



**Universitas Negeri Surabaya
Vocational Faculty,
D4 Electrical Engineering Study Program**

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date												
DC Electrical Machines	99992040102031	Compulsory Study Program Subjects	T=2 P=0 ECTS=3.18	3	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																
	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	The DC electric machine course is a course that explains the characteristics of direct current motors, equivalent circuits, rotation settings, braking of direct current motors, working principles of direct current electric machines, characteristics of direct current generators, generator loading, generator parallel connections.																
References	Main :																
	1. Fitzgerald A E dan Charles Kingsley Jr. 1990. Mesin-mesin Listrik, terjemahan Djoko Achyanto, edisi ke empat. Jakarta: Penerbit Erlangga. 2. Harten Van. 1983. Rangkaian motor :Instalasi Listrik Arus Kuat, terjemahan E Setiawan, Cetakan Pertama. Bandung:Bina Cipta. 3. Kadir Abdul.1989. Mesin-mesin Listrik.Jakarta: PT MEDIA ELEX KOMPUTINDO.																
	Supporters:																
	1. Theodore Wildi, Electrical Machines, Drives, and Power System 5th Ed., 2002																
Supporting lecturer	Mahendra Widyartono, S.T., M.T. 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	Understand the principles of energy conversion. Understand the principles of direct current machines. Understand the construction of direct current machines	<ol style="list-style-type: none"> 1.Explain the development of direct current machines 2.Explain direct current machines based on their function. 3.Explain the occurrence of induced EMF 4.Explain the working principle of a direct current machine 5.Explain the construction of a direct current machine 6.Explain magnetic circuits 7.Explain the polarite, and rotation strengthening systems 8. Observe/observe direct current machines in the Lab. Conversion 	Form of Assessment : Participatory Activities	2 X 50		Material: direct current machine Bibliography: <i>Fitzgerald AE and Charles Kingsley Jr. 1990. Electrical Machines, translated by Djoko Achyanto, fourth edition. Jakarta: Erlangga Publishers.</i>	5%
2	Understand the principles of energy conversion. Understand the principles of direct current machines. Understand the construction of direct current machines	<ol style="list-style-type: none"> 1.Explain the development of direct current machines 2.Explain direct current machines based on their function. 3.Explain the occurrence of induced EMF 4.Explain the working principle of a direct current machine 5.Explain the construction of a direct current machine 6.Explain magnetic circuits 7.Explain the polarite, and rotation strengthening systems 8. Observe/observe direct current machines in the Lab. Conversion 	Form of Assessment : Participatory Activities	2 X 50		Material: electrical machines References: <i>Fitzgerald AE and Charles Kingsley Jr. 1990. Electrical Machines, translated by Djoko Achyanto, fourth edition. Jakarta: Erlangga Publishers.</i> Material: induced emf Reference: <i>Fitzgerald AE and Charles Kingsley Jr. 1990. Electrical Machines, translated by Djoko Achyanto, fourth edition. Jakarta: Erlangga Publishers.</i>	5%
3	Understand the types of anchor coils. Skilled in drawing types of anchor coils	<ol style="list-style-type: none"> 1.Explain the development of the anchor coil 2.Explain the types of anchor coils 3.Explains how to make a list of anchor coil windings 4.Explain how to draw an anchor coil 	Form of Assessment : Participatory Activities	Cooperative Learning and Direct Learning Model 2 X 50		Material: anchor coil References: <i>Fitzgerald AE and Charles Kingsley Jr. 1990. Electrical Machines, translated by Djoko Achyanto, fourth edition. Jakarta: Erlangga Publishers.</i>	5%

4	Understand the types of power, power losses, and efficiency of direct current generators	<ol style="list-style-type: none"> 1.Explain the various types of direct current generator power 2.Explain the types of power losses in direct current generators 3.Explain the efficiency of a direct current generator 	Form of Assessment : Participatory Activities	Cooperative Learning Model and Direct Learning Method: Presentation, discussion and assignment 2 X 50		Material: direct current generator power losses References: <i>Fitzgerald AE and Charles Kingsley Jr. 1990. Electrical Machines, translated by Djoko Achyanto, fourth edition. Jakarta: Erlangga Publishers.</i>	5%
5	Analyze the characteristics of direct current generators	<ol style="list-style-type: none"> 1.Explain the various characteristics of direct current generators 2.Explain the various characteristics of a separate amplifier direct current generator 3.Explain the various characteristics of self-amplifying direct current generators 		Cooperative Learning Model and Direct Learning Model Method: Presentation, discussion and assignment 2 X 50			0%
6	Analyze the characteristics of direct current generators	<ol style="list-style-type: none"> 1.Explain the various characteristics of direct current generators 2.Explain the various characteristics of a separate amplifier direct current generator 3.Explain the various characteristics of self-amplifying direct current generators 		Cooperative Learning Model and Direct Learning Model Method: Presentation, discussion and assignment 2 X 50			0%
7	Understand the operation of a direct current generator.	<ol style="list-style-type: none"> 1.Explain the types of loading of a direct current generator 2.Explain the loading with a three-wire system 3.Explain balancing machines 4.Explain the parallel connection of direct current generators 5.Give examples of solving problems involving parallel connections of direct current generators 		Cooperative Learning Model and Direct Learning Model Method: Presentation, discussion and assignment 2 X 50			0%

8	Understand the operation of a direct current generator.	1.Explain the types of loading of a direct current generator 2.Explain the loading with a three-wire system 3.Explain balancing machines 4.Explain the parallel connection of direct current generators 5.Give examples of solving problems involving parallel connections of direct current generators		Cooperative Learning Model and Direct Learning Model Method: Presentation, discussion and assignment 2 X 50			0%
9							0%
10							0%
11							0%
12							0%
13							0%
14							0%
15							0%
16							0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	20%
		20%

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.**

