators 2. analyze the performance of synchronous generators	**Criteria:** 1. carry out measurements of the synchronous generator correctly 2. properly analyze the performance of the synchronous generator **Form of Assessment** : Practice / Performance	Lectures, discussions, questions and answers and practicum 2 X 50			2%

11	Skilled in measuring and analyzing asynchronous generators	1. students can carry out measurements of asynchronous generators 2. can analyze the performance of asynchronous generators	**Criteria:** 1. can carry out measurements of asynchronous generators correctly 2. correctly analyze the performance of asynchronous generators **Form of Assessment** : Practice / Performance	Lectures, discussions, questions and answers and practicum 2 X 50			2%
12	1. Understand the principles of DC motors and their components 2. able to analyze the performance of DC electric motors	Students can understand DC electric motors and their components	**Criteria:** 1. Can explain DC electric motors and their components correctly 2. analyze the performance of DC electric motors correctly **Form of Assessment** : Practice / Performance	Lectures, discussions and questions and answers, 2 X 50 practicum			2%
13	Skilled in measuring V, I of DC motors with loading	Students are skilled at measuring V, I of DC motors with loading	**Criteria:** measurement of V, I DC motors with loading correctly **Form of Assessment** : Practice / Performance	Lectures, discussions, questions and answers and practicum 2 X 50			2%
14	skilled at measuring V, I starting induction motors	students are skilled at measuring V, I starting induction motors	**Form of Assessment** : Practice / Performance	Lectures, discussions, questions and answers and practicum 2 X 50			2%
15	Understand designing power electronic systems for electrical power control applications	designing power electronic systems for electrical power control applications	**Form of Assessment** : Practical Assessment	Lectures, discussions, assignments 2 X 50			18%
16	1. Capable of paralleling two synchronous generators 2. able to analyze the parallel performance of two synchronous generators	1. can parallel two synchronous generators 2. analyze the parallel performance of two synchronous generators	**Criteria:** 1. can parallel two synchronous generators properly 2. correctly analyze the parallel performance of two synchronous generators **Form of Assessment** : Project Results Assessment / Product Assessment	lecture, performance			30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	15%
2.	Project Results Assessment / Product Assessment	55%
3.	Practical Assessment	18%
4.	Practice / Performance	12%
		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.