



**INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FACULTY OF CIVIL, PLANNING AND GEO ENGINEERING
DEPARTMENT OF GEOMATICS ENGINEERING
UNDERGRADUATE STUDY PROGRAM**

**Document
Code**

SEMESTER LEARNING PLAN (SLP)

COURSE NAME	CODE	COURSE GROUP	CREDITS (SKS)	SEMESTER	Date of Preparation
Wave Physics	CM234205		T=2 P=1		-
AUTHORIZATION	SLP Developer		Course Group Coordinator		Head of Study Program
	Ira Mutiara Anjasmara, S.T., M.Phil, Ph.D		Prof. Dr. Eko Yuli Handoko, S.T., M.T.		Putra Maulida, S.T., M.T., Ph.D
Learning Outcomes (LO)	Expected Learning Outcomes (ELO) that Imposed in the Course				
	ELO-4	Able to apply mathematics, science, and engineering in the fields of geodesy, surveying, hydrography, remote sensing, photogrammetry, geographic information systems, and cadastral to gain a thorough. understanding of the principles of engineering.			
	Course Learning Outcomes (CLO)				
	CLO-1	Able to understand wave theory and its propagation			
	CLO-2	Able to understand wave function and interference			
	CLO-3	Able to understand the properties of waves: reflection, transmission, radiation, diffraction, and scattering			
	CLO-4	Able to understand the concept of rectangular waves			
	CLO-5	Able to understand the role of waves in geomatics: optical and acoustic waves			
	CLO-6	Able to understand wave propagation			
	Matrix ELO - CLO				
	CLO	ELO-4			
	CLO-1	V			
	CLO-2	V			
	CLO-3	V			

		CLO -4	V
		CLO-5	V
		CLO-6	V
Course Description	<p>This course introduces students to the fundamental principles of wave physics with a focus on their relevance to geomatics engineering. It covers the basic concepts of wave theory and propagation, wave functions, and the phenomenon of interference. Students will explore key wave properties such as reflection, transmission, radiation, diffraction, and scattering. The course also examines rectangular waves and their mathematical representations. Emphasis is placed on understanding the application of wave behavior in geomatics, particularly in the use of optical and acoustic waves for data acquisition, remote sensing, and subsurface exploration. By the end of the course, students will be able to analyze and interpret various wave phenomena and their propagation in different media relevant to geomatic applications.</p>		
Course Materials	<ol style="list-style-type: none"> 1. Simple Harmonic Motion 2. Transverse Waves 3. Longitudinal Waves 4. Waves in More Than One Dimension 5. Waves in Optical Systems 6. Properties of Light Waves: Interference, Polarization, and Diffraction 7. Acoustic Waves 8. Wave Propagation 		
References	Main:		
		<ol style="list-style-type: none"> 1. Gerig, A. L. (2021). Introduction to wave physics. ResearchGate. 2. Georgi, H. (1993). The physics of waves. Harvard University. 3. Afnimar. 2018. Gelombang Dalam Geofisika. ITB Press 4. Pain, H.J., "The Physics of Vibrations and Waves", John Wiley & Sons Ltd., 6th Edition, 2015 	
	Additional:		
Lecturer	<ol style="list-style-type: none"> 1. Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D. 2. Prof. Dr. Eko Yuli Handoko, S.T., M.T. 3. Dr. Muhammad Aldila Syariz, S.T., M.S., Ph.D. 4. Irena Hana Hariyanto, S.T., M.T. 5. Candida Aulia De Silva Nusantara, S.T., M.T. 6. Nafisatus Sania Irbah, S.T., M.T. 		
Prerequisite			

Class/ Week	Lesson Learning Outcome (Sub-CLO)	Valuation		Learning Forms, Learning Methods, Student Assignments/Task, [Estimated Time]		Learning Materials [References]	Weight (%)
		Indicators	Criteria	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to explain simple harmonic waves	Accuracy in explaining simple harmonic waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah Teacher-centered Learning 3x50'		Penjelasan materi dan sistem evaluasi, definisi gelombang harmonik sederhana	5
2	Able to explain simple harmonic waves	Accuracy in explaining simple harmonic waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Penjelasan karakteristik gelombang harmonik sederhana	5
3	Able to explain wave functions and their interference	Accuracy in explaining wave functions and their interference	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Tugas Pembelajaran Kolaboratif 3x50'		Penjelasan fungsi gelombang dan interferensinya	10
4	Able to explain the properties of waves	Accuracy in explaining the properties of waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Penjelasan sifat-sifat gelombang (refleksi, transmisi, radiasi, difraksi, dan scattering) dan sifat-sifat gelombang pada 0,3 - 0,8 nm (Visible light)	5
5	Able to explain types of wave propagation	Accuracy in explaining types	1. Completeness of the material	Kuliah dan Diskusi Pembelajaran Kolaboratif		Penjelasan rambatan gelombang tidak	10

		of wave propagation	2. Depth of explanation and effectiveness of communication	3x50'		harmonis dan transversal, gelombang lebih dari satu dimensi	
6	Able to explain the application of waves	Accuracy in explaining the application of waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Aplikasi gelombang pada EDM dan remote sensing	10
7	Able to explain the concept of rectangular waves	Accuracy in explaining the concept of rectangular waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Penjelasan konsep gelombang rektangular	5
8	Midterm Evaluation / Midterm Exam						50
9	Able to explain wave theory and its equations	Accuracy in explaining wave theory and its equations	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Tugas Pembelajaran Kolaboratif 3x50'		Penjelasan teori gelombang dan persamaan gelombang	10
10	Able to explain reflection and transmission coefficients	Accuracy in explaining reflection and transmission coefficients	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Koefisien Refleksi dan Transmisi	5
11	Able to explain wave impedance	Accuracy in explaining wave impedance	1. Completeness of the material 2. Depth of explanation and	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Impedansi gelombang	5

			effectiveness of communication				
12	Able to explain light waves	Accuracy in explaining light waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Penjelasan gelombang cahaya dan persamaannya	5
13	Able to explain waves in optical systems	Accuracy in explaining waves in optical systems	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Penjelasan sifat dan karakteristik gelombang pada sistem optik	5
14	Able to explain acoustic waves	Accuracy in explaining acoustic waves	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Gelombang akustik (karakteristik dan persamaan)	10
15	Able to explain wave propagation	Accuracy in explaining wave propagation	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	Kuliah dan Diskusi Pembelajaran Kolaboratif 3x50'		Konsep propagasi gelombang	10
16	Final Semester Evaluation / Final Semester Examination						100