	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
Electrical Power Planning and Installation	8320103102	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Nur Kholis, 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 have the ability to plan and install electrical power in office buildings, hotels and industries according to PUIL 2000

PLO-PO Matrix

P.O
PO-1

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																

Short Course Description	This course discusses the installation of direct current machines, installation of alternating current machines, motor safety and security measures. Direct current machine installation includes parallel connection of the direct current generator, how to connect the direct current motor, setting the rotation speed of the direct current motor. Alternating current machine installation includes the rotation direction and phase sequence of a three-phase motor, how to start a three-phase motor, the triangle star connection of a three-phase motor and regulating the rotational speed of a three-phase motor. Motor safety includes zero voltage safety, maximum thermal and magnetic safety

References

Main :

1. Harten dan Setiawan. 2002. Instalasi Listrik Arus Kuat 3. Trimitra Mandiri
2. Djoko Achyanto, 1990. Mesin-Mesin Listrik. Jakarta : Erlangga.
3. Joko, 2013. Bahan Ajar Mesin Arus Bolak Balik. Jurusan Teknik Elektro Fakultas Teknik Unesa Surabaya
4. Mislan. 1991. Mesin Tak Serempak. Surabaya: University Press IKIP Surabaya
5. O&rsquoKelly, Denis. 1992. Performance and Control of Electrical Machines. London: McGraw-Hill
6. Zuhal. 2000. Dasar Teknik Tenaga Listrik dan Elektronika Daya . Jakarta: PT. Gramedia Pustaka Utama

Supporters:

1. Persyaratan Umum Instalasi Listrik (PUIL) 2000, Jakarta : Yayasan PUIL

Supporting lecturer	Dr. Subuh Isnur Haryudo, 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	Students understand the basics of designing electrical installations based on applicable standards	1. Students understand electrical installation requirements 2. Students know the materials and equipment for electrical installations 3. Students know occupational safety and health 4. Students know the scope of electrical design	**Criteria:** The score is 1 to 4 **Forms of Assessment** : Participatory Activities, Practice/Performance, Tests	lectures, discussions and questions and answers 3 X 50	- -		3%
2	Students understand the technical requirements.	1. Students understand the scope of work, standards & references 2. Students understand the requirements for materials 3. Student c. Work Plan and Terms/RKS 4. Students know the parallel relationship of generators	**Criteria:** The score is 1 to 4	lectures, discussions and questions and answers 3 X 50			0%
3	Students have knowledge about the installation of alternating current machines, alternating current motors, the direction of rotation of three-phase motors, the phase sequence of three-phase motors, star and triangle connections for three-phase motors, how to start three-phase alternating current motors and practice questions.	1. Students are able to explain the installation of an alternating current machine correctly. 2. Students are able to explain alternating current motors correctly. 3. Students are able to explain the direction of rotation and phase sequence of a three-phase motor. 4. Students are able to explain the relationship between stars and triangles of three-phase motors, how to start three-phase alternating current motors	**Criteria:** The score is 1 to 4	Question and answer discussion lecture and 3 X 50 practice questions			0%

4	Students have knowledge about the installation of alternating current machines, alternating current motors, the direction of rotation of three-phase motors, the phase sequence of three-phase motors, star and triangle connections for three-phase motors, how to start three-phase alternating current motors and practice questions.	1. Students are able to explain the installation of an alternating current machine correctly. 2. Students are able to explain alternating current motors correctly. 3. Students are able to explain the direction of rotation and phase sequence of a three-phase motor. 4. Students are able to explain the relationship between stars and triangles of three-phase motors, how to start three-phase alternating current motors	**Criteria:** The score is 1 to 4	Question and answer discussion lecture and 3 X 50 practice questions			0%
5	Students have knowledge about the installation of alternating current machines, alternating current motors, the direction of rotation of three-phase motors, the phase sequence of three-phase motors, star and triangle connections for three-phase motors, how to start three-phase alternating current motors and practice questions.	1. Students are able to explain the installation of an alternating current machine correctly. 2. Students are able to explain alternating current motors correctly. 3. Students are able to explain the direction of rotation and phase sequence of a three-phase motor. 4. Students are able to explain the relationship between stars and triangles of three-phase motors, how to start three-phase alternating current motors	**Criteria:** The score is 1 to 4	Question and answer discussion lecture and 3 X 50 practice questions			0%
6	Students have knowledge about regulating the rotational speed of three-phase alternating current motors, drag rings, rotor resistance regulation, contactless regulation, synchronization and regulation with electrical power systems and speed regulation of special machines, servo motors.	1. Students are able to explain the regulation of the rotational speed of three-phase motors 2. Students are able to explain the rotational speed settings of drag ring armature motors 3. Students are able to explain synchronization and regulation with an electric shaft system	**Criteria:** The score is 1 to 4	Lectures, question and answer discussions and practice questions 3 X 50			0%

7	Students have knowledge about regulating the rotational speed of three-phase alternating current motors, drag rings, rotor resistance regulation, contactless regulation, synchronization and regulation with electrical power systems and speed regulation of special machines, servo motors.	1. Students are able to explain the regulation of the rotational speed of three-phase motors 2. Students are able to explain the rotational speed settings of drag ring armature motors 3. Students are able to explain synchronization and regulation with an electric shaft system	**Criteria:** The score is 1 to 4	Lectures, question and answer discussions and practice questions 3 X 50			0%
8	Understanding Distribution Network Planning	· Able to collect, identify, differentiate, operate and analyze data as well as communicate ideas and information about Distribution Network Planning · Able to create distribution network design models at a location	**Criteria:** Full marks are obtained if the Distribution System installation design is designed correctly	Lectures, discussions, questions and answers, and 3 X 50 Assignments			0%
9	Understanding Distribution Network Planning	· Able to collect, identify, differentiate, operate and analyze data as well as communicate ideas and information about Distribution Network Planning · Able to create distribution network design models at a location	**Criteria:** Full marks are obtained if the Distribution System installation design is designed correctly	Lectures, discussions, questions and answers, and 3 X 50 Assignments			0%
10	Understanding Distribution Network Planning	· Able to collect, identify, differentiate, operate and analyze data as well as communicate ideas and information about Distribution Network Planning · Able to create distribution network design models at a location	**Criteria:** Full marks are obtained if the Distribution System installation design is designed correctly	Lectures, discussions, questions and answers, and 3 X 50 Assignments			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	1%
2.	Practice / Performance	1%
3.	Test	1%
		3%

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.