

MATRIX OF COURSES TO LEARNING OUTCOMES UNDERGRADUATE PROGRAM IN GEOPHYSICS

1st Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.1201	Physical Geology				√					√	
2	D10F.1202	Physics 1				√		√				
3	D10F.1203	Calculus				√						
4	UNX01-001	Religion	√									
5	UNX01-004	Indonesian					√					
6	UNX01-006	Exercise, Creativity and Entrepreneurship					√					
7	UNX01-007	Pancasila	√									
8	UNX01-008	Civic Education	√									

2nd Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.2201	Physics 2				√		√				
2	D10F.2202	Geomathematics				√						
3	D10F.2203	Differential Equation				√						
4	D10F.2204	Structural Geology and Sedimentation				√						
5	D10F.2205	Practical work on Structural Geology and Sedimentation									√	
6	D10F.2206	Introduction to Earth and Planetary Science				√						

3rd Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.3201	Geographical Information System and Mapping			√							
2	D10F.3202	Practical work on Geographic Information System and Mapping (SIG)									√	
3	D10F.3206	Fundamental and Exploration Geophysics I		√					√			
4	D10F.3207	Practical work on Fundamental and Exploration Geophysics I								√		
5	D10F.4204	Instrumentation			√						√	
6	D10F.4202	Geochemistry				√						
7	D10F.4201	Geodynamics		√								

4th Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.3204	Geostatistics				√						
2	D10F.3205	Numerical Methods			√						√	
3	D10F.4203	Signal Processing and Geophysical Inversion		√							√	
4	D10F.4205	Fundamental and Exploration Geophysics II		√					√			
5	D10F.4206	Practical work on Fundamental and Exploration Geophysics II								√		
6	D10F.4207	Volcanology and Geothermal Energy		√								

5th Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.5201	Practical work on Geology and Geophysical							√	√		√

2	D10F.5202	Environmental Geophysics and Natural Hazard	√									√
3	D10F.5203	Communication in Earth Sciences						√				
4	D10F.6201	Research Methodology	√							√		
6	D10F.5204	Computational Geophysics			√							

6th Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.6201	Geophysical Project					√			√		√
2		Elective courses							√	√	√	√

7th Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1		Elective courses / MBKM							√	√	√	√

8th Semester

No.	Course Code	Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
1	D10F.8201	Thesis						√	√			√

TOTAL LOs DISTRIBUTION	4	6	4	10	4	3	7	6	8	6
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Los Dec ription

- LO1 Good comprehension, respect, and execution of the moral, social, environmental, and religious obligations associated with geophysical exploration and study.
- LO2 Comprehensive knowledge of both geophysical and geoscience concepts and theories, including the concept of method of seismic, method of gravity and magnetic, electric and electromagnetic methods, geodynamics, and dynamic process on earth.
- LO3 Comprehensive understanding of the principles of instruments and equipment used in geophysical exploration and other support for geophysical works such as numerical method and computational geophysics, basic mapping, Geographic Information System and

- LO4 Comprehensive understanding of mathematics and fundamental sciences such as physics, geology and chemistry and other related basic sciences as foundation for geophysics.
- LO5 Good ability to work collaboratively and communicate effectively with colleagues, professionals from different disciplines and society as general in order to solve the problems.
- LO6 Able to apply research methodology, provide independent and high quality results, and communicate the research results effectively through reports and presentations in accordance with scientific, technological and ethical principles.
- LO7 Competent in showing independent, high-quality, measurable performance with high adaptability to different environmental work as well as logical, critical, systematic, and innovative thinking to develop and implement science and technology within their field.
- LO8 The ability to carry out comprehensive geophysical measurements starting from survey design, determine the measurement lines, conduct data acquisition, processing and interpretation of the data based on geology and other supporting sciences
- LO9 The ability to conduct basic geological measurements as well as mapping, GIS and computational and instrumentation in general in order to support geophysical data acquisitions and interpretations.
- LO10 The ability to integrate geophysical methods in the field of environment and disaster comprehensively as well as solving the cases arises in exploration and fundamental geophysics.



MATRIX LOs TO OBJECTIVES UNDERGRADUATE PROGRAM IN GEOPHYSICS

Code	Description of LO's	O1	O2	O3
LO1	Good understanding, well appreciation and well implementation of ethical, social, environmental and religious responsibilities related to geophysical exploration and research.			✓
LO2	Comprehensive understanding of the principles and theories of geophysics and geosciences, including seismic, gravity, magnetic, and electromagnetic methods as well as basic geology, basic mapping and geographical information system, internal structure of the earth and computational	✓		
LO3	Knowledge of the instruments and equipment used in geophysical exploration, as well as the data processing and analysis techniques involved.	✓		
LO4	Good understanding of the interdisciplinary nature such as mathematics, physics and other related basic sciences.	✓		
LO5	The ability to work collaboratively and communicate effectively with colleagues, professionals from different disciplines and society as general in order to solve the problems.			✓
LO6	Strong analytical and problem-solving skills, as well as proficiency in computer programming and data analysis.		✓	
LO7	Competent in showing independent, high-quality, measurable performance with high adaptability to different environmental work.			✓
LO8	The ability to apply geophysical techniques to investigate the physical properties of the Earth, such as its structure, composition, and processes.		✓	
LO9	The ability to conduct basic geological measurements as well as mapping, SIG and instrumentation in general in order to support geophysical data acquisitions and interpretations.		✓	
LO10	The ability to integrate geophysical methods in the field of environment and disaster comprehensively as well as solving the cases arises in explorational and fundamental geophysics.		✓	

Objectives :

- O-1 Apply principles of physics, mathematics, geology and other related sciences to analyze and interpret geophysical data, as well as to identify and analyze the physical properties of rocks and minerals.

- O-2 Conduct survey design and data acquisition using various geophysical methods with mapping, GIS and instrumental support and apply computational methods for processing and modeling geophysical data.
- O-3 Communicate effectively in scientific written and oral presentations, work collaboratively in multidisciplinary teams and society in general, with admiration to ethical and environmental considerations, and utilize geophysical data and modeling to solve environmental problems.

MATRIX OF OBJECTIVES to LOs
UNDERGRADUATE PROGRAM IN GEOPHYSICS

DESCRIPTIONS	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
(O-1). Apply principles of physics, mathematics, geology and other related sciences to analyze and interpret geophysical data, as well as to identify and analyze the physical properties of rocks and minerals.		√		√						
(O-2) Conduct survey design and data acquisition using various geophysical methods with mapping, GIS and instrumentational support and apply computational methods for processing and modeling geophysical data.			√					√	√	
(O-3). Communicate effectively in scientific written and oral presentations, work collaboratively in multidisciplinary teams and society in general, with admiration to ethical and environmental considerations, and utilize geophysical data and modeling to solve environmental problems.	√				√	√	√			√

Code	Description of LO's	Courses
LO1	Good comprehension, respect, and execution of the moral, social, environmental, and religious obligations associated with geophysical exploration and study.	1. Religion 2. Pancasila 3. Civic Education
LO2	Comprehensive knowledge of both geophysical and geoscience concepts and theories, including the concept of method of seismic, method of gravity and magnetic, electric and electromagnetic methods, geodynamics, and dynamic process on earth.	1. Fundamental and Explorational Geophysics 1 2. Fundamental and Explorational Geophysics 2 3. Signal Processing and Inversion 4. Environmental Geophysics and Natural Hazards 5. Field Work Geology and Geophysics 6. Geophysical Project 7. Computational Geophysics
LO3	Comprehensive understanding of the principles of instruments and equipment used in geophysical exploration and other support for geophysical works such as numerical method and computational geophysics, basic mapping, Geographic Information System and geostatistics.	1. Mapping and GIS 2. Numerical Methods 3. Instrumentation 4. Computational Geophysics
LO4	Comprehensive understanding of mathematics and fundamental sciences such as physics, geology and chemistry and other related basic sciences as foundation for geophysics.	1. Calculus 2. Geomathematics 3. Differential Equation 4. Physics 1 5. Physics 2 6. Earth and Interplanetary Science 7. Geochemistry 8. Physical Geology 9. Structural Geology and Sedimentation
LO5	Good ability to work collaboratively and communicate effectively with colleagues, professionals from different disciplines and society as general in order to solve the problems.	1. Bahasa Indonesia 2. Creativity and Entrepreneurship 3. Geophysics Project 4. Communication
LO6	Able to apply research methodology, provide independent and high quality results, and communicate the research results effectively through reports and presentations in accordance with scientific, technological and ethical principles.	1. Research Methodology 2. Final Assignment
LO7	Competent in showing independent, high-quality, measurable performance with high adaptability to different environmental work as well as logical, critical, systematic, and innovative thinking to develop and implement science and technology within their field.	1. Physics 1 2. Physics 2 3. Geology and Geophysics Field Work 4. Research Methodology 5. Final Assignment
LO8	The ability to carry out comprehensive geophysical measurements starting from survey design, determine the measurement lines, conduct data acquisition, processing and interpretation of the data based on geology and other supporting sciences	1. Practical Work for Fundamental and Exploration Geophysics 1 2. Practical Work for Fundamental and Exploration Geophysics 2 3. Geology and Geophysics Work 4. Geophysics Project
LO9	The ability to conduct basic geological measurements as well as mapping, GIS and computational and instrumentation in general in order to support geophysical data acquisitions and interpretations.	1. Physical Geology 2. Practical Work for Structural Geology and Sedimentation 3. Practical Work for Mapping and GIS 4. Numerical Methods 5. Instrumentation 6. Signal Processing and Inversion
LO10	The ability to integrate geophysical methods in the field of environment and disaster comprehensively as well as solving the cases arises in exploration and fundamental geophysics.	1. Environmental Geophysics and Natural Hazards 2. Geology and Geophysics Field Works 3. Geophysical Project



MATRIX OF COURSES TO LEARNING OUTCOMES UNDERGRADUATE PROGRAM IN GEOPHYSICS

Code	Subject Specific Criteria	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
UB1	Basic knowledge and understanding of the natural sciences (Physics, Chemistry, Mathematics) underlying the study of Geology				√						
UB2	Knowledge and understanding of the essential features, processes, materials, history and the development of the Earth and life		√								
UB3	Basic knowledge and understanding of the key aspects and concepts of geology, including some at the forefront of that discipline				√						
UB4	Knowledge of the common terminology and nomenclature and the use of bibliography in Geoscience		√								
UB5	Awareness of the wider spectrum of geological disciplines				√						
UB6	Awareness and understanding of the temporal and spatial dimensions in Earth processes		√								
UB7	Awareness of the applications and responsibilities of Geosciences and its role in society including its environmental aspects		√								
UB8	Awareness of major geological paradigms, the extent of geological time and plate tectonics				√						

UB9	Knowledge and understanding of the complex nature of interactions within the geosphere										√
UB10	Appropriate knowledge of other disciplines relevant to geosciences				√						
ADI1	Some understanding of the complexity of problems in the specific field of study and the feasibility of their solution							√			
ADI2	Understanding the need of a rational use of earth resources										√
ADI3	Basic ability in the formalisation and specification of problems whose solution involves the use of geo-methods								√		
ADI4	Knowledge of appropriate solution patterns for geosciences problems								√		
ADI5	Basic ability to describe a solution at an abstract level					√					
ADI6	Knowledge of the range of applications of geosciences										√
ADI7	Ability to integrate field and laboratory evidence with theory following the sequence from observation to recognition, synthesis and modelling								√		
ADI8	Appreciation of issues concerning sample selection, accuracy, precision and uncertainty during collection, recording and analysis of data in the field and laboratory	√									
ADI9	Ability to formulate and test hypotheses						√				
TMTS1	Basic ability to become familiar with new geological methods and technologies							√			
TMTS2	Ability to select and use relevant analytic and modelling methods									√	
TMTS3	Basic ability to apply appropriate technology and use relevant methods									√	

TMTS4	Ability to use simple quantitative methods and to apply them to geological problems									√	
TMTS5	Basic ability to independently analyze Earth materials in the field and laboratory and to describe, process, document and report the results						√				
TMTS6	Ability to undertake field and laboratory investigations in a responsible and safe manner, paying due attention to risk assessment, rights of access, relevant health and safety regulations, and sensitivity to the impact of investigations on the environment and stakeholders								√		
TMTS7	Basic ability to combine theory and practice to complete geology tasks									√	
TMTS8	Ability to undertake literature searches, and to use data bases and other sources of information						√				
TMTS9	Ability to receive and respond to a variety of information sources (eg textual, numerical, verbal, graphical)						√				
TMTS10	Ability to conduct appropriate experiments, to analyze and interpret data and draw conclusions						√				
TMTS11	Basic awareness of relevant state-of-the-art technologies and their application							√			
TMTS12	Basic ability to solve numerical problems using computer and non-computer based techniques									√	
TMTS13	Basic knowledge of the application of information technology to geological science									√	
TMTS14	Ability to use spreadsheet and word-processing software									√	
OPC1	Ability to complete assigned tasks in a range of technical, economical and social contexts										√
OPC2	Ability to learn and study including effective time management and flexibility							√			
OPC3	Awareness of the concept of professionalism and professional ethics	√									

OPC4	Knowledge of the economic, social, environmental and legal conditions expected in professional practice	√									
OPC5	Basic awareness of project management and business practices and understanding of their limitations										√
OPC6	Ability to work effectively as an individual and as a member of a team					√					
OPC7	Recognition of the need for, and engagement in, self-managed and life-long learning							√			
OPC8	Ability to organise their own work independently							√			
OPC9	Basic ability to formulate an acceptable problem solution using geological methods in a costeffective and time-efficient way									√	
OPC10	Basic knowledge in estimating and measuring costs and productivity								√		
OPC11	Basic ability to communicate effectively in written and verbal form with colleagues, other professionals, customers and the general public about substantive issues and problems related to their chosen specialisation					√					
OPC12	Basic ability to prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques and packages						√				