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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Electrical Energy Control System	2020102200		T=2	P=0	ECTS=3.18	8	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Lusia Rakhmawati, 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	Understanding and studying the concepts of electrical energy control, control engineering and power system control equipment
References	**Main :**
	1. KUNDUR dan Prabha.1994. Power System Stability and Control. EPRI, McGraw-Hill. 2. ELGERD dan Olle I.1971. Electric Energy SystemTheory : An Introduction. McGraw-Hill.
	Supporters:
Supporting lecturer	Muhamad Syariffuddien Zuhrie, S.Pd., M.T. Roswina Dianawati, S.Pd., M.Ed.

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	Students are able to understand power system problems, control engineering and power system control equipment	Students are able to understand power system problems. Students are able to understand control engineering. Students are able to understand power system control equipment		Lectures, discussions 2 X 50			0%
2	Students are able to understand the concept of matrices, matrix equations, types of matrices and matrix operations	Students are able to understand matrix equations Students are able to understand matrix types Students are able to understand matrix operations		Lectures, discussions 4 X 50			0%
3	Students are able to understand determinants, adjoints and inverses	Students are able to understand and explain Determinants Students are able to understand and explain Adjoin Students are able to understand and explain Inverse matrices Using Conventional Methods		Lectures, discussions 4 X 50			0%
4	Students are able to understand inverse matrices using the partition method, rank of a matrix and eigenvalue	Students are able to understand the Inverse matrix Using the Partition Method Students are able to understand the Rank of a Matrix Students are able to understand Eigenvalue		Lectures, discussions 4 X 50			0%
5	Students are able to understand the concept of state space, state space from differentials, state space in the Jordan canon and the P transformation	Students are able to understand the concept of State Space. Students are able to understand State Space from Differential. Students are able to understand State Space in the Jordan canon. Students are able to understand the P Transformation.		Lectures, discussions 4 X 50			0%

6	Students are able to understand the Transformation of State Space Equations into Scalar Differential Equations, Partial Division Techniques for State Space Representation, Formation of State Space Equations from Block Diagrams and Solving State Space Equations	Students are able to understand the Transformation of State Space Equations into Scalar Differential Equations. Students are able to understand the Partial Division Technique for State Space Representation Students are able to understand the Formation of State Space Equations from Block Diagrams Students are able to understand the Solution of State Space Equations		2 X 50			0%
7	Students are able to understand the concepts of controllability, observability and stability	Students are able to understand Controlability. Students are able to understand Observability. Students are able to understand Stability		2 X 50			0%
8	Students are able to understand the basic concepts of power system control	Students are able to understand the System Model Students are able to understand the Equilibrium Point Students are able to understand the Stability of the Equilibrium Point		2 X 50			0%
9	Students are able to understand the concept of linear models of synchronous machines	Students are able to understand the Voltage Equation Students are able to understand the Electrical Torque Equation Students are able to understand the Terminal Voltage Equation Students are able to understand the State Space Equation		2 X 50			0%

10	Students are able to understand the concept of linear models of synchronous machines	Students are able to understand synchronous machines with their settings. Students are able to understand vibration models in multi-machine systems. Students are able to understand the concept of regulated synchronous machines.		2 X 50			0%
11							0%
12							0%
13							0%
14							0%
15							0%
16							0%

Evaluation Percentage Recap: Project Based Learning

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.