

		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																																									
Cooling and Air Conditioning Engineering		8320102243		T=2	P=0	ECTS=3.18	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)																																																
	PLO-PO Matrix																																																
		<div style="border: 1px solid black; padding: 5px; display: inline-block;">P.O</div>																																															
	PO Matrix at the end of each learning stage (Sub-PO)																																																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 5%;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 3.33%;">1</td> <td style="width: 3.33%;">2</td> <td style="width: 3.33%;">3</td> <td style="width: 3.33%;">4</td> <td style="width: 3.33%;">5</td> <td style="width: 3.33%;">6</td> <td style="width: 3.33%;">7</td> <td style="width: 3.33%;">8</td> <td style="width: 3.33%;">9</td> <td style="width: 3.33%;">10</td> <td style="width: 3.33%;">11</td> <td style="width: 3.33%;">12</td> <td style="width: 3.33%;">13</td> <td style="width: 3.33%;">14</td> <td style="width: 3.33%;">15</td> <td style="width: 3.33%;">16</td> </tr> </table>																P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																	
Short Course Description	Planning and designing electrical systems based on regulations and standards in various buildings. Drawing installations, calculating electrical installation equipment requirements. Planning industrial electricity distribution systems, modeling, simulating and analyzing electrical systems in industry. Selection of equipment adapted to industrial needs and environment, design of safety systems, grounding systems, improvement of power quality due to industrial loads and external disturbances																																																
References	Main :																																																
	1. Edy Setiawan . 1986. Instalasi Listrik Arus Kuat I . Jakarta: Bina Cipta 2. Zan Scbotsman . 1990. Instalasi . Jakarta: Erlangga 3. Trevor Linsley . 2004. Instalasi Listrik Tingkat Lanjut . Jakarta: Erlangga																																																
	Supporters:																																																
Supporting lecturer	Dr. Ir. Achmad Imam Agung, M.Pd.																																																
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 refrigeration engineering, the working principles of refrigeration machines, and the components of refrigeration machines as well as the ability to understand symbols, refrigeration machine systems and Air Conditioners (AC).	1. Students can explain the working principles of cooling machines. 2. Students can determine the operating steps of a cooling machine. 3. Students determine the usability of mechanical components of cooling machines. 4. Students can read the symbols for refrigeration and AC machine systems.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50			0%
2	Students understand the basics of refrigeration engineering, the working principles of refrigeration machines, and the components of refrigeration machines as well as the ability to understand symbols, refrigeration machine systems and Air Conditioners (AC).	1. Students can explain the working principles of cooling machines. 2. Students can determine the operating steps of a cooling machine. 3. Students determine the usability of mechanical components of cooling machines. 4. Students can read the symbols for refrigeration and AC machine systems.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50			0%
3	Students have the ability to identify cooling machines and calculate cooling load	1. Students can identify cooling machines. 2. Students can determine the need for cooling machine installation materials. 3. Students read the electrical circuit of a cooling machine. 4. Students can calculate cooling load.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50			0%

4	Students have the ability to identify cooling machines and calculate cooling load	1. Students can identify cooling machines. 2. Students can determine the need for cooling machine installation materials. 3. Students read the electrical circuit of a cooling machine. 4. Students can calculate cooling load.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50		0%
5	Students can calculate AC ducting and can calculate the cost of installation projects for cooling machines	1. Students can calculate AC ducting. 2. Students can calculate the value and cost of a cooling machine installation project.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50		0%
6	Students can calculate AC ducting and can calculate the cost of installation projects for cooling machines	1. Students can calculate AC ducting. 2. Students can calculate the value and cost of a cooling machine installation project.	Criteria: PAP with criteria 80	Lectures, discussions and questions and answers 3 X 50		0%
7						0%
8						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
		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** 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.