PROGRAM PLAN AND SEMESTER LEARNING ACTIVITIES (RPKPS) SCHOOL YEAR 2021/2022

Geophysics

Wave Physics

MFF1405/ 2 credits

Mentoring Team:

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GADJAH MADA UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
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	Gadjah Mada University Faculty of Mathematics and Natural Sciences Department of Physics / S1 Geophysics Study Program Academic Year 2021/2022	**Document Code:** .....

SEMESTER LEARNING PROGRAM AND ACTIVITY PLAN (RPKPS)

Course Code	Course Name	Weight (credit)	Semester	Course Status	Prerequisite Courses
MFF1405	Wave	T:2, P:1	Complete	Mandatory	MFF1012

Short Description Courses	The Wave Subject is a compulsory subject for the S1 Physics and S1 Geophysics study programs at Gadjah Mada University. The existence of Basic Physics I and Basic Physics II courses with the hope that students have an adequate background in mechanics and electromagnetics. Meanwhile, from the Mathematical Physics course, it is expected to be an important provision for the mathematical study of several problems that arise in Wave matter. The use of vector algebra in wave matter will facilitate the exposure of various concepts and physical laws about waves in a concise but profound manner. Weekly materials can be accessed by students on the GitHub platform before the lecture starts, so students can learn in advance so that they are better prepared for class sessions. The lecturer will give an explanation of the week's topic, then give students the opportunity to ask questions. If necessary, lecturers can also hold quizzes (pre test or post test) to see student understanding. The presentation of material begins with oscillations with a discussion of mechanical oscillations and electromagnetic oscillations that underlie the understanding of waves. In mechanical waves discussed about wave kinematics, wave dynamics and wave energetics. While in electromagnetic waves will be discussed the propagation of electromagnetic waves in vacuum and in the medium and electromagnetic radiation. Assignments will be given in a structured manner (there are clear instructions either in writing or verbally) as part of an independent learning method, either in the form of individual assignments or in the form of group assignments (collaborative learning) Students will also be given assignments in the form of case studies *where students are expected to be able to conduct comprehensive studies by applying* The concept that has been explained by the lecturer at the previous meeting. Snell's law, head waves, body waves from long/near/moderate earthquakes, surface waves/mantle/canals, microwaveseismic waves; *Source parameters and their determination*: epicenter, hypocenter, magnitude and energy, earthquake intensity; *Earthquake source mechanism*: fault plane resolution and earthquake source mechanism parameters. The learning method used in this lecture is in the form *of blended learning* (a combination of face-to-face in class, synchronous and asynchronous)	
Graduate Learning Outcomes (CPL) that	***CPL-1***	**Good Attitude:** Graduates are honest, disciplined, curious, critical, confident, independent, emotionally mature, cooperative, and trustworthy. Uphold norms, values, morals, religion, general ethics and professional ethics, and actively play a role in the global movement of sustainable development and behave professionally

<table>
<tr><td>Charged in MK</td><td>CPL-2</td><td>Mastery of general knowledge: Graduates are able to apply basic science (mathematics, physics) in general and the interrelation of wave phenomena.</td></tr>
<tr><td rowspan="5">Course Learning Outcomes (CPMK)</td><td colspan="2">After completing the learning of this course, students are expected to be able to:</td></tr>
<tr><td>CPMK-1</td><td>Students are able to understand the basic phenomenology of oscillations as the underlying concept of waves, both in mechanical oscillations and electromagnetic oscillations. [CPL-1, CPL-2]</td></tr>
<tr><td>CPMK-2</td><td>Students are able to use wave differential equations in explaining wave propagation. [CPL-1, CPL-2]</td></tr>
<tr><td>CPMK-3</td><td>Students are able to describe and explain the propagation motion of mechanical waves, both in wave kinematics, wave dynamics and wave energetics. [CPL-1, CPL-2]</td></tr>
<tr><td>CPMK-4</td><td>Students are able to identify and explain the propagation of electromagnetic waves in vacuum and in medium and electromagnetic radiation. [CPL-1, CPL-2]</td></tr>
<tr><td>CPL mapping with CPMK</td><td colspan="2"><table><tr><th></th><th>CPMK1</th><th>CPMK2</th><th>CPMK3</th><th>CPMK4</th></tr><tr><td>CPL-1</td><td></td><td></td><td></td><td></td></tr><tr><td>CPL-2</td><td></td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td rowspan="11">CPMK link with Material and Form of Learning, as well as Time Allocation</td><td></td><td>Learning Materials</td><td>Forms of Learning</td><td>Time Allocation</td></tr>
<tr><td>CPMK1</td><td>Oscillation</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK1</td><td>The mathematical basis of waves</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK1</td><td>Wave motion</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK1</td><td>Mechanical Waves</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK2</td><td>Sound waves through the medium of Solids, Liquids</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK3</td><td>Wave Reflection and Standing Waves</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td>CPMK3</td><td>Spherical Waves and Multidimensional</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
<tr><td colspan="3">UTS/Project Task Results/Case Analysis Results</td></tr>
<tr><td>CPMK2</td><td>Doppler effect on sound waves</td><td>TCL - SCL mixed</td><td>2 Hours</td></tr>
</table>

		and Shock Wave		
	CPMK2	Electromagnatic Waves	TCL - SCL mixed	2 Hours
	CPMK2	Electromagnetic wave radiation 1	TCL - SCL mixed	2 Hours
	CPMK3	Electromagnetic wave radiation 2	TCL - SCL mixed	2 Hours
	CPMK4	Wave interference and diffraction	TCL - SCL mixed	2 Hours
	CPMK4	Wave interference and diffraction	TCL - SCL mixed	2 Hours
	CPMK4	Applied case studies of waves in life everyday	Student Group Project	2 Hours
	UAS/ Project Task Results/ Case Analysis			
Learning Methods	TCL - SCL mixed			
Student Learning Experience	Download and study lecture materials Work on assignments			
Access Learning Media / LMS and Offline &; Online Percentage	Synchronous or asynchronous in-person/virtual lectures			

Assessment Methods and Alignment with CPMK	**Assessment Techniques**	**Percentage Assessment**	**Criteria/ Indicators**	**CPMK-1**	**CPMK-2**	**CPMK-3**	**CPMK-4**
	Participatory Activities*)						
	***Project Results*/Case Study Results/PBL Results*)**						

	Cognitive						
	Assignment	**10**					
	Quiz	**10**					
	UTS	**40**					
	UAS	**40**					
	Total	**100**					
	*) can also be obtained from UTS or UAS which is the result of participatory activities or *project* / case study results. In accordance with IKU 7, **the percentage of** participatory activities and project results/case studies/PBL results is at least 50%.						
Reference List	1. Hirose, A., and K.E. Longren, 2010: Fundamentals of wave phenomena, 2nd ed., John Wiley & Sons. 2. Pain., H.J., 2005: The physics of vibrations and waves, J. Wiley &; Sons. 3. Zahara M., 1994: Waves and optics, Education Personnel Development Project of PT, Directorate General of Higher Education, Ministry of Education and						
Name of Lecturer (*Team Teaching*)	Juliasih Partini, Wiwit Suryanto						
Authorization	**Drafting Date**	**Course Coordinator**	**Coordinator of Expertise (if applicable)**	**Head of Study Program**			
	2022			 Dr. Sudarmaji, MSi			