



**Universitas Negeri Surabaya**  
**Faculty of Mathematics and Natural Sciences**  
**Bachelor of Science Education 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>																																	
Substance and Energy	8420103158		T=3	P=0	ECTS=4.77	0	July 19, 2024																																	
<b>AUTHORIZATION</b>	<b>SP Developer</b>		<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																		
	.....		.....			Prof. Dr. Erman, M.Pd.																																		
<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																																							
		P.O																																						
<b>Short Course Description</b>	This course discusses the properties of a substance, temperature, heat & expansion, thermodynamics, forms of energy and changes through theory & practice to solve problems and their application in everyday life.																																							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 10%; text-align: center;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 5%;"></td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 5%;">6</td> <td style="width: 5%;">7</td> <td style="width: 5%;">8</td> <td style="width: 5%;">9</td> <td style="width: 5%;">10</td> <td style="width: 5%;">11</td> <td style="width: 5%;">12</td> <td style="width: 5%;">13</td> <td style="width: 5%;">14</td> <td style="width: 5%;">15</td> <td style="width: 5%;">16</td> </tr> </table>							P.O	Week																	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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<b>References</b>	<b>Main :</b>																																							
	<ol style="list-style-type: none"> <li>1. _____. 2004. Advanced Energetic Materials. Comutteon advanced Energetic Materials and technologies Bocvel. Washington : The National Academic Press</li> <li>2. _____. 2004. Material Count : The case For Material Flows Analysis, Division on Earth and Life Studies. Washington the National academic ress</li> <li>3. <a href="http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/change.htm">http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/change.htm</a></li> <li>4. Mc Graww Hill . 2005. The Nature Of Matter. Columbus: United States Of America.</li> <li>5. Mc Graww Hill . 2005. Chemistry. Columbus: United States Of America.</li> </ol>																																							
	<b>Supporters:</b>																																							
<b>Supporting lecturer</b>	Tutut Nurita, S.Pd., M.Pd.																																							
	Muhamad Arif Mahdiannur, S.Pd., M.Pd. Ernita Vika Aulia, S.Pd., M.Pd.																																							
<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 make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	<ol style="list-style-type: none"> <li>1. Identifying forms of matter/substances</li> <li>2. Analyze phase diagrams</li> <li>3. Analyzing changes in the state of a substance</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Score</li> <li>2. Rubric</li> <li>3.4</li> <li>4. The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</li> <li>5.3</li> <li>6. The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</li> <li>7.2</li> <li>8. The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</li> <li>9.1</li> <li>10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</li> </ol>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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2	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	<ol style="list-style-type: none"> <li>1. Identifying forms of matter/substances</li> <li>2. Analyze phase diagrams</li> <li>3. Analyzing changes in the state of a substance</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Score</li> <li>2. Rubric</li> <li>3.4</li> <li>4. The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</li> <li>5.3</li> <li>6. The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</li> <li>7.2</li> <li>8. The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</li> <li>9.1</li> <li>10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</li> </ol>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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4	Master theoretical concepts in the field of substances and energy in depth and formulate them in solving problems procedurally. Able to utilize science and technology in the field of substances and energy and able to adapt to situations faced in solving problems	<ol style="list-style-type: none"> <li>1.Explain the concepts of temperature and heat</li> <li>2. Identify and analyze the expansion of a substance</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.Score</li> <li>2.Rubric</li> <li>3.4</li> <li>4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</li> <li>5.3</li> <li>6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</li> <li>7.2</li> <li>8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</li> <li>9.1</li> <li>10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</li> </ol>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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8	Mastering theoretical concepts in the field of matter and energy in depth and formulating them in procedural problem solving	<ol style="list-style-type: none"> <li>1. Identifying forms of matter/substances</li> <li>2. analyze phase diagrams</li> <li>3. Analyzing changes in the state of a substance</li> <li>4. Explain the concepts of temperature and heat</li> <li>5. Identify and analyze the expansion of a substance</li> <li>6. Explain the concept of thermodynamics</li> <li>7. Analyzing thermodynamics in everyday life</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.4: correct description</li> <li>2.3: the description is generally correct, there is one aspect where the explanation is incorrect</li> <li>3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect</li> <li>4.1: the description is wrong</li> </ol>	student-centered learning (student-centered learning) 3 X 50			0%
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9	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	<ol style="list-style-type: none"> <li>1.Explain the meaning of mechanical energy</li> <li>2.Determines the amount of mechanical energy for various states of an object</li> <li>3.Explain the law of conservation of energy</li> <li>4.Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.Score</li> <li>2.Rubric</li> <li>3.4</li> <li>4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</li> <li>5.3</li> <li>6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</li> <li>7.2</li> <li>8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</li> <li>9.1</li> <li>10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</li> </ol>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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14	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	<ol style="list-style-type: none"> <li>1.Explain the meaning of mechanical energy</li> <li>2.Determines the amount of mechanical energy for various states of an object</li> <li>3.Explain the law of conservation of energy</li> <li>4.Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.Score</li> <li>2.Rubric</li> <li>3.4</li> <li>4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</li> <li>5.3</li> <li>6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</li> <li>7.2</li> <li>8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</li> <li>9.1</li> <li>10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</li> </ol>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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15	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	<p>1.Explain the meaning of mechanical energy</p> <p>2.Determines the amount of mechanical energy for various states of an object</p> <p>3.Explain the law of conservation of energy</p> <p>4.Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters</p>	<p><b>Criteria:</b></p> <p>1.Score</p> <p>2.Rubric</p> <p>3.4</p> <p>4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement</p> <p>5.3</p> <p>6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement</p> <p>7.2</p> <p>8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement</p> <p>9.1</p> <p>10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement</p>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 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.