



**Universitas Negeri Surabaya**  
**Faculty of Engineering,**  
**Electrical Engineering Undergraduate Study Program**

Document Code

**SEMESTER LEARNING PLAN**

<b>Courses</b>	<b>CODE</b>	<b>Course Family</b>	<b>Credit Weight</b>	<b>SEMESTER</b>	<b>Compilation Date</b>																																	
Electrical Energy Generation	2020102102		T=2 P=0 ECTS=3.18	5	July 17, 2024																																	
<b>AUTHORIZATION</b>	<b>SP Developer</b>		<b>Course Cluster Coordinator</b>	<b>Study Program Coordinator</b>																																		
	.....		.....	Dr. Lusia Rakhmawati, S.T., M.T.																																		
<b>Learning model</b>	Case Studies																																					
<b>Program Learning Outcomes (PLO)</b>	PLO study program that is charged to the course																																					
	Program Objectives (PO)																																					
	PLO-PO Matrix																																					
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="padding: 5px;">P.O</td></tr> </table>				P.O																																
P.O																																						
	PO Matrix at the end of each learning stage (Sub-PO)																																					
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2" style="padding: 5px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">9</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">11</td> <td style="padding: 5px;">12</td> <td style="padding: 5px;">13</td> <td style="padding: 5px;">14</td> <td style="padding: 5px;">15</td> <td style="padding: 5px;">16</td> </tr> </table>					P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P.O	Week																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																						
<b>Short Course Description</b>	Introduction, Natural Energy that can be converted into electrical energy, Energy Conversion, Energy problems and development strategies in Indonesia, Hydroelectric Power Plants, Components or equipment from hydroelectric power plants, Types of Thermal Power Plants, Components and equipment from Thermal Power Plants, Types of renewable power plants, problems with power plants																																					
<b>References</b>	<b>Main :</b>																																					
	1. Arismunandar, Artono. 1975. Buku pegangan Teknik tenaga listrik Jilid 1. Jakarta: Pradya Paramita 2. Marsudi, Djiteng. 2005. Pembangkitan energi listrik. Jakarta Erlangga 3. Archi, W. 1985. Prinsip-prinsip konversi energi. Jakarta erlangga																																					
	<b>Supporters:</b>																																					
<b>Supporting lecturer</b>	Prof.Dr. Tri Wrahatnolo, M.Pd., M.T.																																					
<b>Week-</b>	<b>Final abilities of each learning stage (Sub-PO)</b>	<b>Evaluation</b>		<b>Help Learning, Learning methods, Student Assignments, [ Estimated time]</b>		<b>Learning materials [ References ]</b>	<b>Assessment Weight (%)</b>																															
		<b>Indicator</b>	<b>Criteria &amp; Form</b>	<b>Offline ( offline )</b>	<b>Online ( online )</b>																																	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																															

1	Able to understand basic knowledge regarding electrical energy generation	Explain the basic knowledge of electric power plants. Explain the types of electric power plants	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.Participation: carried out by observing student activities (weight 2) UTS: carried out with assessments during the middle of the semester (weight 2) UAS: carried out every semester to measure all indicators (weight 3) Assignments: carried out on each indicator (weight 3) Value Student End: 3.Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Presentation, group discussion and reflection 2 X 50			0%
2	Able to understand knowledge about electrical installations from power generation centers	Explain knowledge of electrical installations from hydro and thermal power generation centers	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.Participation: carried out by observing student activities (weight 2) UTS: carried out with assessments during the middle of the semester (weight 2) UAS: carried out every semester to measure all indicators (weight 3) Assignments: carried out on each indicator (weight 3) Value Student End: 3.Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Presentation, group discussion and reflection 2 X 50			0%

3	Able to understand knowledge about the working principles of hydroelectric power plants	Explain the basic knowledge of the working principles of hydroelectric power plants. Explain the components of hydroelectric power plants	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.Participation: carried out by observing student activities (weight 2) UTS: carried out with assessments during the middle of the semester (weight 2) UAS: carried out every semester to measure all indicators (weight 3) Assignments: carried out on each indicator (weight 3) Value Student End: 3.Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Presentation, group discussion and reflection 2 X 50			0%
4	Able to understand basic knowledge regarding the working principles of coal-fired steam power plants	Explain the basic knowledge and working principles of coal-fired steam power plants	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.Participation: carried out by observing student activities (weight 2) UTS: carried out with assessments during the middle of the semester (weight 2) UAS: carried out every semester to measure all indicators (weight 3) Assignments: carried out on each indicator (weight 3) Value Student End: 3.Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Presentation, group discussion and reflection 2 X 50			0%

5	Able to understand the components of a coal-fired steam power plant	Explain the knowledge of the components of a coal-fired steam power plant	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.Participation: carried out by observing student activities (weight 2) UTS: carried out with assessments during the middle of the semester (weight 2) UAS: carried out every semester to measure all indicators (weight 3) Assignments: carried out on each indicator (weight 3) Value Student End: 3.Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Presentation, group discussion and reflection 2 X 50		0%
6	UTS			2 X 50		0%
7	Students are able to understand the types of coal-fired thermal plants (PLTU).	1. Explain the components and equipment in coal-fired thermal plants2. Explain the working principles of coal power plants	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.1. Participation: carried out by observing student activities (weight) 3.2.UTS: carried out with an assessment during the middle of the semester (weight 2) 4.3. UAS: carried out every semester to measure all indicators (weight 3) 5.4. Task: carried out on each indicator (weight 3) 6.Student Final Grade: 7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Discussion, exercises, assignments and presentations 2 X 50		0%

8	Students are able to understand the types of coal-fired thermal plants (PLTU).	1. Explain the components and equipment in coal-fired thermal plants 2. Explain the working principles of coal power plants	<b>Criteria:</b> 1. The assessment criteria are carried out by looking at aspects: 2.1. Participation: carried out by observing student activities (weight) 3.2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4.3. UAS: carried out every semester to measure all indicators (weight 3) 5.4. Task: carried out on each indicator (weight 3) 6. Student Final Grade: 7. Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Discussion, exercises, assignments and presentations 2 X 50		0%
9	Students are able to explain the components of an oil-fired steam power plant and students are able to explain the working principles of an oil-fired steam power plant	1. Explain the components and equipment of oil-fired thermal plants 2. Explain the working principle of an oil power plant	<b>Criteria:</b> 1. The assessment criteria are carried out by looking at aspects: 2.1. Participation: carried out by observing student activities (weight) 3.2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4.3. UAS: carried out every semester to measure all indicators (weight 3) 5.4. Task: carried out on each indicator (weight 3) 6. Student Final Grade: 7. Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	Discussion, exercises and assignments 2 X 50		0%

10	Students are able to explain the components of an oil-fired steam power plant and students are able to explain the working principles of an oil-fired steam power plant	<ol style="list-style-type: none"> <li>1.Explain the components and equipment of oil-fired thermal plants</li> <li>2.Explain the working principle of an oil power plant</li> </ol>	<b>Criteria:</b> <ol style="list-style-type: none"> <li>1.The assessment criteria are carried out by looking at aspects:</li> <li>2.1. Participation: carried out by observing student activities (weight</li> <li>3.2. UTS: carried out with an assessment during the middle of the semester (weight 2)</li> <li>4.3. UAS: carried out every semester to measure all indicators (weight 3)</li> <li>5.4. Task: carried out on each indicator (weight 3)</li> <li>6.Student Final Grade:</li> <li>7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</li> </ol>	Discussion, exercises and assignments 2 X 50			0%
11	Students are able to explain the components of gas power plants and gas and steam power plants (PLTU and PLTGU). Students are able to explain the working principles and process of producing electrical energy from gas-fired power plants (PLTG). Students are able to explain the working principles and process of producing electrical energy from gas and steam-powered power plants (PLTGU)/Combined Cycle	<ol style="list-style-type: none"> <li>1.Explain the components and equipment of gas-fired Gas Power Plants (PLTG).</li> <li>2.Explain the components and equipment of a Gas and Steam Power Plant (PLTGU)/Combined Cycle Plant fueled by steam gas</li> <li>3.Explain the working principles of gas power plants and the working principles of steam gas power plants</li> </ol>	<b>Criteria:</b> <ol style="list-style-type: none"> <li>1.The assessment criteria are carried out by looking at aspects:</li> <li>2.1. Participation: carried out by observing student activities (weight</li> <li>3.2. UTS: carried out with an assessment during the middle of the semester (weight 2)</li> <li>4.3. UAS: carried out every semester to measure all indicators (weight 3)</li> <li>5.4. Task: carried out on each indicator (weight 3)</li> <li>6.Student Final Grade:</li> <li>7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</li> </ol>	Discussion of Exercises and Assignments 2 X 50			0%

12	<p>Students are able to explain the components of gas power plants and gas and steam power plants (PLTU and PLTGU). Students are able to explain the working principles and process of producing electrical energy from gas-fired power plants (PLTG). Students are able to explain the working principles and process of producing electrical energy from gas and steam-powered power plants (PLTGU)/Combined Cycle</p>	<ol style="list-style-type: none"> <li>1.Explain the components and equipment of gas-fired Gas Power Plants (PLTG).</li> <li>2.Explain the components and equipment of a Gas and Steam Power Plant (PLTGU)/Combined Cycle Plant fueled by steam gas</li> <li>3.Explain the working principles of gas power plants and the working principles of steam gas power plants</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.The assessment criteria are carried out by looking at aspects:</li> <li>2.1. Participation: carried out by observing student activities (weight</li> <li>3.2. UTS: carried out with an assessment during the middle of the semester (weight 2)</li> <li>4.3. UAS: carried out every semester to measure all indicators (weight 3)</li> <li>5.4. Task: carried out on each indicator (weight 3)</li> <li>6.Student Final Grade:</li> <li>7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</li> </ol>	<p>Discussion of Exercises and Assignments 2 X 50</p>			0%
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14	Students are able to explain the working principles and components of renewable generators.	<ol style="list-style-type: none"> <li>1.Explain the components and equipment of renewable generators</li> <li>2.explain the working principles of renewable generators</li> </ol>	<b>Criteria:</b> <ol style="list-style-type: none"> <li>1.The assessment criteria are carried out by looking at aspects:</li> <li>2.1. Participation: carried out by observing student activities (weight</li> <li>3.2. UTS: carried out with an assessment during the middle of the semester (weight 2)</li> <li>4.3. UAS: carried out every semester to measure all indicators (weight 3)</li> <li>5.4. Task: carried out on each indicator (weight 3)</li> <li>6.Student Final Grade:</li> <li>7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</li> </ol>	Discussion, exercises and assignments 2 X 50		0%
15	Students are able to understand the problems of interference and frequency regulation of electric power plants	Explain the problems faced by generators, namely interference and frequency regulation	<b>Criteria:</b> <ol style="list-style-type: none"> <li>1.The assessment criteria are carried out by looking at aspects:</li> <li>2.1. Participation: carried out by observing student activities (weight</li> <li>3.2. UTS: carried out with an assessment during the middle of the semester (weight 2)</li> <li>4.3. UAS: carried out every semester to measure all indicators (weight 3)</li> <li>5.4. Task: carried out on each indicator (weight 3)</li> <li>6.Student Final Grade:</li> <li>7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</li> </ol>	Discussion, exercises and assignments 2 X 50		0%



16	UAS	UAS	<b>Criteria:</b> 1.The assessment criteria are carried out by looking at aspects: 2.1. Participation: carried out by observing student activities (weight 3.2. UTS: carried out with an assessment during the middle of the semester (weight 2) 4.3. UAS: carried out every semester to measure all indicators (weight 3) 5.4. Task: carried out on each indicator (weight 3) 6.Student Final Grade: 7.Participation Score (2) x Lever Score (3) x UTS Score (2) x UAS Score (3) divided by 10.	2 X 50			0%
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**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.**