UNDERGRADUATE PROGRAM IN GEOPHYSICS

THE ACADEMIC GUIDEBOOK

FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS PADJADJARAN
2023

http://geophys.unpad.ac.id

THE ACADEMIC GUIDEBOOK
UNDERGRADUATE PROGRAM IN GEOPHYSICS

CURRICULUM OF 2021
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
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2023

Preface

This academic guidebook of Undergraduate Program of Geophysics consists of general information about Undergraduate Program of Geophysics and the 2021 curriculum of Undergraduate Program of Geophysics.

Jatinangor, August 2021

Undergraduate Program of Geophysics

Contents

Preface	0
Contents	1
List Of Tables	2
Chapter 1: Identity of Study Programme	3
1. Hystory	3
2. Vision and Mission	3
3. Objectives	4
4. Teaching staffs	6
Chapter 2: Learning Resources	7
Chapter 3: Curriculum	8
1. Description	8
2. Courses List	10
3. Courses Relation and Description	13
1st Semester	15
2nd Semester	16
3rd Semester	20
4th Semester	23
5th Semester	26
6th Semester	29
7th Semester	29
4. Learning outcomes	32
5. Specific Subject Criterion	33
Chapter 4: Activities	36
Closing Remarks	47

List Of Tables

Table 1. Bachelor in Geophysics Profile 5

Table 2. List of Teaching Staffs 7

Table 3. Compulsory courses for first year 10

Table 4. Compulsory courses for second year 10

Table 5. Compulsory courses for third year 11

Table 6. Compulsory courses for fourth year 11

Table 7. Elective courses 11

Table 8. Distribution of credits 11

Chapter 1: Identity of Study Programme

1. Hystory

Geophysics Study Program started from the Physics Department. Since 1985, the Physics Department has organized a Geophysics Study Group (KBK) to facilitate students who are interested in taking up this field. When the Physics Study Program was formed which was approved based on the Decree of the Directorate General of Higher Education on July 11 1996 Number: 217/DIKTI/Kep/96, the Geophysics KBK was included in the Physics Study Program. Apart from the Geophysics KBK, the Physics Study Program also has other KBK, namely Materials Physics, Energy Physics, Instrumentation, and Biophysics. KBK functions in scientific development, lectures in its field, as well as student thesis research. Competency improvement in the field of geophysics continues to be carried out, including through a cooperation agreement between the Dean of FMIPA and the Head of the Center for Geological Research and Development, the Energy and Mineral Resources Research and Development Agency of the Ministry of Energy and Mineral Resources number 749/J06.6.FMIPA/DN/2001 and 313/05.01/BLG/2001. In this agreement, the KBK Geophysics Expert Staff was formed, consisting of geophysicists from the two institutions. In 2008, the cooperation agreement was renewed into a Memorandum of Understanding with numbers 88/J06.6.FMIPA/DN/2008 and 055/05/BGS/2008.

In accordance with the 2006 – 2010 Strategic Plan of FMIPA Unpad, an academic study was carried out on the opening of the Geophysics Study Program on October 18 2008, in order to provide an opportunity for the wider community to deepen studies and apply physics in the field of earth science and technology. After going through several stages of the process at the faculty level up to the rectorate, the proposal for implementing the Geophysics Study Program was approved through the Decree of the Minister of National Education No. 49/D/O/2010 dated 21 May 2010 concerning "Granting permission to implement the Geophysical Engineering Study Program (S1) at Padjadjaran University" which was later revised by Decree of the Minister of National Education of the Republic of Indonesia No. 257/D/O/2010, dated 30 December 2010 to become a Geophysics Study Program at the Bachelor (S1) program at Padjadjaran University (Unpad). In accordance with the decree issued, student admissions began in 2011.

2. Vision and Mission

Vision:

“To become a Geophysics Study Program that excels in providing education and research in the field environmental geophysics at regional level in 2026.”

Mission:

1. Carrying out education and teaching to produce graduates who master geophysical science and its applications, are skilled at communicating and are competitive at the regional level.
2. Carrying out research in the field of scientific and applied geophysics that contributes to solving environmental problems.
3. Organizing research-based services to overcome environmental problems in society.
4. Building and developing collaboration in the fields of education and research with domestic and foreign institutions.

3. Objectives

The aim of the Geophysics undergraduate program is to develop students who are able to:

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-1).
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-2).
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 (O-3).

Table 1. Undergraduate Program in Geophysics Profile

1	University	Universitas Padjadjaran (Unpad)
2	Faculty	Mathematics and Natural Sciences
3	Department	Geophysics
4	Study programme	Undergraduate Program in Geophysics
5	Level programme	Bachelor
6	LAMSAMA (National accreditation)	Very good
7	Graduate's title	Sarjana Sains (S.Si)
9	Vision of study programme	1. Become a Geophysics Study Program that excels in providing education and research in the field of environmental geophysics at the regional level in 2026.
10	Mission of study programme	2. Carrying out education and teaching to produce graduates who master geophysical science and its applications,

		are skilled at communicating and are competitive at the regional level. 3. Carrying out research in the field of scientific and applied geophysics that contributes to solving environmental problems. 4. Organizing research-based services to overcome environmental problems in society. 5. Building and developing collaboration in the fields of education and research with domestic and foreign institutions.
11	Goal of study programme	The aim of the Geophysics undergraduate program is to develop students who are able to: 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-1). 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-2). 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 (O-3).
12	Address	Jl. Raya Bandung - Sumedang, Km. 21 Jatinangor, Sumedang 45361
15	Web address	https://geophys.unpad.ac.id/
16	Head of Department of Geophysics	Prof. Dr. rer. nat. Yudi Rosandi rosandi@geophys.unpad.ac.id

17	Head of Undergraduate Program in Geophysics	Dr. Irwan Ary Dharmawan kaprodi.geofisika.s1@unpad.ac.id iad@geophys.unpad.ac.id

4. Teaching staffs

The composition of teaching staff in the Geophysics undergraduate program at Universitas Padjadjaran (Unpad) reflects diversity and extensive expertise across various aspects of geophysics. The staff consists of experts with diverse educational backgrounds and professional experiences, ranging from geophysical modeling and data processing to practical applications in exploration and environmental monitoring. They demonstrate a high dedication to advancing cutting-edge research and imparting relevant knowledge to students. Additionally, these staff members actively engage in interdisciplinary collaborations and serve as mentors to students in developing a deep understanding of geophysics and its real-world applications.

Table 2. List of Teaching Staffs

No.	Teaching Staff	E-mail Adress
1	Prof. Dr. rer. nat. Yudi Rosandi	rosandi@geophys.unpad.ac.id
2	Dr. Irwan Ary Dharmawan	iad@geophys.unpad.ac.id
3	Dr. Asep Harja	asep.harja@geophys.unpad.ac.id
4	Dr. Dini Fitriani	dini@geophys.unpad.ac.id
5	Dr. Eleonora Agustine	leo@geophys.unpad.ac.id
6	Dr. Imran Hilman Mohammad	imran@geophys.unpad.ac.id
7	Dr. Kartika Hajar Kirana	kartika@geophys.unpad.ac.id
8	Bambang Widjatmoko, M.Si	bwmoko@geophys.unpad.ac.id
9	Budy Santoso, MT	budi@geophys.unpad.ac.id
10	Kusnahadi Susanto, MT	k.susanto@geophys.unpad.ac.id
11	Anggie Susilawati, M.Si	anggie@geophys.unpad.ac.id
12	Mia Uswatun Hasanah, MT	hasanah@geophys.unpad.ac.id

Chapter 2: Learning Resources

Universitas Padjadjaran provides a single account and student card for each student. The single account is used for accessing all study facilities based on internet connections, such as student email accounts, integrated information and academic system (SIAT), and Learning Management systems. During the COVID-19 outbreaks, Universitas Padjadjaran encouraged the civitas academic to develop the hybrid-based lecture. The online material courses can be accessed on LMS provided in http://reguler.live.unpad.ac.id by all enrolled students and team teaching. Moreover, the LMS site also contains other online materials such as video course links, online quizzes, assignments repositories, etc. Universitas Padjadjaran also subscribes to all teacher's accounts to get a professional Zoom meeting Identity (Zoom ID) to discuss online teaching.

Chapter 3: Curriculum

1. Description

The curriculum applied in the Geophysics study program follows the SNPT (Indonesian National Standard for Higher Education) and Indonesian Association of Geophysical Education (APPGI) standards, with the addition of several local content courses. The geophysics education program offered by the Faculty of Mathematics and Natural Sciences at Unpad is a full-time program. The duration of the Undergraduate Program in geophysics is 7 to 8 semesters, with 12 subject groups, 48 courses, and 144 credits/260.6 ECTS (Figure 1).

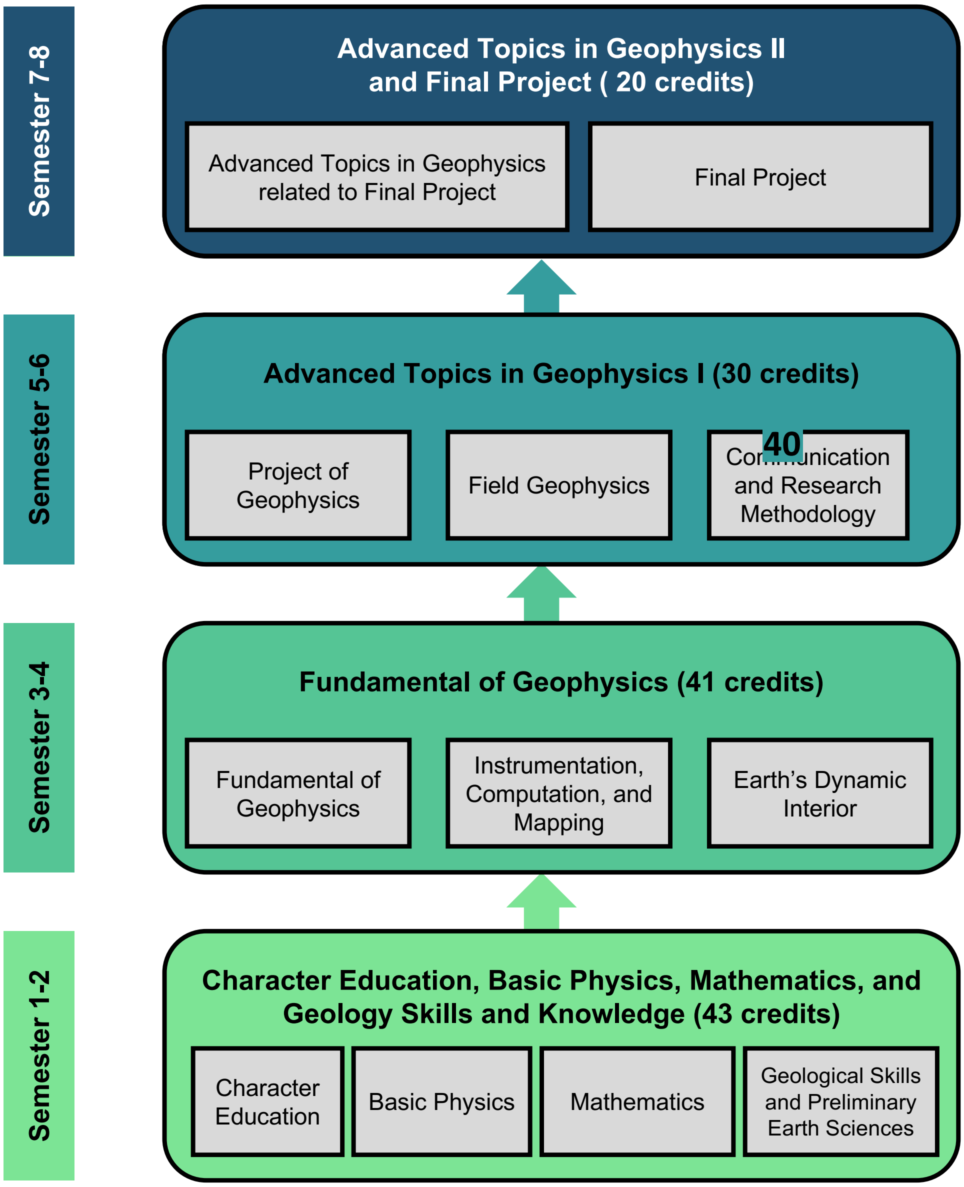

Figure 1. Curriculum structure of Undergraduate Program in Geophysics

Nowadays, Undergraduate Program in Geophysics implements Curriculum 2021 accommodating MBKM systems and APPGI guidance. The newest curriculum forced the program responsible for making policy modifications. Curriculum 2021 adopted MBKM and adjusted the student workload policy. In the curriculum 2021, The GPA isn't the workload limitation because curriculum MBKM needs around 20 credits for external student activities at the end of the study period. Normally, The MBKM courses being held in the 6^{th} and 7^{th} semesters. This policy was initiated and conducted by the Geophysics study program.

The 2021 Curriculum is organized into four subject course groups, each spanning four years of study. It comprises 43 credits in the first year, emphasizing foundational knowledge, followed by 41 credits in the second year, focusing on fundamental and theoretical geophysics. In the third year, there are 30 credits dedicated to advanced topics in geophysics, and in the fourth year, the curriculum culminates with 20 credits allocated for the final project (see **Figure 1**)

In the first year of the geophysics program, students have a packed curriculum. They learn about character development, basics like physics and math, and geology. They also focus on personal skills like communication and creativity. They study physics topics such as motion and energy, along with math concepts like calculus. They explore the Earth's structure and how it works. This mix of subjects helps students develop not just knowledge but also essential skills for a career in geophysics. All of this is the starting point for becoming experts in geophysics.

In the second year of the geophysics program, students dive into intermediate geophysics courses. These courses are like building blocks, laying the foundation for understanding Earth's subsurface. These second-year courses are carefully designed to cover various subjects crucial for geophysicists. This includes computer skills, using instruments, working with data, and creating Earth models. They also learn mapping, both traditional and using Geographic Information Systems (GIS). All of this training helps students become skilled at planning and carrying out geophysical experiments.

In the third year, students get hands-on with geophysics through practical projects. Geophysics is all about understanding the Earth's features and natural events using methods like seismic studies, magnetic surveys, and gravity measurements. These methods help geophysicists learn about geological structures and environmental changes. Students also take courses on communication and research techniques. They learn how to effectively share their scientific findings and conduct research responsibly. This includes topics like designing studies, analyzing data, scientific writing, and giving presentations. These courses prepare geophysics students to explain complex ideas, analyze geophysical data, and carry out field investigations successfully, which is important for their future in geophysical research or related jobs. Furthermore, students can choose elective courses that match their interests and career goals. These electives cover advanced geophysics topics and related subjects like instrumentation and computational geophysics. These courses are carefully designed to provide a well-rounded education in geophysics, computational skills, instrumentation techniques, and mapping methods.

In the fourth year of their geophysics program, students start their final projects, which mark the end of their education. They choose topics that interest them and match their future careers in geophysics. These projects let them use what they've learned to solve real geophysical problems or do advanced scientific research. In addition to these projects, students can pick elective courses tailored to their interests or explore advanced geophysics subjects. These electives help students expand their knowledge and skills, getting them ready for their future roles in the geophysics field.

To successfully finish their academic programs, students are required to register for all the courses outlined in the curriculum. Courses that are not specified in the curriculum will not be eligible for credit conversion. The Geophysics curriculum, which encompasses 144 credits, offers students the chance to engage in various mobility activities, including internships, MBKM activities, international seminars, practical training, and community service initiatives. Table xx provides a breakdown of the workload and credit distribution for the Undergraduate Program in Geophysics.

2. Courses List

Table 3. Compulsory courses

SEMESTER I

NO	CODE	COURSES	CREDIT
1	D10F.1201	Physical Geology	3(2-3)
2	D10F.1202	Physics 1	4(3-3)
3	D10F.1203	Calculus	3(3-0)
4	UNX01-001	Religion	2(2-0)
5	UNX01-004	Indonesian	2(2-0)
6	UNX01-006	Exercise Creativity and Entrepreneurship	3(3-0)
7	UNX01-007	Pancasila	2(2-0)
8	UNX01-008	Civic education	2(2-0)
		TOTAL	**21**

SEMESTER II

NO	CODE	COURSES	CREDIT
1	D10F.2201	Physics 2	4(3-3)
2	D10F.2202	Geomathematics	6(6-0)
3	D10F.2203	Differential Equations	4(4-0)
4	D10F.2204	Structural Geology and Sedimentation	4(4-0)
5	D10F.2205	Practical work on Geology of Structure and Sedimentation	2(0-6)

6	D10F.2206	Introduction to Earth and Planetary Sciences	2(2-0)
		TOTAL	**22**

SEMESTER III

NO	CODE	COURSES	CREDIT
1	D10F.3201	Geographic Information Systems and mapping	2(2-0)
2	D10F.3202	Practical work on Geographic Information Systems and Mapping	2(0-6)
3	D10F.3206	Fundamental Geophysics and Exploration I	4(4-0)
4	D10F.3207	Fundamental and Exploration Geophysics Practicum I	2(0-6)
5	D10F.4204	Instrumentation	3(2-3)
6	D10F.4202	Geochemistry	4(4-0)
7	D10F.3208	Geodynamics	3(3-0)
		TOTAL	**20**

SEMESTER IV

NO	CODE	COURSES	CREDIT
1	D10F.3204	Geostatistics	3(3-0)
2	D10F.3205	Numerical Methods	3(2-3)
3	D10F.4203	Signal Processing and Geophysical Inversion	4(3-3)
4	D10F.4205	Fundamental and Exploration Geophysics 2	6(6-0)
5	D10F.4206	Practical work Fundamental and Exploration Geophysics 2	2(0-6)
6	D10F.4207	Volcanology and Geothermal Energy	3(3-0)
		TOTAL	**21**

SEMESTER V

NO	CODE	COURSES	CREDIT
1	D10F.5201	Practical work on Geology and Geophysics	6(0-18)
2	D10F.5202	Environmental Geophysics and Natural Hazard	4(4-0)
3	D10F.5203	Communications in Earth Earth	2(2-0)
4	D10F.5204	Research Methodology	2(2-0)
5	D10F.5205	Computational Geophysics	3(3-0)
		TOTAL	**17**

SEMESTER VI

NO	CODE	COURSES	CREDIT
1	D10F.6201	Geophysics Project	6(0-18)
2		Elective Courses	11
		TOTAL	**17**

SEMESTER VII

NO	CODE	COURSES	CREDIT
2		Elective Courses	20

		TOTAL	**20**

SEMESTER VIII

NO	CODE	COURSES	CREDIT
2		Thesis	6(6-0)
		TOTAL	**6**

Table 4. Elective courses

NO	CODE	COURSES	CREDIT	PREREQUISITES
1	D10F.0201	Oil and Gas Geology	2(2-0)	Physical Geology and Structural Geology
2	D10F.0202	Environmental Magnetism	2(2-0)	Physics I and Physics II
3	D10F.0203	Physics of Porous Media	2(2-0)	Physical Geology and Structural Geology
4	D10F.0204	Indonesian Tectonics	2(2-0)	Structural Geology
5	D10F.0209	Remote Sensing	3(3-0)	Physics I, Physics II, Geomathematics, Differential Equations
6	D10F.0210	Gravitational and Magnetic Methods of Exploration	2(2-0)	Fundamental Geophysics and Exploration I and II
7	D10F.0211	Hydrogeophysics	2(2-0)	Fundamental Geophysics and Exploration I and II
8	D10F.0212	Electromagnetic and Electrical Methods of Exploration	4(3-3)	Fundamental Geophysics and Exploration I and II
9	D10F.0213	Multivariate Analysis of Geophysical Data	2(2-0)	Geostatistics
10	D10F.0214	Introduction to Computational Fluid Dynamics	2(2-0)	Numerical Methods
11	D10F.0215	Mine Management	2(2-0)	Physical Geology, Structural Geology, Fundamental Geophysics and Exploration I and Fundamental Geophysics and Exploration II
12	D10F.4207	Volcanology and Geothermal Energy	3(3-0)	
13	D10F.0216	Geophysical Survey for Disasters	2(2-0)	

Table 5. Distribution of credits

CREDIT DISTRIBUTION		PRACTICAL WORK (HOURS)
SMT I	21	6
SMT II	22	9
SMT III	20	15
SMT IV	21	12
SMT V	20	18
SMT VI	17	
SMT VII	17	

SMT VIII	6	
TOTAL	144	60

3. Courses Relation and Description

The forms of learning during lectures are synchronous, laboratory experimental, fieldwork, work practice, structured independent learning, and literary studies. Additionally, students are provided with the necessary skills for literacy and scientific writing. In carrying out learning, students will be guided by course lecturers and teaching assistants both in the classroom and in the field.

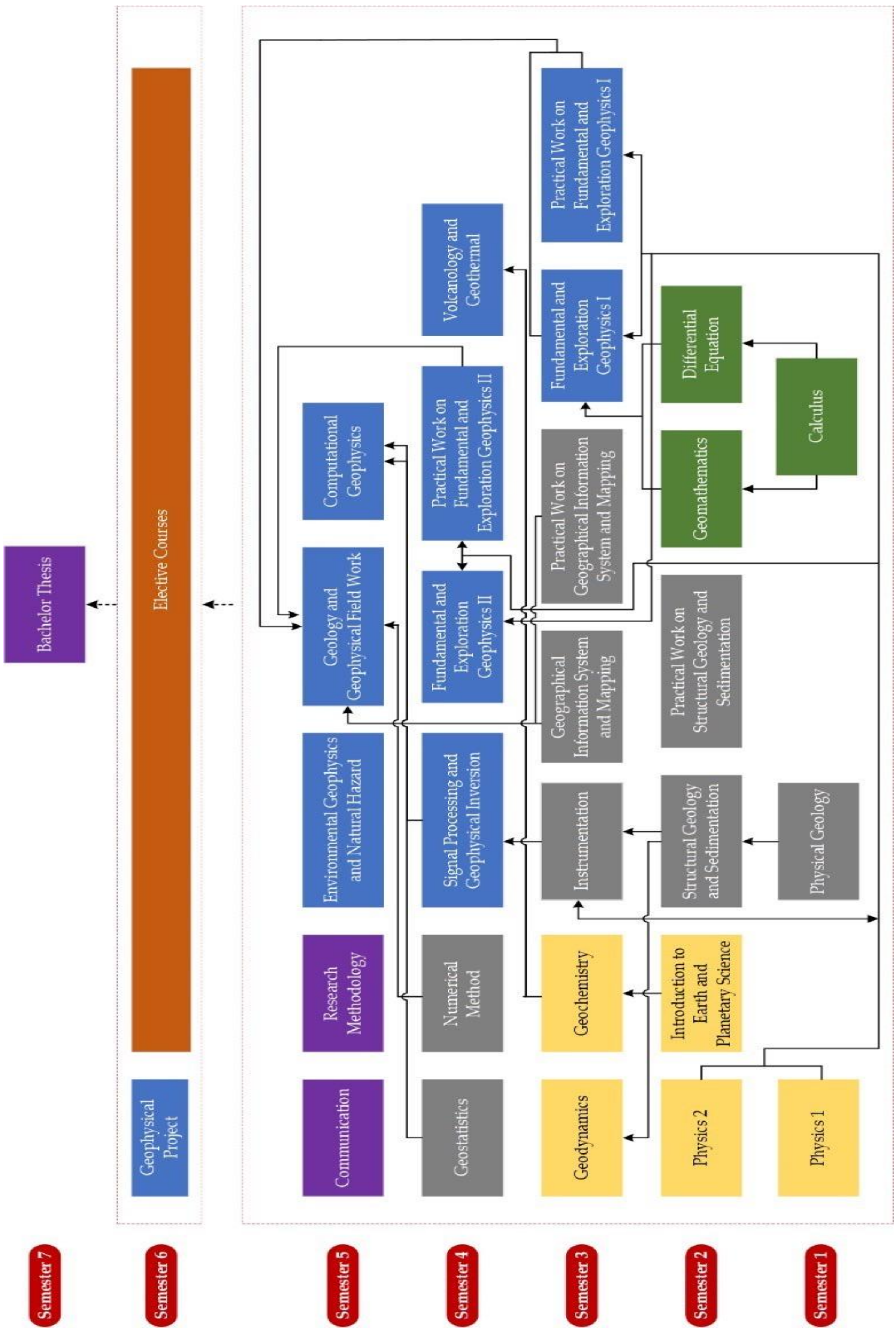

Figure 2. Course Network on The 2021 Curriculum.

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	Practial 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							√	√		√

Undergraduate Program in Geophysics

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

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**

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 geostatistics.

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 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.

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.	√				√	√	√			√

GEOFISIKA
FMIPA UNPAD

COURSES vs LO's
UNDERGRADUATE PROGRAM IN GEOPHYSICS

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 Enterpreneurship 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

GEOFISIKA
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MATRIX OF COURS 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						√				

1st Semester
Physical Geology 3(2-3) SKS

This course is a mandatory course that gives the theory of formation and interior system of the earth, types of rock and minerals, the formation of mountains, volcanoes and volcanic earthquakes, geology processes, and landscape changes. This course also gives field work to implement concepts about formation and interior system of the earth, types of rocks and minerals, the formation of mountains, volcanoes and volcanic earthquakes, geology processes, and landscape changes.

Contents

1. Theory of Formation and Interior System of Earth
2. Rocks and Minerals
3. Landscape and Morphology
4. Formation of the Earth's Surface
5. Field Work

Reference

1. Clarks If and Cook Bj, 2010, *Perspectives of the Earth*, Australian Academy of Science. Camberra
2. Plummer C, Carson Dand Hammersley L, 2012, Physical Geology, McGraw-Hill. Newyork
3. Arthur Holmes, 2000. *Principles of Physical Geology*. Thomas Nelson and Sons Ltd. London.
4. Keith Lye,2011, *The All Colour Book of The Earth*, Marshall Cavendish Limited, London.

Physics I 4(3-3) SKS

This course is mandatory course that provides students gravity fundamental, rotational motion, elasticity, mechanical waves, and laws of thermodynamics. This course also provides experiments to implement the principle of calculating the acceleration of gravity, angular acceleration; reflection principle, transmission, and diffraction waves; elasticity principle; and heat transfer in laboratory experiments.

Contents

1. Mechanical: gravity and rotational motion
2. Elasticity
3. Mechanical Waves
4. Laws of Thermodynamics
5. Experiment

Reference

1. Lowrie, W., & Fichtner, A. (2020). *Fundamentals of geophysics*. Cambridge university press.
2. Halliday, D., Resnick, R., & Walker, J. (2013). *Fundamentals of physics*. John Wiley & Sons.

Calculus 3(3-0) SKS

This course is a mandatory course that provides participants with basic lectures regarding limits, derivatives, integrals and transcendent functions and is able to implement them in solving simple problems.

Contents

1. Introduction of calculus and basic concepts of limits
2. Basics of derivative
3. Basics of integral
4. Transcendent function
5. Integration techniques and improper integrals

References

Purcell, E. J., Varberg, D., & Rigdon, S. E. (2004). KALKULUS, jilid 1.

2nd Semester
Physics II 4(3-3)

This course is a mandatory course that provides students about electrostatic, magnetostatic, electrodynamic, and electromagnetic waves. This course also provides experiments to implement electrostatic calculation principle, magnetostatic, electrodynamic, and electrodynamic waves in laboratory experiments.

Contents

1. Electrostatic and Magnetostatic
2. Electrodynamic
3. Electromagnetic waves
4. Experiments

References

1. Fundamentals of Geophysics (Lowrie, 2020).
2. Physics (Halliday and Resnick, 2013).

Geomathematics 6(6-0)

This course is a mandatory course that provides the basics of complex number, sequences, Fourier analysis, integral transform, vector analysis, multivariable derivative, multiple integral, linear algebra, and the implementation in geophysics simple cases.

Contents

1. Series and sequences
2. Complex number
3. Multivariable derivative and multiple integral
4. Vector analysis
5. Fourier analysis and Laplace transform
6. Linear algebra

Reference

Mary L Boas, 2006, Mathematical Methods in the Physical Sciences, John Wiley and Sons.

Differential Equations

This course is a mandatory course that provides students with the foundations for finding solutions to differential equations, both ordinary differential equations and partial differential equations. The study of this course includes solving first-order and second-order ordinary differential equations, both zero and non-zero right-hand sides, and solving partial differential equations in Cartesian, cylindrical and spherical coordinates for steady state, diffusive and wave equations.

Contents:

1. Ordinary differential equation first and second order
2. Partial differential equations steady state: solution of Laplace's equation in cartesian, cylindrical and spherical coordinates
3. Partial differential equation diffusion: solution of diffusion equations in cartesian, cylindrical and spherical coordinates
4. Partial differential equation waves: solution of the wave equation in cartesian, cylindrical and spherical coordinates

Reference

Mary L Boas, 2006, Mathematical Methods in the Physical Sciences, John Wiley and Sons

Structural Geology and Sedimentation 4(4-0)

This course aims to provide lecture participants with knowledge in the fields of structural geology, sedimentation processes and stratigraphic techniques, as well as identification of mineral depositional environments. This course discusses geological structures which include the forces that cause structures, folds, fractures, faults, and introduction to tectonics. The course continues with a discussion of sedimentation and stratigraphy, and closes with an introduction to mineralogy and mineral deposition.

Contents:

1. Geological structure, causal forces, folds, fractures/joints, faults, and introduction to tectonic.
2. Sedimentation and stratigraphy
3. Mineral deposition environment

Reference

1. Boggs, S., Jr.,-2nd ed.,1995,Principles of Sedimentology and Stratigraphy, Prentice Hall, Inc. John Suppe, 2002, Principles of Structural Geology, Prentice Hall Canada Inc. Toronto.
2. Ransay,JG and Hubev,MI, 2007, Modern Structural Geology, Academic Press Sydney.

Field Observation for Structural Geology and Sedimentation 2(0-6)

Structural geology studies the types and mechanisms of formation of geological and tectonic structures involved in rock deformation. Geological structures are the result of tectonic processes, including: faults, joints and folds. A fault is a rock fracture followed by a shift in the rock layers, while a joint is a rock fracture without an accompanying shift in the rock layers. Fault structures are divided into 3 types, namely: normal faults, thrust faults and strike-slip faults. Joint structures are divided into 3 types, namely: columnar joints, sheeting joints and tectonic joints. In structural geology, tectonics is also studied. Tectonics studies the movement of plates/continents based on the hypothesis of continental drift, sea floor spreading and plate tectonic theory

Contents:

1. Force and the relationship to properties of materials
2. Joints
3. Folds
4. The relationship between folds and faults
5. Faults
6. Hyothesis of continental drift and sea floor spreading

7. Plate tectonic theory
8. Field lecture

Reference

1. John Suppe, 2002, Principles of Structural Geology, Prentice Hall Canada Inc. Toronto.
2. Ransay,JG and Hubev,MI, 2007, Modern Structural Geology, Academic Press Sydney.
3. Vander Pluijm,BA and Marshak,S, 2012, Earth Structure and Introduction to Structural Geology and Tectonics, McGraw-Hill. Newyork.
4. Mc Clay, KR, The Mapping of Geological Structures, 2011. Butliev & Tanner Ltd, London.

Introduction to Earth and Planetary Science 2(2-0)

This course is a mandatory course that provides participants with foundational lectures regarding the formation process of the solar system, the physical processes that occur on planets, and the interior structure of planets.

Contents:

1. The structure of the universe and the Copernicus principle
2. Star and sun
3. Planets outside the solar system
4. The process of forming the solar system
5. Complex functions
6. Planetary interior structure
7. Planet Shape
8. Surface processes
9. Rock planet
10. Planetary magnetism

Reference

1. Lewis: Physics and chemistry of the solar system: http://geosci.uchicago.edu/~kite/doc/Lewis_2004.pdf
2. Jones: Discovering the Solar System: http://minerva.ufsc.br/~kanaan/astro/Discovering%20the%20Solar%20System.pdf
3. Beatty, Petersen, Chaikin: The new solar system: https://de1lib.org/book/18786823/4455f2
4. de Pater, Lissauer: Planetary Sciences: https://vdocument.in/download/planetary-sciences-de-pater-lissauer
   Cosmology: Roos: Introduction to Cosmology

http://physics.sharif.edu/~cosmology-intro/references/Introductio%20To%20Cosmology%20Matt%20Roots.pdf

5. Ryden: Introduction to Cosmology http://carina.fcaglp.unlp.edu.ar/extragalactica/Bibliografia/Ryden_IntroCosmo.pdf

3rd Semester

Geographical Information System and Mapping 2(2-0) SKS

This course discusses mapping and geographic information systems. The discussion of mapping in this course includes coordinate systems, geoid and reference systems, projections on flat planes, scales on maps and the basics to create maps. The discussion of geographic information systems in this course includes understanding georeferencing, the characteristics of raster and vector format files, and operations on raster and vector files (geoprocessing and raster analysis). The lecture was closed with the creation of a simple thematic map.

Contents

1. Coordinate system, geoid, reference system and projections
2. Basics map creation
3. Georeferencing and projection in GIS
4. Raster and Vector Format in GIS

Reference

1. Heywood, I., Cornelius, S., and Carver, S. (2002) An Introduction to Geographical Information Systems. Second edition. Prentice Hall
2. Subagio, 2003, Pengetahuan Peta. Penerbit ITB, Bandung.

Field Work for Geographical Information System and Mapping 2(0-6) SKS

This course is an experience course from mapping and GIS courses. This course emphasizes the measurement of topographic data and land navigation which is then processed into maps using QGIS software. Practice is also directed to be able to create thematic maps using QGIS and perform simple vector and raster analysis.

Contents

1. Topographic and land navigation measurements
2. Topographic data processing
3. Map creation using QGIS
4. Raster and vector analysis in QGIS

Reference

1. Subagio, 2003, Pengetahuan Peta. Penerbit ITB, Bandung.
2. Indra Sinaga, 1997, Pengukuran dan Pemetaan Pekerjaan Konstruksi, Pustaka
3. Idi Sutardi, 1993, Ilmu Ukur Tanah – Kursus Surveyor Topografi Ukur Tambang, P3P, Bandung

Fundamental and Exploration Geophysics I 4(4-0) SKS

This course is a mandatory course that gives student gravity fundamental, magnetic, and DC resistivity. This course also gives student basic of acquisition, data processing, data interpretation of gravity, magnetic, and DC resistivity. This course concludes with an explanation of the potential and magnetic field theory for gravity, geomagnetic, and DC resistivity methods.

Contents

1. Gravity Methods
2. Magnetic Methods
3. Geoelectrical Methods
4. Potential and Magnetic Field Theory

Reference

Blakely, R. J. (1996). Potential theory in gravity and magnetic applications. Cambridge university press.

Telford, W. M., Geldart, L. P., & Sheriff, R. E. (1990). Applied geophysics. Cambridge university press.

Koefoed, O. (1979). Geosounding principles, 1. Resistivity sounding measurements.

Field Work for Fundamental and Exploration Geophysics I 2(0-6) SKS

This course is a mandatory course that trains participants to acquire, process data, and interpretation gravity, magnetic, and DC Resistivity methods.

Contents

1. Field Work of Gravity Method
2. Field Work of Magnetic Method
3. Field Work of Geoelectrical Method

Reference

1. Blakely, R. J. (1996). Potential theory in gravity and magnetic applications. Cambridge university press.

2. Telford, W. M., Geldart, L. P., & Sheriff, R. E. (1990). Applied geophysics. Cambridge university press.
3. Koefoed, O. (1979). Geosounding principles, 1. Resistivity sounding measurements.

Instrumentation 3(2-3) SKS

This course discusses instrumentation principles and their application to geophysical measuring instruments. This course starts by discussing electronics and the main components of electronics, followed by an understanding of the basics of instrumentation, measurement and control systems. The discussion of basic intelligent information systems is explained after the basic instrumentation is given as an introduction to learning how some basic geophysical instruments work. The course ends with an independent project that implements the instrumentation principles.

Contents:

1. Introduction of electronics and electronic components
2. Fundamentals of instrumentation, measurement and data control
3. Intelligent information system
4. Geophysical instrumentation
5. Independent project

Reference

1. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). Principles of Instrumental Analysis. Cengage Learning.
2. Blackburn, J. A. (2004). Modern Instrumentation for Scientists and Engineers. CRC Press.
3. Northrop, R. B. (2018). Introduction to Instrumentation and Measurements. CRC Press.
4. Harrington, N. J. (2004). Fundamentals of Instrumentation. CRC Press.
5. Morris, A. S., & Langari, R. (2011). Measurement and Instrumentation: Theory and Application. Academic Press.
4. Lowrie, W. (2007). Fundamentals of Geophysics. Cambridge University Press.
5. Milsom, J. (2003). Field Geophysics. Wiley-Blackwell.

Geochemistry 4(4-0) SKS

This course is a mandatory course that gives the basics of rock chemistry along with rock weathering process, rock alteration, mineral redox that occur in rocks, and the basics of rock cycle; earth minerals and their characterization methods; and implement the concept of rock chemistry and earth mineral for environmental and geochemical exploration studies in mining sector.

Contents

1. Stoichiometry, periodic table of elements, chemical equilibrium, and redox reactions
2. Atom model and crystal structure, chemical bonds between atoms, silicate minerals, diffraction and imaging, spectroscopic methods
3. Geochemical exploration and heavy metal

Reference

1. Introduction to Mineral Science (Andrew Putnis, 2008)
2. Methods in Geochemistry and Geophysics (Batacarya dan Patra)
3. Heavy Metal in the Environment (Bradl, 2005)
4. Introduction to the study of mineralogy (Cumhuraydinalp, 2012)

Geodynamics 3(3-0) SKS

This course discuss about Earth dynamic process, along with: tectonic plates and continental drift, the effect isostasi and gravitational forces on the Earth's surface morphology, the forces leading to plate tectonics as viewed through fluid mechanics in the mantle, the rheology of rocks considering their viscoelastic, elastic, and plastic properties and their relation to mantle convection, and faulting mechanisms and the geological disasters they cause.

Contents

1. Geodynamic Processes
2. The formation of the Earth's surface features processes and the formation of large tectonic plates in the world.
3. Reconstruction of tectonic plates processes
4. The heat transfer system within Earth's internal structure.

Reference

1. Turcotte, D. L., & Schubert, G. (2002). Geodynamics. Cambridge university press.
2. Cox and Hart (1986), Plate Tectonics- How It Works.

4th Semester
Geostatistics 3(3-0)

This course is a mandatory course that gives concepts of univariate description, bivariate description, spatial description, random function model and estimation, and kriging.

Contents

1. Univariate description, Bivariate, Spatial
2. Random function model
3. Estimation

Reference

Applied Geostatistics (Isaaks and Srivastava, 1989)

Numerical Method 3(2-3)

This course is a mandatory course that provides participants with foundational lectures on the basics of programming, numerical computing and their applications in geophysics. After attending this lecture, students are expected to be able to master the basics of programming and the application of numerical methods in the field of geophysics.

Contents

1. Introduction to computer programming: operating systems and data structures
2. Graphical and numerical representation, Data processing with Python
3. Numerical method 1: Root finding and interpolation
4. Numerical method 2: Numerical integration and differentiation

Reference

Numerical Methods in Engineering with Python 3, Jaan Kiusalaas, Cambridge University Press, 2013
https://docs.python.org/3/tutorial/
https://www.tutorialspoint.com/python3/python_tutorial.pdf
https://www.cs.unibo.it/~renzo/doc/awk/nawkA4.pdf

Signal Processing dan Inversi Geofisika 4(3-3)

Fundamental and Exploration Geophysics II 6(6-0)

This course is a mandatory course that provides students about seismology and seismicity, seismic exploration, seismic passive, well log, and electromagnetic methods. This course also provides student the basic concepts of theory, acquisition, data processing, and interpretation about seismology and seismicity, seismic exploration, seismic passive, well log, and electromagnetic methods

Contents

1. Seismology and seismicity
2. Seismic Exploration
3. Seismic Passive
4. Well Log
5. Electromagnetic methods

Reference

1. Exploration Seismology (Sheriff and Geldart, 1995)
2. Electromagnetic Methods in Applied Geophysics (Nabighian, 1988)

Field Work for Fundamental and Exploration Geophysics II 2(0-6)

This course is a mandatory course that trains participants to carry out acquisition, data processing, and interpretation of seismology and seismicity,seismic exploration, passive seismic, and electromagnetic methods.

Contents

1. Field work of Seismological and Seismicity
2. Field work of Seismic Exploration
3. Field work of Passive Seismic
4. Field work of Electromagnetic

Reference

1. Exploration Seismology (Sheriff and Geldart, 1995)
2. Electromagnetic Methods in Applied Geophysics (Nabighian, 1988)

Volcanology and Geothermal 3(3-0)

This course is an introduction to volcanic and geothermal systems. The course begins with a discussion of physical processes that occur in volcanic and geothermal systems which include: physical, chemical and statistical in volcanoes, magma formation processes, eruptive characteristics and hydrovolcanism. Furthermore, the discussion continued on identifying the characteristics of volcanic and geothermal systems which include surface manifestations, craters in geothermal systems and heat transfer characteristics in geothermal systems.

Contents

1. Introduction
2. Physical process in volcanic and geothermal systems : physical, chemical, and statistical process
3. Physical process in volcanic and geothermal system : magma formation process, eruptive characteristics and hydrovolcanism

4. Surface manifest in geothermal system
5. Volcanic crater system
6. Heat transfer in geothermal system

Reference

Wohletz, K., & Heiken, G. 1992. Volcanology and Geothermal Energy, University of California Press.

5th Semester

Geology and Geophysics Field Course

Geology and Geophysics field work material consists of geological mapping and geophysical measurements. Geological mapping includes: geomorphology, mapping rock types, mapping structures such as faults, anticlines, synclines, joints and other structures, as well as mapping mineral types associated with these rocks. Geophysical measurements carried out in field courses include: measurements of gravity, geomagnetic, resistivity, self potential, very low frequency, seismic and conductivity. This geophysics field course activity can provide comprehensive knowledge and experience for students regarding geological mapping and measurements.

Content

1. Understanding Geology and Field Survey Design
2. Geological Mapping and Geophysical data acquisition
3. Geology and Geophysical data processing
4. Integrated Analysis and Interpretation of Geological and Geophysical Data

Reference

1. John Suppe, 2002, Principles of Structural Geology, Prentice Hall Canada Inc. Toronto.
2. Arthur Holmes, 2000. Principles of Physical Geology. Thomas Nelson and Sons Ltd. London.
3. Telford, W. M., Geldart, L. P., & Sheriff, R. E. (1990). Applied geophysics. Cambridge university press.

Environmental Geophysics and Natural Hazard

Environmental Geophysics and Natural Hazard is a course that applies geophysical approaches to solve environmental and natural hazard problems. This course starts by introducing environmental problems following by the discussion of natural hazard. Furthermore, students are directed to analyze environmental and natural hazard problems based on a comprehensive and integrated geophysical approach.

Content

1. Geophysical method and its application on environmental and natural hazard problems
2. Study case of environmental and natural hazard problems

Reference

1. Reynolds, J.M. 2002. An Introduction to Applied and Environmental Geophysics. Wiley-Blackwell
2. Sharma, H.D & Reddy, R.K. 2004. Geoenvironmental Engineering. John Wiley and Sons.

Communication in Geoscience

This course teaches about knowledge and understanding communication copcets, communication strategies, and measurin the success of a communication process that will be used in geophysical context. This course provides cognitive competence up to application in study in communication strategy concepts which will be measured through assignments.

Content

1. Communication
2. Communication Techniques
3. Communication Strategies
4. Communicator Credibility
5. Verbal and Non-verbal Messages
6. Media of Communication
7. Target Audience in Communication
8. Communication Goals

Reference

1. Devito, Joseph A. Essentials of Human Communication
2. Holtzhausen, Derina; Zerfass, Ansgar. Strategic Communication
3. Knobloch, Silvia. Choice and Preference in Media Use
4. Mulyana, Deddy. Ilmu Komunikasi: suatu pengantar
5. Rahmat, Jalaludin. Psikologi Komunikasi

Research Methodology

The research methodology course discusses the steps to conduct scientific research. The course is preceded by identifying problems through topics chosen by each participant with independent literature studies. Participants are directed to conduct independent literature studies in order to formulate real problems according to the case chosen by participants. Furthermore, participants were asked to formulate the problem formally along with the purpose and objectives of the research carried out in solving the problem. Then participants are directed to choose a suitable research method in solving the problem that has been formulated and design a research flow / roadmap as a fundamental for participants in completing the research. At the end of this lecture, participants are expected to be able to make chapter 1, chapter 2 and chapter 3 following Unpad thesis writing format.

Content

1. Introduction
2. Literature Study and Problem Identification
3. Formulate Problem
4. Chose Research Method
5. Final Presentation and Paper

References

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Geophysical Computation

Advanced geophysical computing is an elective course that gives the basics of finite difference numerical methods and its application in various complex physical systems. Finite difference method discusses the finite difference method for steady state cases, diffusion, and wave equation. Finite difference method application focuses on its application in the field of geophysics. This course ends with application using finite difference method to solve geophysical cases.

Content

1. Introduction to Finite Difference Method
2. Finite Difference 1: Laplace and Poisson Equation
3. Finite Difference 2: Diffusion Equation
4. Finite Difference 3: Wave Equation
5. Numerical Stability of Finite Difference Method
6. Project

References

Mathews, J. H. (1992). Numerical methods for mathematics, science and engineering (Vol. 10). Prentice-Hall International.

6th Semester
Geophysics Project

Content

The Geophysics Project course is designed to integrate the diverse realms of geophysical knowledge acquired in preceding semesters and apply them to address societal needs, particularly in the realm of social requirements within communities. Students will engage in practical, hands-on projects aimed at utilizing their understanding of various geophysical techniques and methodologies to solve real-world challenges faced by communities.

Throughout this course, students will explore the application of seismic, magnetic, gravity, electrical, and electromagnetic methods, among others, to tackle pressing societal issues such as environmental monitoring, disaster mitigation, resource exploration, and urban planning. Emphasis will be placed on interdisciplinary collaboration, critical thinking, and problem-solving skills as students work on projects that directly impact communities.

By the end of the course, students will have not only deepened their understanding of geophysical principles but also gained valuable experience in project management, data analysis, and communication, preparing them to contribute effectively to addressing the complex challenges of society through the lens of geophysics.

7th Semester
Final Project

The thesis course is a final level course that is a continuation of the research methods course. The participants are directed to conduct research based on the chosen method , then analyze the results based on standard scientific principles. The results of the discussion are used to draw conclusions that answer the aims and objectives of the research that have been previously determined. In this course, participants are also required to comprehensively understand the theoretical concepts underlying the topic of their thesis. Participants are required to present the results of their research in the form of a progress seminar which is then reviewed by a team of reviewers. The results of the review are then revised by the participants and reported back in the form of a final draft of the thesis as a thesis defence requirement which is also a requirement for passing this course.

Content:

1. Comprehensive study
2. Analysis of results and drawing conclusions

3. Progress seminars
4. Review process
5. Thesis defence

Reference

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Elective Courses

Petroleum Geology 2(2-0)

This course focuses on the process of forming oil and natural gas, discussing the process of forming oil and natural gas accumulations, as well as the geological characteristics of oil and natural gas reservoirs. The course ends with case studies of petroleum geology at several specific sites.

Contents

1. **Introduction**
2. The physical process of forming oil and gas
3. Oil and gas migration and reservoir traps
4. Geological characteristics of oil and gas sites
5. Study case

Reference

Koesoemadinata, R. P., 1980, Geologi Minyak dan Gas Bumi, Penerbit ITB.

Environmental Magnetism 2(2-0)

This course discusses the application of rock magnetism in the environmental field. This course begins with the physical properties of minerals, the fundamentals of magnetism, magnetic materials, and remnant magnetization as basic concepts that underlie the field of rock magnetism. Participants are then guided to receive instructions on sample collection, measurements, and the application of environmental magnetism. The course concludes with a study of case and problem-based learning in the environmental domain.

Contents

1. Geomagnetic field
2. The physical properties of minerals
3. The fundamentals of magnetism
4. Magnetic materials
5. Remnant magnetization

6. Sampling and measurement
7. Application of environment magnetism
8. Study case and Problem-based learning

References

1. Evans, M. E., and Heller, F. 2003. Environmental Magnetism, California: Academic Press (An Imprint of Elsevier Science).
2. Maher, B., and Thomson, R., Eds, Quaternary Climates, Environments and Magnetism. Cambridge University Press, Cambridge.
3. Butler, R.F. (1992) : Paleomagnetism : Magnetic Domains to Geologic Terranes, Blackwell Scientific Publications, Boston.

Introduction to computational fluid dynamics 2(2-0)

This course is a continuation of the fluid dynamics course. This course implements the computational technique of the Lattice Boltzmann Method in the case of fluid dynamics as a tool in analyzing complex systems that often occur in fluid dynamics analysis. After attending this lecture, participants are expected to be able to apply the Lattice Boltzmann method on fluid dynamics analysis in complex systems.

Contents

1. Introduction
2. Introduction to the Lattice Boltzmann method
3. Introduction to openLB
4. Geometry initiation and boundary conditions in openLB
5. Final project

Reference

1. Timm Krüger et al., The Lattice Boltzmann Method: Principles and Practice, Springer, 2017.
2. A. Mohamad, Lattice Boltzmann Method: Fundamentals and Engineering Applications with Computer Codes, Springer, 2011.
3. Dieter Wolf-Gladrow, Lattice-Gas Cellular Automata and Lattice Boltzmann Models: An Introduction, Springer, Berlin Heidelberg, 2010.

RemoteSensing

This course discusses the application of remote sensing in earth sciences, especially in the fields of geology and disasters. This course covers theory and practice, as well as an introduction to geospatial technology and cloud computing along with artificial intelligence. The expected output is for students to be able to apply remote sensing technology to observe the earth using the latest methods.

Contents

1. Introduction to Remote Sensing and its Applications in Earth Sciences
2. Google Earth Engine (GEE): trends in cloud computing for remote sensing
3. Optical Remote Sensing
4. Thermal Remote Sensing
5. Radar Remote Sensing
6. Study Cases

Reference

1. Kumar, L.; Mutanga, O. Google Earth Engine applications since inception: Usage, trends, and potential. Remote Sens. 2018, 10, 1–15, doi:10.3390/rs10101509.
2. Wang, Y.; Li, Z.; Zeng, C.; Xia, G.; Shen, H. Extracting urban water by combining deep learning and google earth engine. ArXiv 2019, 1–14.
3. Kumar, L.; Mutanga, O. Geospatial Data Analysis on Google Earth Engine; 2018; Vol. 38; ISBN 9783038978848.
4. Scheip, C.M.; Wegmann, K.W. HazMapper: A global open-source natural hazard mapping application in Google Earth Engine. Nat. Hazards Earth Syst. Sci. 2021, 21, 1495–1511, doi:10.5194/nhess-21-1495-2021.
5. Gorelick, N.; Hancher, M.; Dixon, M.; Ilyushchenko, S.; Thau, D.; Moore, R. Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote Sens. Environ. 2017, 202, doi:10.1016/j.rse.2017.06.031.
6. Genzano, N.; Pergola, N.; Marchese, F. A Google Earth Engine Tool to Investigate , Map and Monitor Volcanic Thermal Anomalies at Global Scale by Means of Mid-High Spatial Resolution Satellite Data. Remote Sens. 2020, 12, 3232, doi:doi.org/10.3390/rs12193232.
7. Kennedy, R.E.; Yang, Z.; Gorelick, N.; Braaten, J.; Cavalcante, L.; Cohen, W.B.; Healey, S. Implementation of the LandTrendr algorithm on Google Earth Engine. Remote Sens. 2018, 10, 2019–2021, doi:10.3390/rs10050691.

4. Learning outcomes

Learning outcome of Undergraduate program of Geophysics are based on APPGI year 2021 as follow:

1. Good understanding, well appreciation and well implementation of ethical, social, environmental and religious responsibilities related to geophysical exploration and research.

2. Comprehensive understanding of the principles and theories of geophysics and geosciences, including seismic, gravity, magnetic, electromagnetic methods, geodynamics and other earth process.
3. Comprehensive understanding of the principles of instruments and equipment used in geophysical exploration as well as numerical method and computational geophysics, basic mapping, Geographic Information System and geostatistics for supporting geophysical work.
4. Comprehensive understanding of the interdisciplinary nature such as mathematics, physics, geology and chemistry other related basic sciences as foundation for geophysics.
5. Good ability to work collaboratively and communicate effectively with colleagues, professionals from different disciplines and society as general in order to solve the problems.
6. Proficient in applying scientific methodology, independent, high-quality performance, and effective communication of study results through reports and presentations in alignment with scientific, technical, and ethical principles.
7. The ability to apply geophysical methods to investigate the physical properties of the Earth, such as its structure, composition, and processes.
8. 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.
9. The ability to conduct basic geological measurements as well as mapping, SIG computational and instrumentation in general in order to support geophysical data acquisitions and interpretations.
10. 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.

5. Specific Subject Criterion

Code	Subject Specific Criteria
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

Chapter 4: Activities

The implementation of education in department/study programs at the Faculty of Mathematics and Natural Sciences refers to the General Guidelines for the Implementation of Education at Padjadjaran University and Unpad Chancellor's Regulation Number 1 of 2024 about Education Management at Padjadjaran University. Padjajaran University uses the Semester Credit System (SKS) in providing its education. This system provides opportunities to universities to: (1) provide varied and flexible programs so that there are broader possibilities for students to choose certain academic or professional levels and (2) use educational facilities, both hardware and software, efficiently from various educational programs.

Basic Definitions

Several basic definitions used in the semester credit system are explained in the description below:

Semester

A semester is the smallest unit of time used to express the length of the teaching and learning activity process for a program at an educational level. The implementation of a complete educational program from start to finish will be divided into semester activities so that at the beginning of the semester, students must plan and decide what learning activities they will undertake in that semester.

Generally, for a Diploma III program, Undergraduate Program, and Postgraduate Program, one semester equals around 16 weeks of learning activities, followed by evaluation by the end of the semester. One academic year consists of two regular semesters: Odd Semester and Even Semester.

Semester Credit Unit

Semester credit (called a semester credit unit, abbreviated as SKS) is a unit used to express:

1. The amount of student's study load
2. The success of student's learning efforts
3. The amount of effort required by students to complete a program, whether a semester program or a complete program
4. The amount of effort to provide education for teaching staff

Semester Credit Unit Load for College Activities

The load of 1 semester credit system of lecture activities is equivalent to the study load per week for one semester, which consists of the following three activities:

1. A total of 1 hour (equivalent to 50 minutes) of scheduled lectures;

2. For 1 hour (equivalent to 60 minutes) structured activities planned by teaching staff in the relevant course includes completing homework, writing a reference, translating an article;
3. For 1 hour (equivalent to 60 minutes), independent activities, including reading references, deepening materials, and completing assignments.

Semester Credit Unit Load for Seminar Activities and Selected Topics

One semester credit system (1 SKS) for seminar and selected topics activities:

1. The number of literature used as a reference by students, summarized in writing papers, and presented in front of the forum for the weight of 1 credit is a minimum of 3 titles, depending on the weight of the literature.
2. Students take turns as paper presenters, discussants, or moderators.

Semester Credit Unit Load for Practical, Laboratory, and The Like Activities

One semester credit (1 SKS) of practical activities in laboratories and the like is set to be equivalent to a study of 2 hours of scheduled laboratory work, followed by:

1. For 1-2 hours of structured activities, planned by relevant teaching staff, including discussions and writing reports every week for one semester;
2. For 1-2 hours of independent activities, including reading references, deepening materials, and completing assignments.

Semester Credit Unit for Fieldwork and The Like Activities

One semester credit (1 SKS) of fieldwork, clinical work, and the like is set to be equivalent to 4 hours scheduled hours per week for one semester, followed by:

1. For 1-2 hours of scheduled activities, planned by relevant teaching staff, including discussions, seminars, case conferences, and writing reports every week for one semester;
2. For 1-2 hours, independent activities, including reading references, deepening materials, and completing assignments.

The time students spend going to and from the fieldwork or clinical workplace is not counted.

Semester Credit Unit Load for Research Activities, Thesis Writing, and The Like

One semester credit (1 SKS) for the final project and the like is equivalent to 4 scheduled hours per week for one semester, followed by:

1. For 1-2 hours of scheduled activities, planned by relevant teaching staff, including discussions, seminars, literature studies, laboratory or field research, participation in an institution;
2. For 1-2 hours of independent activities, including looking for books or journals in libraries, preparing research, and wiring a final project report.

Cumulative Study Load and Study Time

Semester Study Load is the number of credits students take in a particular semester. Meanwhile, the Cumulative Study Load is the minimum number of credits a student must take to be declared to have completed a specific study program.

Cumulative study time is the maximum time a student must take to complete their studies in an educational program. The amount of cumulative study load and maximum cumulative study time for each program is different:

1. Diploma III Program, minimum 110 credits and maximum 120 credits with a scheduled study period of 6 semesters and a study time limit of 8.
2. Undergraduate Program, minimum 144 credits and maximum 160 credits with scheduled study period of 8 semesters and a study time limit of 10.
3. Master Program, minimum 36 credits and maximum 45 credits, including 1 credit of Research Proposal Seminar and 6 credits of Thesis with a scheduled study time limit of 4 semesters and study time limit of 8 semesters, starting from the time registered as a student in the first semester of the Program.
4. Doctoral program study load:

For a field of science with a program that has been taken in one field below, the minimum is 49 credits (including a dissertation of 30 credits) with a scheduled study period of 6 semesters and study time limit of 10 semesters starting from being registered as a student in the first semester of the doctoral program.

For those not in the same field of knowledge with a program that has been taken one level below, the minimum is 61 credits (including a dissertation of 30 credits) with a scheduled study period of 6 semesters and study time limit of 10 semesters starting from being registered as student in the first semester of the doctoral program and is mandatory to take matriculation before first semester is completed.

Types/Groups of Courses

The groups of courses offered includes:

1. Personality Development Courses (MPK), aimed to develop Indonesian who have faith and devotion to God Almighty and have noble character, a stable and independent personality, and have a sense of social and national responsibility;
2. Science and Skills Courses (MKK), intended to provide a basis of mastering certain knowledge and skills;
3. Creative Skills Course (MKB), aimed to produce experts with creative skills based on the basic knowledge and skills they have mastered;
4. Work Behaviour Course (MPB), aimed to form attitudes and behavior required for a person to work according to the level of expertise based on the basic knowledge and skills mastered;
5. Community Life Course (MBB), aimed to understand the rules of social life according to the choice of work skills.

Learning Process

The learning process organized by the Faculty of Mathematics and Natural Science Padjadjaran Univerity uses the Student Centered Learning (SCL) method.

Student Registration

1. Every Padjadjaran University student is required to do administrative registration;
2. Administrative registration is carried out for new and existing students to obtain a student card, with the following requirements:
    - Pass the specified exam or selection;
    - Bring examination or selection identification cards;
    - Show the required original diploma and submit a certified copy;
    - Complete and resubmit the registration or application form;
    - Pay BPP for the applicable semester.

   For existing students, the re-registration requirement applies by paying BPP for the applicable semester according to the paymet schedule.
3. Students who do not carry out administrative registration are not permitted to carry out academic administrative registration (filling the KRS) and are not entitled to receive academic services at faculties and study program.
4. Academic registration is carried out after completing the administrative registration.
5. Academic administration registration is registering to receive educational services. This registration is carried out online via the Integrated Administrative Information System (SIAT), which can be accessed on the website through http:// siat.unpad.ac.id.
6. To carry out academic administrative registration, students must follow the steps in the user manual document, which contains a brief explanation of the instructions to use Unpad Online KRS (SIAT) application for students, lecturers, and educational staff tasked with handling the registration.
7. Students who are allowed to take part in learning activities are students who have registered for academic registration.

Cards and Lists

In carrying out academic administration, several cards and lists are used, including:

1. Study Card Plan (KRS)
2. Study Card Plan Change(PKRS)
3. Student Study Card (KSM)

   Student Stury Card is a card as proof of contract for taking courses by students each semester.
4. List of Students and Lecturers Attendance (DHMD)
    - DHMD contains name and student identification number (NPM) taking the relevant course;
    - DHMD is signed during teaching and learning activities, by students and course lecturers;

- DHMD is submitted to administration in each study program to be filled into SIAT.

5. Final Exam Attendance List (DHUA)
    - DHUA contains a list of names and student identification number (NPM) of students who meet the requirements to take the final exam;
6. List of Students and Final Score (DPNA)
    - DPNA contains a list o name, student identification number (NPM), and student score components;
7. Study Progress Card (KKS)
    - KKS contains of final score of all courses the student that has taken during one semester;
    - KKS can be accessed through SIAT to be used as consideration for filling out KRS for the following semester;
8. Exam Participant Card (KPU)
    - Exam Participant Card (KPU) is a card as a student identity for final semester examination period.
    - KPU can be obtained if students fulfill the academic administration requirements to take the final semester examination.
9. Academic Achievement Card (KPA)

    Academic Achievement Card (KPA) is a card contains the entire list of courses that a student has taken during their studies, can also be called a temporary academic transcript or a collection of Study Progress Card (KKS).

Cards and lists used in carrying out academic administration can be viewed and printed from SIAT as needed.

Learning Activities

1. Students are permitted to take part in teaching and learning activites if the student has:
    - Carry out administrative registration so that student status in SIAT is recorded as an active student.
    - Carry out academic administration registration by filling the KRS online to be registered in DHMD.
2. Attend lectures according to the specified schedule.

Exam Requirements

Students are allowed to take course exams if they meet the requirements below:

1. To take the final semester exam, students must meet the following attendance requirements:
    - At least 80% of participation of real college activities held in the semester.
    - Participate in all activities (100%) in practicums, fieldwork, seminars, or similar activities.
2. Bring Exam Participant Card (KPU) and show it to the supervisor during the exam.

3. To take the final exam (comprehensive exam, thesis trial, closed/open dissertation trial, or similar activities), students must have fulfilled the requirements below:
   - Pass all courses taken in the faculty/department/study program (meeting the required cumulative study load).
   - Have prepared and written a Final Assignment Report (for Diploma III Programs) or a Thesis (which has been 'test worthy' by the supervisor), completed writing a thesis or dissertation (for Masters and Doctoral Programs), or similar activities.
   - Have completed administrative requirements regulated by the university and faculty.

Writing Final Project Reports, Thesis, Dissertations

A. Diploma 3 Final Project Report Writing

At the end of the D-3 program studies, students are required to prepare and write a Final Assignment Report, with the following provisions (see Guide to Preparing and Writing Final Assignment Reports):

1. Supervisors are basically lecturers in the relevant D-3 program who at least have the position of Lector with a Master's degree;
2. The appointment of supervisor is carried out with a decision letter or letter of assignment from the Dean;
3. If field research is required for the Final Assignment Report, the D-3 program can appoint an Assistant Supervisor (non-permanent lecturer) who is considered expert in the researched field;
4. If the Final Assignment Report can not be completed in the semester, then:
   - Students are allowed to complete it in the following semester by re-entering it in the KRS (Final Assignment Report Topic and supervisor remains the same);
   - In the relevant semester the Final Assignment Report was given a quality score of 0.
5. If the Final Assignment Report can not be completed in two consecutive semesters, then:
6. The Final Assignment Report is given a quality score of 0;
7. Students are required to go through the activities of preparing and writing the Final Assignment Report with a different topic (the supervisor can be different or remain the same); Furthermore, the provisions as in point (4) above apply.
8. The quality letter of the Final Assignment Report is at least 2.0 (quality letter C).

B. *Undergraduate Thesis Writing*

At the end of the undergraduate study program, students are required to prepare and write a thesis, with the following provisions (see Guideline for preparing wand writing a thesis):

Terms:

1. Student may officially start taking thesis course (composing a thesis) if they have completed at least 80% of the required cumulative study load;
2. Have completed all thesis prerequisite courses;

3. Have a KRS that includes a thesis as one of the courses.

Thesis Supervisor:

1. Thesis supervisor can be more than 1 person who is appointed by the Study Program and determined by the Dean's Decree;
2. If there are more than 1 supervisor, then the Main Supervisor and Assistant Supervisor are permanent lecturers who at least have a position of Lector with a Master's degree.
3. If the thesis requires field research or field activities, the faculty can appoint a Field Supervisor, staff from the institution/agency where the student carries out research activities.

Other Terms:

1. If the thesis can not be completed in one semester, then:
   - Students are still allowed to complete it in the followin semester by re-entering it in the KRS (thesis topic and supervisor remains the same);
   - At the end of the semester, the thesis is given a quality score of 0.
2. If the thesis can not be completed in two consecutive semesters, then:
   - Students are required to retake the thesis with a different title (the supervisor can be different or remains the same);
   - In certain cases that can be academically justified, students can still continue their thesis with the same title.
3. The thesis quality score is at least 2.0 (quality letter C).
4. A thesis that turns our written and completed outside of the provisions above (when the student stops studying temporarily with or without the Chancellor's permission), even if supervised by an Assistant supervisor in accordance with the provisions above, the thesis is not justified and the results of the guidance considered invalid.
5. In circumstances such as point (4) above, students are required to change the topic and repeat the preparation and writing of their thesis and the guidance process;
6. The thesis examination is held at the end of the study, at the Undergraduate Examination Session.

C. *Master's Program Thesis Writing*

At the end of the study period, master's program students are required to write a thesis with the following provisions:

1. Fill out KRS which includes the writing of the thesis;
2. Other provisions regarding supervision, requirements, and appointment of supervisors are determined separately through the Academic Guidelines for Masters and Doctoral Programs, where the appointment is made by the study program and determined by the Dean's Decree;

3. Students can take Thesis Examination if they have completed (passed) all the require courses.
4. Complete instructions regarding writing a thesis are regulated separately in the Guidelines for Preparing and Writing Thesis and Dissertations for the Padjadjaran University Postgraduate Program.

D. *Doctoral Program Dissertation Writing*

At the end of the study period, doctoral program students are required to write a dissertation with the following provisions:

1. Students can officially start taking dissertation courses (composing and writing a dissertation) ig they have passed the Qualification Examination;
2. Fill out KRS which includes the writing of the dissertation;
3. Other provisions regarding supervision, requirements, and appointment of supervisors are determined separately through the Academic Guidelines for Masters and Doctoral Programs, where the appointment is made by the study program and determined by the Dean's Decree;
4. Complete instructions regarding writing a thesis are regulated separately in the Guidelines for Preparing and Writing Thesis and Dissertations for the Padjadjaran University Postgraduate Program.

Graduation Predicate

Undergraduate Program and, Diploma-3 Program Graduation Predicate

IPK 2,00 - 2,75	Satisfactory
IPK 2,76 - 3,50	Very Satisfactory
IPK 3,51 - 4,00	With Praise

Master Program Graduation Predicate

IPK 2.75 - 3,40	Satisfactory
IPK 3,41 - 3,70	Very Satisfactory
IPK 3,71 - 4,00	With Praise

Doctoral Program Graduation Predicate

IPK 3,00 - 3,49	Satisfactory
IPK 3,50 - 3,79	Very Satisfactory
IPK 3,80 - 4,00	Cum Laude

Academic Guidance

To help student's learning runs smoothly, the study programs determines a guardian lecturer to guide students in academic activities while studying under the undergraduate, or diploma-3 program. The number of students supervised by the guardian lecturer is adjusted to the capabilities of the study program with the following conditions:

1. Every teaching staff (lecturer) ho has obtained a functional position can become a guardian lecturer who guides students for the entire program taken (the entire diploma-3 program or undergraduate program).
2. The guardian lecturer must monitor the progress of the student's studies periodically, at least at the beginning, middle, and end of the semester.
3. The duties of the guardian lecturer are:
   - Help students in preparing study plans, both full study programs and semester programs;
   - Give consideration to the student guidance in making decisions of study load and types of courses to be taken, in accordance with the GPA obtained in the previous semester;
   - Monitoring the study progress of the supervised students..
4. At the beginning of the semester, the guardian lecturer holds a meeting with students to discuss the overall study plan for the programs they are taking. The matters discussed are:
   - Estimated number of credits that the students will take to complete the entire programs;
   - Students direction of studies in determining the study/interest/depth/concentration to be taken;
   - In determining courses, need to pay attention to:
     - Courses that are prerequisites for the subsequent courses;
     - Courses that are only presented in one semester (odd semester or even semester only) or presented every semester;
     - The weight of course credits, the greater the credit weight, the heavier it will be;
     - Different forms of courses (lectures, practicums, seminars, field practicums, etc.) where the number of hours of learning activities is different;
     - Minimum attendance requirements are 100% in practicum and 80% in lectures (20% of absences must be accompanied by a justifiable reason).
     - Semester study load, if it is too much can cause a low GPA which can reduce the GPA; This will determine the semester study load that can be taken in the following semester;
     - Elective courses available in the study program.
5. The guardian lecturer provides considerations and suggestions for taking the semester study load based on the end-of-semester GPA as a guideline before students fill in the KRS online.
6. The guardian lecturer gives approval to fill in the KRS each semester.
7. The semester study load does not have to be the maximum number of credits allowed on the basis of end-of-semester GPA.
8. The guardian lecturer is obliged to pay attention to the number of quality letters D obtained by students so that it does not exceed the provisions that apply at the end of the entire program (not exceeding 20% of the cumulative study load);

9. In certain cases, personal difficulties can be consulted with the guardian lecturer, if they cannot be resolved, it is recommended to be referred to the TBK Faculty counselor lecturer.
10. If the guardian lecturer is unable to carry out his duties for a long period of time, the faculty leader is obliged to appoint a replacement.
11. Procedures and all matters related to the supervision process in master's and doctoral programs are specifically regulated in the Academic Guidebook for Master's and Doctoral Program Education.

Guidance and Counseling

Guidance and Counseling aims to provide assistance to Padjadjaran University students who have both academic and non-academic problems so that they are able to overcome the problems, and can develop their abilities and self-understanding in an effort to complete their studies, carried out by counselor lecturers who are members of the Guidance and Counseling Team (TBK) faculty.

Guidance and Counseling service procedures are as follows:

1. Students can visit the faculty TBK of their own accord or at the recommendation of their guardian lecturer; The guardian lecturer will propose through study program to the TBK faculty;
2. Services for students affected by the recommendation to change study programs, the following procedures apply:
    - The faculty leader sent a letter requesting a psychological examination to the Vice Concellor II, then requested an examination at the Psychological Innovation Services Bureau (BPIP) to carry out a psychological examination on the student concerned.
    - The results of the BPIP inspection are submitted to the faculty leadership for a follow-up.
    - If the results of the psychological examination show that the student meets the study program transfer requirements, then the transfer to the faculty/program is in accordance with applicable regulations.
    - For certain cases, it is possible to change study programs from the Undergraduate Program to the Diploma III Program.

Learning Outcomes Evaluation

Student learning outcomes evaluation is carried out at least twice, the Mid-Semester Examination (UTS) and the Final Semester Examination (UAS), and can be accompanied by other evaluations (quizzez, assignments, and others) that does not contradict with the applicable regulations. The final grade of a course obtained by student is expressed in two forms, letter quality and quality number.

Assessment Method

Assesment is carried out on student's mastery of the materialism both cognitive, psychomotor, and affective. The letter quality obtained by students are based on the following rankings:

Nilai*	Huruf Mutu	Angka Mutu
80 < NA < 100	A	4
68 < NA < 80	B	3
56 < NA < 68	C	2
45 < NA < 56	D	1
NA < 45	E	0

Students who withdraw or do not attend lectures for a long time due to justifiable reasons (illness, accident, or disaster that requires long-term treatment) can receive a K grade.

Improvement of Quality Letter

1. The change of quality letter T are corrected a maximum of 2 weeks after the final grade comes out, if within this time limit is not changed, then the quality letter becomes E (with a quality number of 0), or the lecturer in charge of the course can process it according to the weight of each evaluation part determined, producing another quality number;
2. Correction of the quality letters B, C, D, and E can be carried out in the regular semesters (Odd Semester and Even Semester) by re-taking the relevant courses completely;

The letter quality used to calculate IP and GPA are the letter quality using the **last value.**

Closing Remarks

In conclusion, the Geophysics curriculum serves as a dynamic framework, continuously evolving to meet the changing needs of both the academic sphere and the professional industry. By committing to periodic evaluations every five years, adopting the latest educational policies, and anticipating shifts in societal trends and the skillsets demanded by the geophysics industry, we ensure that our graduates are equipped with the most relevant knowledge and expertise to navigate and excel in their careers. This dedication to staying abreast of advancements underscores our commitment to producing competent and adaptable geophysicists capable of addressing the challenges of tomorrow's world.