	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
Electromechanics	8320102024		T=2	P=0	ECTS=3.18	5	July 18, 2024

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

Learning model: Case Studies

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: Students are able to understand load characteristics; types of electric motors and their characteristics, starting and braking of electric motors, controlling the rotation speed of electric motors manually, electronically, and using an inverter; factors to consider when selecting an electric motor; and choosing an economical motorbike

References

Main :

1. M. V. Deshapande, 1990. Electric Motor: Applications and Control

Supporters:

Supporting lecturer: Prof. Dr. Joko, M.Pd., 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 load characteristics of electric motors	1. Describe load characteristics 2. Describe the rotation characteristics of the load function 3. Describe the torque characteristics of the load function 4. Describe the moment of energy characteristics of the load function 5. Explain the load function torque curve 6. Explain the velocity curve as a function of time 7. Explain the characteristics of the motor according to the load characteristics 8. Explain the characteristics of electric motors according to the intensity of the load	**Criteria:** 1. Cognitive assessment criteria 2. Question item 6, items 1 - 5 each item max score 15, item 6 max score 25 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10 5. Task assessment criteria: 6. Substance of material content, max score. 60 7. Honesty, amax score. 20 8. Writing style, max score 5 9. Grammar, max score. 5 10. Neatness, max score 5 11. Timeliness of sending assignments, max score 15	Cooperative learningPresentationDiscussionAssignmentReflection 2 X 50			0%
2	Understand the types of electric motors and their characteristics	1. Mention the types of electric motors and their characteristics 2. Explain the types of electric motors and their characteristics 3. Choose the type of electric motor according to the load characteristics 4. Choose the motor type according to the working load intensity 5. Choose the type of motor according to the slow working load 6. Make a summary of choosing the type of motor according to the load characteristics	**Criteria:** 1. Cognitive assessment criteria 2. Question item 6, items 1 - 5 each item max score 15, item 6 max score 25 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Cooperative learning model Presentation discussion Assignment Reflection 2 X 50			0%

3	Understand starting and braking of electric motors	1. Explain the purpose of starting an electric motor 2. Describe the types of starting electric motors 3. Describe how to start according to the type of starting and type of electric motor 4. Explain the purpose of braking an electric motorbike 5. Describe the types of electric motor braking 6. Describe how to do it according to the type of braking and type of electric motor	**Criteria:** 1. Cognitive assessment criteria 2. Question item 6, items 1 - 5 each item max score 15, item 6 max score 25 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Cooperative learningPresentationDiscussionAssignmentReflection 2 X 50			0%
4	Understand how to control the rotation speed of electric motors manually, electronically, and using an inverter	1. Mention the types of manual, electronic and electronic motor rotation speed control using an inverter 2. Describe the working principles of manual, electronic and electronic motor rotation speed control using an inverter 3. Describe how to control the rotation speed of an electric motor manually, electronically, and using an inverter	**Criteria:** 1. Cognitive assessment criteria 2. Question item 3, items 1 - 2 each item max score 40, item 6 max score 20 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Cooperative learningPresentationDiscussionassignmentReflection 2 X 50			0%
5	Understand the factors to consider when selecting an electric motor	1. Mention the factors to consider when choosing an electric motor 2. Describe the factors considered in choosing an electric motor 3. Analyze the factors considered in choosing an electric motor	**Criteria:** 1. Cognitive assessment criteria 2. Question item 3, items 1 - 2 each item max score 40, item 3 max score 20 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Cooperative learningPresentationDiscussionAssignmentReflection 2 X 50			0%

6	Understand how to control the rotation speed of manual electric motors, electromagnetics, electronics, and using inverters	1. Analyzing electric motor speed controllers manually 2. Analyzing electromagnetic speed control of electric motors 3. Analyzing electronic motor speed controllers 4. Analyzing electric motor speed controllers with inverters 5. Choose the type of electric motor controller according to the desired performance.	**Criteria:** 1. Cognitive assessment criteria 2. Question item 3, items 1 - 2 each item max score 40, item 3 max score 20 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Problem-based learning model (MPBM)DiscussionPresentationAssignment 2 X 50			0%
7	Understand the factors to consider when selecting an electric motor	Describe the factors that are considered when selecting an electric motor. Analyze the need for an electric motor based on load characteristics	**Criteria:** 1. Cognitive assessment criteria 2. Question item 3, items 1 - 2 each item max score 40, item 3 max score 20 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Problem-based learning model (MPBM)DiscussionPresentationAssignment 2 X 50			0%
8	Understand the selection of an economical electric motorbike	Choose an economical electric motorbike	**Criteria:** 1. Cognitive assessment criteria 2. Question item 3, items 1 - 2 each item max score 40, item 3 max score 20 total max score 100 3. Participation assessment criteria: 4. Presence. max score 60 Activeness in discussions, max score 10 Activeness and logicalness in asking questions, max score 10 Activeness and logicalness in expressing opinions, max score max score 10 Attention to friends, max score max score 10	Problem-based learning model (MPBM)DiscussionPresentationAssignment 2 X 50			0%

9	Analyzing sources of information to prepare scientific work related to: 1. load characteristics, 2. types of electric motors and their characteristics, 3. starting and braking, 4. rotation speed control, 5. factors to consider in choosing an electric motor, 6. selecting an economical electric motor.	Students access sources of information related to load characteristics Students access sources of information related to types of electric motors and their characteristics Students access sources of information related to starting and braking of electric motors Students access sources of information related to rotating speed controllers Students access sources of information related to the factors considered in choosing an electric motor Students access Source of information related to selecting an economical electric motorbike	**Criteria:** 1. Method used in accessing information, max score 30 2. Max score information completeness level 30% 3. Quality of information access results max score 40%	Problem-based learningPresentationDiscussionAssignmentReflection 2 X 50			0%
10	Prepare a scientific paper on load characteristics and present the results (Group 1)	Presented scientific paper on electric motor load characteristics	**Criteria:** 1. Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2. Presentation or presentation of a maximum score of 20 3. Mastery of material in answering questions with a maximum score of 30 4. Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%
11	Compile scientific work related to types of electric motors and their characteristics in groups and present the results	Scientific papers on types of electric motors and their characteristics have been compiled in group 2 and have been presented	**Criteria:** 1. Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2. Presentation or presentation of a maximum score of 20 3. Mastery of material in answering questions with a maximum score of 30 4. Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%
12	Prepare scientific work on starting and braking of electric motors in groups and present the results	Group 3 completed and presented a scientific paper on starting and braking of electric motors	**Criteria:** 1. Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2. Presentation or presentation of a maximum score of 20 3. Mastery of material in answering questions with a maximum score of 30 4. Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%

13	Compile scientific work related to controlling the rotation speed of electric motors manually, electronically, and using inverters in groups and present the results	Compiled and presented a scientific paper on manual, electronic and electronic motor rotation speed control using an inverter	**Criteria:** 1.Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2.Presentation or presentation of a maximum score of 20 3.Mastery of material in answering questions with a maximum score of 30 4.Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%
14	Compile scientific work related to the factors considered in selecting electric motors as a group and present the results	Compiled and presented a scientific paper on factors to consider when choosing an electric motor	**Criteria:** 1.Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2.Presentation or presentation of a maximum score of 20 3.Mastery of material in answering questions with a maximum score of 30 4.Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%
15	Compile scientific work related to the selection of economical electric motors as a group and present the results	Prepared and presented a scientific paper on the selection of an economical electric motor in groups and presented the results	**Criteria:** 1.Written work, including problem formulation, objectives and benefits of writing scientific papers with a maximum score of 50 2.Presentation or presentation of a maximum score of 20 3.Mastery of material in answering questions with a maximum score of 30 4.Total score 100	Project-based learningDiscussionAssignmentPresentationReflection 2 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.