



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Physics Education Undergraduate Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																
Wave	8420303081		T=3 P=0 ECTS=4.77	4	July 17, 2024																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator																																	
	Mita Anggaryani, M.Pd., Ph.D.																																	
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																																			
Short Course Description	This course examines the basics of vibrations, waves, light, optical devices and their application in everyday life. Presented in the form of theory and practice.																																				
	<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: 2%;">1</td> <td style="width: 2%;">2</td> <td style="width: 2%;">3</td> <td style="width: 2%;">4</td> <td style="width: 2%;">5</td> <td style="width: 2%;">6</td> <td style="width: 2%;">7</td> <td style="width: 2%;">8</td> <td style="width: 2%;">9</td> <td style="width: 2%;">10</td> <td style="width: 2%;">11</td> <td style="width: 2%;">12</td> <td style="width: 2%;">13</td> <td style="width: 2%;">14</td> <td style="width: 2%;">15</td> <td style="width: 2%;">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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Supporting lecturer	Dr. Titin Sunarti, M.Si. Setyo Admoko, S.Pd., M.Pd. Abu Zainuddin, S.Pd., M.Pd. Dr. Rohim Aminullah Firdaus, S.Pd, M.Si Mukhayyarotin Niswati Rodliyatul Jauhariyah, S.Pd., M.Pd. Dr. Muhimmatul Khoiro, S. Si. Dr. Oka Saputra, 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	Utilizing science and technology to explore data and information about the properties of vibration and its use, as well as as a tool for solving problems and communicating the results of the search. Analyzing vibration symptoms to solve relevant problems. Able to make strategic decisions based on data and information about vibrations through. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> 1. Analyze the properties of vibrations. 2. Derive the vibration formula equation. 3. Utilizing ICT to describe the time deviation function of vibrations 4. Analyze the lowest vibrations 5. Analyzing vibration resonance 6. Analyzing vibration superposition 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong <p>Form of Assessment : Participatory Activities</p>	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
2	Utilizing science and technology to explore data and information about the properties of vibration and its use, as well as as a tool for solving problems and communicating the results of the search. Analyzing vibration symptoms to solve relevant problems. Able to make strategic decisions based on data and information about vibrations through. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> 1. Analyze the properties of vibrations. 2. Derive the vibration formula equation. 3. Utilizing ICT to describe the time deviation function of vibrations 4. Analyze the lowest vibrations 5. Analyzing vibration resonance 6. Analyzing vibration superposition 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
3	Utilizing science and technology to explore data and information about the properties of vibration and its use, as well as as a tool for solving problems and communicating the results of the search. Analyzing vibration symptoms to solve relevant problems. Able to make strategic decisions based on data and information about vibrations through. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> 1. Analyze the properties of vibrations. 2. Derive the vibration formula equation. 3. Utilizing ICT to describe the time deviation function of vibrations 4. Analyze the lowest vibrations 5. Analyzing vibration resonance 6. Analyzing vibration superposition 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
4	Utilize science and technology to search for data and information about the properties of waves and their use, as well as as a tool for solving problems and communicating the results of the search. Analyzing wave symptoms to solve relevant problems. Able to make strategic decisions based on data and information about waves. Responsible for self-learning, tasks and agreements with colleagues.	<ol style="list-style-type: none"> 1. Explain the properties of waves. 2. Derive the wave formula equation. 3. Analyzing standing waves 4. Describe the superposition of waves with the help of ICT 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%

5	<p>· Utilize science and technology to search for data and information about the properties of waves and their use, as well as as a tool for solving problems and communicating the results of the search. Analyzing wave symptoms to solve relevant problems. Able to make strategic decisions based on data and information about waves. Responsible for self-learning, tasks and agreements with colleagues.</p>	<ol style="list-style-type: none"> 1.Explain the properties of waves. 2.Derive the wave formula equation. 3.Analyzing standing waves 4.Describe the superposition of waves with the help of ICT 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	<p>Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50</p>			0%
6	<p>· Utilize science and technology to search for data and information about the properties of waves and their use, as well as as a tool for solving problems and communicating the results of the search. Analyzing wave symptoms to solve relevant problems. Able to make strategic decisions based on data and information about waves. Responsible for self-learning, tasks and agreements with colleagues.</p>	<ol style="list-style-type: none"> 1.Explain the properties of waves. 2.Derive the wave formula equation. 3.Analyzing standing waves 4.Describe the superposition of waves with the help of ICT 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	<p>Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50</p>			0%
7	<p>· Utilize science and technology to search for data and information about the properties of waves and their use, as well as as a tool for solving problems and communicating the results of the search. Analyzing wave symptoms to solve relevant problems. Able to make strategic decisions based on data and information about waves. Responsible for self-learning, tasks and agreements with colleagues.</p>	<ol style="list-style-type: none"> 1.Explain the properties of waves. 2.Derive the wave formula equation. 3.Analyzing standing waves 4.Describe the superposition of waves with the help of ICT 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	<p>Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50</p>			0%
8	<p>Science and Technology to search for data and information about the use of sound and communicate the results of the search. Analyze the relationship between buyi characteristics and wave symptoms to solve relevant problems. Able to make strategic decisions based on data and information about sound. Responsible for self-learning, assignments and agreements with his colleague.</p>	<ol style="list-style-type: none"> 1.Analyzing sound characteristics (properties of sound) associated with waves. Analyzing sound sources (strings and air columns) 2.Describe the mechanisms of human hearing 3.Analyze sound quality, sound interference and Doppler effect. 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	<p>Student-centered learning approach (student-centered learning) 3 X 50</p>			0%

9	Analyze light as an electromagnetic wave, geometric optics, and the wave properties of light to solve relevant problems. Able to make strategic decisions based on data and information about light. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> Analyze the characteristics of sound (properties of sound) associated with waves. Analyze sound sources (strings and air columns) Describe the mechanisms of human hearing Analyze sound quality, sound interference and Doppler effect. 	Criteria: <ol style="list-style-type: none"> 4: correct description 3: the description is generally correct, there is one aspect where the explanation is incorrect 2: the description is generally correct, there is more than one aspect where the explanation is incorrect 1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
10	Analyze light as an electromagnetic wave, geometric optics, and the wave properties of light to solve relevant problems. Able to make strategic decisions based on data and information about light. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> Analyze the characteristics of sound (properties of sound) associated with waves. Analyze sound sources (strings and air columns) Describe the mechanisms of human hearing Analyze sound quality, sound interference and Doppler effect. 	Criteria: <ol style="list-style-type: none"> 4: correct description 3: the description is generally correct, there is one aspect where the explanation is incorrect 2: the description is generally correct, there is more than one aspect where the explanation is incorrect 1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
11	Analyze light as an electromagnetic wave, geometric optics, and the wave properties of light to solve relevant problems. Able to make strategic decisions based on data and information about light. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> Analyzing electromagnetic waves as a result of changes in electric and magnetic fields Analyze the formation of shadows due to reflection or refraction of light Analyze the wave properties of light 	Criteria: <ol style="list-style-type: none"> 4: correct description 3: the description is generally correct, there is one aspect where the explanation is incorrect 2: the description is generally correct, there is more than one aspect where the explanation is incorrect 1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
12	Analyze light as an electromagnetic wave, geometric optics, and the wave properties of light to solve relevant problems. Able to make strategic decisions based on data and information about light. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> Analyzing electromagnetic waves as a result of changes in electric and magnetic fields Analyze the formation of shadows due to reflection or refraction of light Analyze the wave properties of light 	Criteria: <ol style="list-style-type: none"> 4: correct description 3: the description is generally correct, there is one aspect where the explanation is incorrect 2: the description is generally correct, there is more than one aspect where the explanation is incorrect 1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%

13	Analyze light as an electromagnetic wave, geometric optics, and the wave properties of light to solve relevant problems. Able to make strategic decisions based on data and information about light. Responsible for self-learning, assignments, and agreements with colleagues.	<ol style="list-style-type: none"> 1. Analyzing electromagnetic waves as a result of changes in electric and magnetic fields 2. Analyze the formation of shadows due to reflection or refraction of light 3. Analyze the wave properties of light 	Criteria: <ol style="list-style-type: none"> 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong 	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
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14	<p>Analyzing equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars. Able to make strategic decisions based on data and information about optical equipment. Responsible for self-learning, assignments and agreements with colleagues.</p> <p>Analyzing equipment that uses light, including cameras, human eyes, glasses, loupe, microscopes, and binoculars. Able to make strategic decisions based on data and information about optical instruments. Responsible for self-learning, assignments, and agreements with colleagues.</p>	<p>1. Analyzing image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars.</p> <p>2. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application</p> <p>3. Analyzing image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars.</p> <p>4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application</p>	<p>Criteria:</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>	<p>Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50</p>			0%
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15	<p>Analyzing equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars. Able to make strategic decisions based on data and information about optical equipment. Responsible for self-learning, assignments and agreements with colleagues.</p> <p>Analyzing equipment that uses light, including cameras, human eyes, glasses, loupe, microscopes, and binoculars. Able to make strategic decisions based on data and information about optical instruments. Responsible for self-learning, assignments, and agreements with colleagues.</p>	<p>1. Analyzing image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars.</p> <p>2. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application</p> <p>3. Analyzing image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars.</p> <p>4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application</p>	<p>Criteria:</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>	<p>Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50</p>			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.