

11. Potential Field and Wave in Geophysics

Module Name	:	Potential field and wave in Geophysics		
Module Level	:	Bachelor		
Code, if applicable	:	23H06120203		
Subtitle, if applicable	:	-		
Courses, if applicable	:	Potential field and wave in Geophysics		
Semester(s) in which the module is taught	:	III (Third Semester)		
Module coordinator(s)	:	Dra. Maria, M.Si.		
Lecturer(s)	:	Dr. Muhammad Hamzah S., S.Si.,MT.,		
		Dra. Maria, M.Si.,		
		Muhammad Fawzy Ismullah Massinai, S.Si, M.T,		
Language	:	Bahasa (Indonesian language)		
Relation to curriculum	:	Compulsory course in the second year for Bachelor Degree in Geophysics		
Type of teaching, contact hours	:	This course is delivered through Lectures (i.e., Project/Casebased learning), complemented by structured assignments (paper review, project/case evaluation) and independent study. Contact hours consist of 150 minutes lectures per week, plus 180 minutes per week for each of the following: structured assignments and independent study		
Workload	:	Total workload is 135 hours per semester, consisting of 38 hours for lectures, and 48.5 hours each for structured assignments an independent study.		
Credit points	:	3 SKS (4.8 ECTS)		
Requirements according to the examination regulations	:	Students are eligible to attend the examination if their absence are less than 20% of the lectures		
Recommended prerequisites	:	-		
Module objectives/intended learning outcomes	:	: After completion of this module, students will be able to: CLO 1. Able to understand the basic principles of fields (gravity electric, magnetic), potentials (gravity, electric, magnetic), Faraday's law in integral and differential forms and its applications, as well as Ampère–Maxwe law in integral and differential forms and its application		



Bachelor Program in Geophysics
Faculty of Mathematics and Natural Sciences
HASANUDDIN UNIVERSITY

		CLO 2. Able to understand the general properties of waves and the wave equation and its solutions, the power and intensity of mechanical waves, two-dimensional (2-D) waves on the water surface, three-dimensional (3-D) waves in sound, properties of electromagnetic (EM) waves, EM waves in conductive media, and the reflection and transmission of EM waves; The following is the mapping of the ILO and the CLO of this course:						
				ILO 1	ILO 5	ILO 8	ILO 11	
			CLO 1	✓	✓			
			CLO 2			✓	✓	
							ı	1
Content	:	Gravitational field and gravitational potential						
		2. Electric field and electric potential						
		3. Magnetic field and magnetic potential4. Faraday's law in integral and differential forms and its applications						
								nd its
		Ampère–Maxwell's law in integral and differential forms and its applications					l forms	
		General properties of waves and the mechanical wave equation						wave
		7. Power and intensity of mechanical waves8. Two-dimensional and three-dimensional waves						
		9. Electromagnetic waves						



Bachelor Program in Geophysics

Faculty of Mathematics and Natural Sciences

Study and examination
requirements

Participants are marked based on their performance in theory: Quiz (10%), Case Study (60%), Written Examination (30%).

Students are marked based on their percentage of points obtained and based on the following grade scale:

Percentage of Achievement	Grade	Conversion Value
85 – 100	Α	4.00
80 - <85	A-	3.75
75 - < 80	B+	3.5
70 - < 75	В	3.0
65 - < 70	B-	2.75
60 - < 65	C+	2.5
50 - < 60	С	2.00
40 - < 50	D	1.00
< 40	E	0.00

Exams and assessment formats

Assessment in this course consists of a case study, quizzes, a written examination. The case study is conducted individually or in groups and requires students to apply theoretical concepts to analyze and solve a problem, culminating in a written report that is evaluated and may be revised after feedback. Assignments are completed individually and may include problem-solving tasks, data processing, or short essays; these are submitted in written form and may involve graphical or computational outputs. Quizzes are administered in a closed-book written format, typically consisting of short-answer and multiple-choice questions, to monitor students' ongoing understanding and provide early feedback on learning progress. The written examination (closed-book, written) evaluates students' understanding of fundamental concepts covered in CLO 1, assesses comprehension of CLO 2.

Reading list

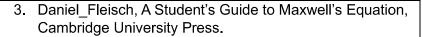
Main references:

- 1. Alexander A. Kaufman, 1992, Geophysical Field Theory and Method Part A; Gravitational, Electric, and Magnetic Fields, Academic Press, Inc.
- 2. Alexander A. Kaufman, 1994, Geophysical Field Theory and Method Part B; Electromagnetic Fields I, Academic Press, Inc.



Bachelor Program in Geophysics

Faculty of Mathematics and Natural Sciences
HASANUDDIN UNIVERSITY



- 4. Afnimar, 2018, Gelombang dalam Geofisika, ITB Bandung.
- 5. Alonso-Fin 1992 "Fundamental University Physics II: Waves" Addison Wesley
- 6. William CronkElmore, Mark A. Heald, 1985, Physics of Waves, Dover Edition, McgrawHill, New York.

Additional references:

- 1. Michael S. Zhdanov, 2009, Geophysical Electromagnetic Theory and Methods, Elsevier.
- 2. Pain, H. J., 1989, The Physics of Vibration and Waves, John Wiley, London
- 3. M. O. Tjia 1994 "Gelombang "Dabara Publisher Solo