

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

Document Code

UNESA	Pn	Physics Education Undergraduate Study Program						ogram		
			SEMESTER	R LEARNII	NG P	LA	N			
Courses		CO	DE	Course Family	,	Cred	lit We	ight	SEMESTER	Compilation Date
Wave		842	20303081			T=3	P=0	ECTS=4.77	4	July 17, 2024
AUTHORIZAT	ΓΙΟΝ	SP	Developer		Cours	e Clus	ster C	oordinator	Study Progra Coordinator	am
									Mita Anggaryani, M.Pd. Ph.D.	
Learning model	Project Based Lear	ning								
Program	PLO study progra	ım that is	s charged to the co	urse						
Learning Outcomes	Program Objectiv	es (PO)								
(PLO)	PLO-PO Matrix									
			.0	- 1>						
	PO Matrix at the e	end of ea	ach learning stage (Sub-PO)						
		P.O	1 2 3 4	5 6 7	We 8 9	-	0 1	11 12	13 14 1	15 16
Short Course Description	This course examine of theory and practic		sics of vibrations, wave	es, light, optical dev	ices and	their a	pplica	tion in everyd	lay life. Presen	ted in the form
References	Main :									
	 Bass, Michael. 1995. Hand Book O f Optics; United States: McGraw-Hill Office. Crowell, Benjamin. 2003. V ibrations and Waves; California: Fullerrton. Giancoli, Douglas 2014. Phy sics: Principles with Applications Ed 7E; California: Addison-Wesley. G iancoli, Douglas. 2010. F isika II; Jakarta: Erlangga. Sahara Mus lim. 2004. Ge lombang dan Optik, Jakarta: Depdikbud Dikt.i 									
	Supporters:									
Supporting lecturer	Dr. Titin Sunarti, M.S Setyo Admoko, S.Pc Abu Zainuddin, S.Pc Dr. Rohim Aminullat Mukhayyarotin Nisw Dr. Muhimmatul Kho Dr. Oka Saputra, M.	d., M.Pd. d., M.Pd. n Firdaus, ati Rodliy piro, S. Si.	atul Jauhariyah, S.Pd.	, M.Pd.						
					Но	In Lea	rnino	1		

Week-	Final abilities of each learning stage	ch learning ge		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References	Assessment Weight (%)
	(Sub-PO)	Indicator	Criteria & Form	Offline (offline)	Online (online)]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

	Γ		ı	1	T	T	
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.	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	Criteria: 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 Form of Assessment: Participatory Activities	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.	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	Criteria: 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.	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	Criteria: 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.	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	Criteria: 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%

			<u> </u>	<u> </u>	<u> </u>	
5	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.	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	Criteria: 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%
6	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.	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	Criteria: 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%
7	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.	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	Criteria: 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%
8	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.	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.	Criteria: 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) 3 X 50		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.	1.Analyze the characteristics of sound (properties of sound) associated with waves. 2.Analyze sound sources (strings and air columnsa) 3.Describe the mechanisms of human hearing 4.Analyze sound quality, sound interference and Doppler effect.	Criteria: 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%
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.	1.Analyze the characteristics of sound (properties of sound) associated with waves. 2.Analyze sound sources (strings and air columnsa) 3.Describe the mechanisms of human hearing 4.Analyze sound quality, sound interference and Doppler effect.	Criteria: 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%
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.	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: 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%
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.	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: 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%

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.	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: 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%
----	--	---	---	---	--	--	----

14	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. 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.	image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars. 2.Make decisions about the use of optical equipment and the power of the lenses selected for a particular application 3.Analyzing image formation and its properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars. 4.Make decisions about the use of optical equipment and the power of the lenses selected for a particular application	Criteria: 1.Score 2.Rubric 3.4 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 5.3 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 7.2 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 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media, the answer from the questioner was incorrect, unable to formulated suggestions for improvement 9.1 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	Student-centered learning approach (student-centered learning) Deductive learning method Strategy Lectures, discussions, presentations 3 X 50			0%
----	---	--	---	---	--	--	----

Analyzing cameria, human content of the content of				Γ			
uses light, incidently common and process in the properties in boxyotys. In the process of the properties of the process of t	15		1.Analyzing				0%
cameria, human powers and concept and process and process and process and process to the provided process and process to the process and process and process to the process and process and process to the process and proc			•				
syste, glasses, improvespes and brincoulars. Alle to make complete the control of		cameras, human					
microscopes and broodurar. Adle to desistens based on data and enternation about the use of operation of colleagues. Colleagues and agreements with colleagues and processing and processi		eyes, glasses,					
binoculars. Alle to longer strategic of the camerans, furnam a year, glusses, fluxers, medical control of the camerans, fluxers, medical control of the camerans, fluxers, flu			• •		•		
make strategic decisions based on information about growth opportunity and the control of special coupling of the coupling of		binoculars. Able to	•				
data and unormation about properties of the common and information about processed for properties of the common and information and informatio			•	•	Deductive		
information about potation all equipments and agreements. Surface and binoculars. All products of the lenses of the surface and information about the suse of colleagues. Analyzing cameries, burnam coupment and the power of the lenses selected for a particular application of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the power of the lenses selected for a particular application about the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the lenses selected for a particular application about the use of optical and the power of the power							
potical equipment. Responsible for adjustments and agreements with Autalyzing equipment that expensive properties about the use of optical cameras, human eyes, glasses, business particular application and inoculars Apile to make strategic district and particular application and information about the use of the power of make strategic district and particular applications. Responsible for seel-learning, such application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for approximation and the power of the lenses selected for approximation and the power of the lenses selected for approximation and the power of the lenses selected for approximation and the power of the lenses and binoculars. 4. Mekee decisions of the power of the lenses selected for approximation and the power of the lenses and binoculars. 5.3 The presentation and length approximation and the power of the lenses and binoculars. 4. Mekee decisions of the power of the lenses and binoculars. 5.4 Mekee decisions of the power of the lenses and binoculars are provided to the power of the lenses and binoculars. 5.3 The presentation and to did not approximate the power of the lenses and binoculars. 5.4 Mekee decisions of the power of the lenses and binoculars. 6.1 The presentation and to did not approximate the power of the lenses and binoculars. 6.1 The presentation and to did not approximate the power of the lenses and binoculars. 6.2 The presentation and to did not approximate the power of							
substances and approximates and agreements with a discussions, and binoculars. Always equipment that dispersion of the lenses objects of the power of data and binoculars. Always to provide the power of the lenses of copical managements, human eyes, but the substance of copical managements, and information about the use of copical managements and colleagues. Self-learning, assignments, and accident of the lenses objects of the lenses ob		optical equipment.	•	•			
assignments and aprecements with colleagues. Colleagues.							
agreements with colleagues. equipment and the power of the terms of th			•	•			
colleagues. Analyzin that uses light, including cameras, human eyes, glasses, microscopes, and biroculars. Able to dicta and successory dicta and successory districts. Responsible for self-learning, assignments, and and successory self-learning, assignments, and the power of the lenses self-learning, the power of the lenses self-learning the power of the lenses the power of the po				,			
Analytiment that uses light, including equipment and the power of the lemans selected for a particular application and incompanies. Responsible for self-learning, self-lea		colleagues.			0 7 00		
uses light, including cameras, human eyes, glasses, microscopes, and binoculars. Alle to mode strategic mode strategic and information about formation and its properties in self-learning, assignments, and colleagues. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application. 5. 3. The presentation was carried out of the internation and its properties in important aspects of the research, with the help of ppt media according to media according suggestions for improvement. 7. 2. The presentation was carried out, was not coherent aspects of the research, was assisted by ppt media but did not meet the media criteria, the me				•			
the power of the lenses selected for a particular analyses, glasses, and binoculars. Able to make strategic data an assent of a component selection of the c			•	formulating			
selected for a particular particular particular papticular papticu		cameras, human	the power of	suggestions for			
microscopes, and binoculars. Alle to make the media correct, the answers from the guestion of the search, was not observed any pop media but did not meet the media citeriat, the answers from the guestion of the media correct, the answers from the guestion of the guestio			the lenses				
binocularis. Able to make strategic application application of data and information about optical instruments. Self-learning, assignments, and agreements with colleagues. Colleagues			selected for a				
decisions based on data and allowing image formation and important interments. Presponsible for self-learning, assignments, and againments, and the power of the lensans selected for a particular application application and the power of the lensans selected for a particular application application and the power of the lensans selected for a particular application application and the power of the lensans selected for a particular application application and the power of the lensans selected for a particular application application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application and the power of the lensans selected for a particular application appli		binoculars. Able to	•	·			
data and information about optical instruments self-learning, and agreements with colleagues. self-learning, assignments, and agreements with colleagues. summan eyes, glasses, louwers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application self-learning, and application application self-learning, application suggestions for improvement self-learning, application self-learning, application suggestions for improvement self-learning, application self-learning, application self-learning, application self-learning, application suggestions for improvement self-learning, application self-learning, application suggestions for improvement self-learning, application self-learning, application self-learning, application self-learning, application suggestions for improvement self-learning, application self-learning, application suggestions for improvement self-learning, application suggestions for improvement self-learning, application suggestions for improvement suggestions for improvement suggestions for improvement sug							
information about optical instruments. Reaponsible for assignments, and agreements with colleagues. Jouwers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application application and the power of the lenses selected for a particular application application and the modern application and the modern application are selected for a particular application application and the modern application are selected for a particular application application and the modern application are selected for a particular application application and the power of the lenses selected for a particular application application application application application are selected for a particular application application and the power of the lenses selected for a particular application application application application application are selected for a particular application application application and the power of the lenses selected for a particular application application application application application are selected for a particular application are selected for a particular application are selected for application a			, ,				
Responsible for self-learning, assignments, and agreements with colleagues. It is properties in equipment that uses light, including cameras, human eyes, glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application It is properties in equipment and the power of the lenses selected for a particular application It is properties in equipment and the power of the lenses selected for a particular application It is properties in equipment and the power of the lenses selected for a particular application It is properties in equipment and uses light, including as a continuity of the properties in a spects of the research, with the help of ppt the the lep of ppt in the legislation of the lenses selected for a particular application It is properties in equipment and uses light, including as to media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement It is properties in appearance that aspects of the research, with the help of ppt the the lep of ppt the dependence of the legislation of the lenses selected for a particular application It is properties in appearance that aspects of the research, with the help of ppt the dependence of the lense of the lense of the lense selected for a particular application was carried out, was assisted by pt media but did not meet the media criteria, the answer from the questioner was incorrect, unable to formulate suggestions for improvement		information about					
self-learning, asgyments, and agreements with colleagues. self-learning, asgyments, and agreements with cincluding cameras, human eyes, glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application application application improvement application improvement application application application improvement application application application improvement application							
assignments, and agreements with colleagues. agreements with colleagues. agreements with colleagues. and innocating cameras, human eyes, glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application Application To the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses selected for a particular application and the power of the lenses and the power of the lenses are the length of the lengt		Responsible for self-learning		· ·			
agreements with colleagues. Including cameras, furnam eyes, glasses, louves, microscopes and binoculars. 4. Make decisions about the use of optical selected for a particular application and the were generally correct of the lenses selected for a particular application application and the were generally correct 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 1.1.10. The presentation was carried out, but 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 9.1.1.10. 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 9.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1		assignments, and		•			
cameras, human eyes, glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application application for microscopes in the decisions of the lense selected for a particular application application for microscopes in the decisions of the lense selected for a particular application application for microscope in the decisions of the decisi		agreements with	•	•			
glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application 4. The presentation was carried out, was not coherent analyor of the research, was assisted by pot media criteria, the answers from the questioner were generally correct, formulating suggestions of might be a supportant the power of the lenses selected for a particular application 4. The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by pot media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not 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		colleagues.	•				
glasses, louvers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application application and the power of the lenses selected for a particular application application and or off on the metals assisted by pot media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1. 10. The presentation was carried out, was assisted by pot media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1. 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			,				
incurers, microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application **Provided in the selection of the lenses selected for a particular application **Provided in the selection of the lenses selected for a particular application **Provided in the selection of the lenses 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 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not coherent and/or did not emphasize important aspects of the research, 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				•			
microscopes and binoculars. 4. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application application application To the lenses selected for a particular application application application To the presentation was carried out, was not coherent 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 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize improval improvement aspects of the research, was not assisted by ppt media but did not meet the media criteria, the answer from the questioner were generally incorrect, formulated suggestions for improvalent aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement			•	,			
A. Make decisions about the use of optical equipment and the power of the lenses selected for a particular application 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 9.1. 10.The presentation was carried out, but was not coherent and/or did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1. 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 on the questioner was incorrect, unable to formulate suggestions for improvement				the questioner			
about the use of optical equipment and the power of the lenses selected for a particular application applica			•	•			
of optical equipment and the power of the lenses selected for a particular application app			4.Make decisions	correct,			
equipment and the power of the lenses selected for a particular application application application application application approvement 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 9.1 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 but the did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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			about the use	formulating			
the power of the lenses selected for a particular application application application was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by pt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent aspects of the research, was not assisted by pt media aspects of the research, was not assisted by pt media aspects of the research, was not assisted by pt media aspects of the research, was not assisted by pt media, the answer from the questioner was incorrect, unable to formulate			of optical	suggestions for			
the lenses selected for a particular application 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 9.1 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 but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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			equipment and				
selected for a particular application 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 9.1. 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			•				
particular application 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 9.1 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, 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							
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 9.1. 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				,			
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 9.1 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			•				
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 9.1 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			application				
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 9.1 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				•			
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 9.1 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				•			
assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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				•			
media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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							
meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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				, , , ,			
criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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							
answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 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							
questioner were generally incorrect, formulated suggestions for improvement 9.1 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							
generally incorrect, formulated suggestions for improvement 9.1 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							
incorrect, formulated suggestions for improvement 9.1 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							
suggestions for improvement 9.1 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				,			
improvement 9.1 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							
9.1 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							
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							
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							
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							
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							
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				,			
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							
important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement							
aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement				· ·			
research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement							
not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement				•			
ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement							
answer from the questioner was incorrect, unable to formulate suggestions for improvement				,			
questioner was incorrect, unable to formulate suggestions for improvement							
incorrect, unable to formulate suggestions for improvement							
to formulate suggestions for improvement				· ·			
suggestions for improvement				·			
improvement							
16 0%							
10 0%	16						00/
	16						0%

No	Evaluation	Percentage
		0%

Notes

- 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.
- 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.
- 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.