

**SEMESTER LEARNING ACTIVITY PLANS  
(SLAP)  
SEMESTER EVEN 2022/2023**



Physics Undergraduate Study Program

Physics Department

Wave

MFF 1405/ 2 Credits

Lecturer Coordinator:

Dr. Juliasih Partini

Dr. Wiwit Suryanto

**UNIVERSITAS GADJAH MADA  
FACULTY OF MATHEMATICS AND NATURAL SCIENCE  
2022**



**Universitas Gadjah Mada**  
 Faculty of Mathematics and Natural Science  
 Physics Department / Physics Undergraduate Study Program  
 Semester EVEN 2022/2023

**Document Number :**

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Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
<i>MFF 1405</i>	<i>Wave</i>	<i>T: 2</i>	<i>P: ...</i>	<i>EVEN</i>	<i>Compulsory</i>	<i>Basic Physics II (MFF1021*)</i>
<b>Short Description</b>	<p>The Wave course is compulsory for the Bachelor of Physics and Geophysics study programs at Gadjah Mada University. There are Basic Physics I and Basic Physics II courses with the hope that students will have an adequate background in mechanics and electromagnetics. Meanwhile, the Mathematical Physics course is expected to be an essential provision for the mathematical study of some problems that arise in the Wave material. Using vector algebra in wave material will facilitate the presentation of various concepts and physical laws regarding waves in a concise yet in-depth manner. The presentation of the material begins with oscillations with a discussion of mechanical oscillations and electromagnetic oscillations that underlie the understanding of waves. In mechanical waves discussed wave kinematics, wave dynamics, and wave energetics. While in electromagnetic waves will be discussed the propagation of electromagnetic waves in a vacuum or a medium, as well as electromagnetic radiation.</p>					
<b>Program Learning Outcomes (PLO) Imposed on the Course</b>	<b>PLO 2</b>	<b>Knowledge.</b> Able to explain theoretical concepts and principles of classical and modern physics and able to apply basic concepts of physics and related mathematical methods in finding solutions to physical problems.				
	<b>PLO 5</b>	<b>Long Life Learning.</b> Able to analyze various alternative solutions to physical problems and conclude them for appropriate decision-making, both in familiar and new problems.				
<b>Course Outcomes (CO)</b>	<b>After completing this course, students are expected to be able to:</b>					
	<b>CO1</b>	Students can understand the basic phenomenological understanding of oscillations as the concept that underlies waves, both in mechanical and electromagnetic oscillations. (PLO 2, PLO 5).				
	<b>CO2</b>	Students can use wave differential equations to explain wave propagation. (PLO 2, PLO 5).				
	<b>CO3</b>	Students can describe and explain mechanical wave propagation in kinematics, wave dynamics, and wave energetics. (PLO 2, PLO 5).				
	<b>CO4</b>	Students can identify and explain the propagation of electromagnetic waves in a vacuum or medium and electromagnetic radiation. (PLO 2, PLO 5).				
<b>The Correlation of CO to Learning Materials and Methods, and Time Allocation</b>		<b>Learning Materials</b>			<b>Learning Methods</b>	<b>Time Allocation</b>
	<b>CO 1</b>	Oscillation			TCL-SCL mixed	<i>2X50 minutes</i>
	<b>CO 2</b>	Wave Motion			TCL-SCL mixed	<i>2X50 minutes</i>
	<b>CO 2</b>	Wave Motion			TCL-SCL mixed	<i>2X50 minutes</i>
	<b>CO 3</b>	Mechanical Wave			TCL-SCL mixed	<i>2X50 minutes</i>
	<b>CO 3</b>	Mechanical Wave			TCL-SCL mixed	<i>2X50 minutes</i>
<b>CO 4</b>	Sound waves travel through solids, liquids, and gases			TCL-SCL mixed	<i>2X50 minutes</i>	

	<b>CO 4</b>	Sound waves travel through solids, liquids, and gases		TCL-SCL mixed			<i>2X50 minutes</i>	
<b>Midterm exam/Project Task Results/Case Analysis Results</b>								
	<b>CO 5</b>	Wave Reflection and Standing Wave		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	Spherical Waves and Standing Waves		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	Doppler Effect on Sound Waves and Shock Waves		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	The Doppler Effect on Sound Waves and Shock Waves		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	Electromagnetic wave		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	Electromagnetic wave		TCL-SCL mixed			<i>2X50 minutes</i>	
	<b>CO 5</b>	Electromagnetic Wave Radiation		TCL-SCL mixed			<i>2X50 minutes</i>	
<b>Final exams/ Project Task Results/Case Analysis Results</b>								
<b>Learning Methods</b>	<b>SCL (Student Centered Learning): Project-based learning (Team-based Project)/Case-based learning/PBL/other SCL methods</b>							
<b>Student Learning Experience</b>	<b>Learn to examine and examine each topic that is taught.</b>							
<b>Access to Learning Media/ LMS and Offline and Online Percentage</b>	Offline (LCD, PPT Slide, Whiteboard, Laptop) and Online (Zoom Meeting, Google Meet, Google Classroom)							
<b>Assessment Methods and Synchronization with CO</b>	<b>Assessment Methods</b>	<b>Assessment Percentage</b>	<b>Criteria/ Indicators</b>	<b>CO1</b>	<b>CO2</b>	<b>CO3</b>	<b>CO4</b>	
	<b>Participatory Activity*</b>							
	<b>Project Results/ Case Study Results/ PBL Results*</b>							
	<b>Cognitive</b>							
	<b>Assignment</b>	<b>10</b>		√	√	√	√	
	<b>Quiz</b>	<b>10</b>		√	√	√	√	
	<b>Midterm Exam</b>	<b>40</b>		√	√			
	<b>Final Exam</b>	<b>40</b>				√	√	
	<b>Total</b>	<b>100</b>						
	*) can also be obtained from the Midterm or Final Exam as the result of participatory activities or project/ case study results. According to IKU 7, the percentage of project results/ case study/ PBL results is at least 50%.							

<b>References</b>	<b>Main References;</b> <ol style="list-style-type: none"> <li>1. Hirose, A., dan K.E. Longren, 2010: Fundamental of wave phenomena, Edisi ke 2, John Wiley &amp; Sons..</li> <li>2. Pain., H.J., 2005: The physics of vibrations and waves, J. Wiley &amp; Sons..</li> <li>3. Zahara M., 1994: Gelombang dan optika, Proyek Pembinaan Tenaga Kependidikan PT, Ditjen DIKTI, Depdikbud.</li> </ol>			
<b>Lecturers (Team Teaching)</b>	<ol style="list-style-type: none"> <li>1. Dr. Juliasih Partini</li> <li>2. Dr. Wiwit Suryanto</li> <li>3.</li> <li>4.</li> </ol>			
<b>Authorization</b>	<b>Date of Drafting</b>	<b>Lecturer Coordinator</b>	<b>Head of Curriculum Committee</b>	<b>Head of Study Program</b>
		<i>Dr. Juliasih Partini</i>		<i>Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.</i>