

SEMESTER COURSE PLAN

**SOIL AND ROCK PHYSICS (P1) COURSES
(23H06121902)**



TEACHING TEAM

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STUDI PROGRAM OF GEOPHYSICS - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY
MAKASSAR
2025

**STUDY PROGRAM OF GEOFISIKA - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY**

Vision

Become a program Reliable studies in the field of geophysics to produce superior graduates and mastering science, technology, arts and culture based on BMI in 2030.

Vision Strategy

Mission

Based on the Vision above, the Geophysics Study Program has a mission:

1. Improving the quality of education to produce graduates who are competitive, able to work independently and in groups in implementing and developing BMI science and technology;
2. Carrying out research to produce reliable and competitive scientific work oriented towards the scientific development of solid geophysics, marine geophysics, geoinformatics and hydro-meteorology;
3. Disseminate the results of applied research, action studies and appropriate technology packages in synergistic and accelerated productive activities to improve the quality of life of the community.

Graduate Profiles

Educators in the Field of Geophysics; meteorologist; geomaths; oceanographer; exploration geophysicist; seismologist ; geophysical entrepreneur.

PLO charged to courses

- CPL-4 (P1) - Mastering theoretical concepts of land, sea and geophysics atmosphere, principles of exploration, and design exploration necessary for identification and mapping natural resources and natural disaster mitigation;
- CPL-6 (P3) - Mastering the principles and methods of exploration geophysics in the analysis and interpretation of Geophysical measurement data;
- CPL-11 (KK1) - Able to apply the principles of mathematics and earth science, as well as the principles of Exploration and Mitigation to solve natural resource exploration and disaster mitigation problems (Exploration natural resources and natural disaster mitigation)
- CPL-13 (KK3) - Able to formulate alternative solutions to solve disaster mitigation problems by taking into account public safety, social and environmental factors

Course Learning Outcomes (CLO)

- CPMK-1: CPMK1 - Able to know basic rock parameters and soil characteristics (CPL4)
- CPMK-2: CPMK2 - Able to understand the physical properties of rocks (CPL6)
- CPMK-3: CPMK3 - Able to explain the principles of soil mechanics (CPL11)
- CPMK-4: CPMK4 - Able to explain soil and water conservation (CPL13)

Sub-CLO

- Sub CPMK-1: Students know the composition of materials, methods and evaluation of learning as well as the scope of soil and rock physics (CPMK-1)
- Sub CPMK-2: Students are able to explain what is related to porosity, permeability, inter-pore space,

density, and the elements that make up rocks. (CPMK-1)

Sub CPMK-3: Students are able to explain the thermal and elastic properties of rocks and their relationship to minerals and pore and fluid content within them (CPMK-2)

Sub CPMK-4: Students are able to explain the attenuation properties of seismic waves in rocks, minerals and the pore content of rocks (CPMK-2)

Sub CPMK-5: Students are able to explain the magnetic and electrical properties of rocks and minerals as well as the contents in rock pores (CPMK-3)

Sub CPMK-6: Students are able to explain the physical properties, morphology, composition, structure and classification of soil (CPMK-1)

Sub CPMK-7: Students are able to explain seepage and groundwater flow networks and the types of aquifers (CPMK-3)

Sub CPMK-8: Students are able to explain normal pressure, shear stress, effective stress, and shear stress (CPMK-3)

Sub CPMK-9: Students are able to explain the principles of consolidation and soil bearing capacity as well as slope stability and safety factors (CPMK-4)

Sub CPMK-10: Students are able to explain the meaning, types and processes of soil and water conservation and water use efficiency (CPMK-4)

Learning Analytics

Soil and Rock Physics (P1)



Students are able to explain the meaning, types and processes of soil and water conservation and water use efficiency (CPMK-4)



Students are able to explain the principles of consolidation and soil bearing capacity as well as slope stability and safety factors (CPMK-4)



Students are able to explain normal pressure, shear stress, effective stress, and shear stress (CPMK-3)



Students are able to explain seepage and groundwater flow networks and the types of aquifers (CPMK-3)



Students are able to explain the physical properties, morphology, composition, structure and classification of soil (CPMK-1)



Students are able to explain the magnetic and electrical properties of rocks and minerals as well as the contents in rock pores (CPMK-3)



Students are able to explain the attenuation properties of seismic waves in rocks, minerals and the pore content of rocks (CPMK-2)



Students are able to explain the thermal and elastic properties of rocks and their relationship to minerals and pore and fluid content within them (CPMK-2)



Students are able to explain what is related to porosity, permeability, inter-pore space, density, and the elements that make up rocks. (CPMK-1)



Students know the composition of materials, methods and evaluation of learning as well as the scope of soil and rock physics (CPMK-1)



HASANUDDIN UNIVERSITY

FAKULTY OF MATHEMATICS AND NATURAL SCIENCES

STUDY PROGRAM OF GEOPHYSICS - S1

SEMESTER LEARNING PLAN

Course		Code	Course Group	Credits	SEMESTER	Compilation Date
Soil and Rock Physics (P1)		23H06121902		2	4	1 Juli 2025
AUTHORITY		SLP Developer Lecturer	Coordinator		Head of Study Program	
		Drs. Erfan, M.Si., Dra. Maria, M.Si., Syamsuddin, S.Si.,MT.	Syamsuddin, S.Si.,MT.		Dr. Muhammad Alimuddin, Eng.	
Learning Outcomes Course	SLOs that are imposed on the course					
	SLO-4:	Menguasai konsep teoritis Geofisika darat, laut dan atmosfer, prinsip-prinsip eksplorasi, dan perancangan eksplorasi yang diperlukan untuk identifikasi dan pemetaan SDA serta mitigasi bencana alam;				
	SLO-6:	Menguasai prinsip dan metode geofisika eksplorasi dalam analisis dan interpretasi data pengukuran Geofisika;				
	SLO-11:	Mampu menerapkan prinsip-prinsip matematika dan sains kebumian, serta prinsip Eksplorasi dan Mitigasi untuk menyelesaikan masalah eksplorasi SDA dan mitigasi bencana (Exploration natural resource and natural disaster mitigation)				
	SLO-13:	Mampu merumuskan alternatif solusi untuk menyelesaikan masalah mitigasi bencana dengan memperhatikan faktor-faktor keselamatan publik, sosial dan lingkungan				
	SLO ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-4	CLO-1: CPMK1 - Able to know basic rock parameters and soil characteristics				
	SLO-6	CLO-2: CPMK2 - Able to understand the physical properties of rocks				
	SLO-11	CLO-3: CPMK3 - Able to explain the principles of soil mechanics				
	SLO-13	CLO-4: CPMK4 - Able to explain soil and water conservation				
	CLO ⇒ Sub-CLO					
	CLO-1	Sub-CLO-1:Students know the composition of materials, methods and evaluation of learning as well as the scope of soil and rock physics				
		Sub-CLO-2:Students are able to explain what is related to porosity, permeability, inter-pore space, density, and the elements that make up rocks.				
		Sub-CLO-6:Students are able to explain the physical properties, morphology, composition, structure and classification of soil				
	CLO-2	Sub-CLO-3:Students are able to explain the thermal and elastic properties of rocks and their relationship to minerals and pore and fluid content within them				

		Sub-CLO-4:Students are able to explain the attenuation properties of seismic waves in rocks, minerals and the pore content of rocks							
	CLO-3	Sub-CLO-5:Students are able to explain the magnetic and electrical properties of rocks and minerals as well as the contents in rock pores							
		Sub-CLO-7:Students are able to explain seepage and groundwater flow networks and the types of aquifers							
		Sub-CLO-8:Students are able to explain normal pressure, shear stress, effective stress, and shear stress							
	CLO-4	Sub-CLO-9:Students are able to explain the principles of consolidation and soil bearing capacity as well as slope stability and safety factors							
		Sub-CLO-10:Students are able to explain the meaning, types and processes of soil and water conservation and water use efficiency							
Correlation between SLOs/CLOs to Sub-CLOs									
SLOs that are charged on the Course	CPMK	SUB CPMK	Form of Assessment*				Weight	Value	Student Score
			Formative	Sumative					
				Task	Project/Case Study	Summative Test			
SLO-4	CLO-1	SUB-CLO-1	participation	3	0	0	3		
SLO-4	CLO-1	SUB-CLO-2	participation	8	0	0	8		
SLO-6	CLO-2	SUB-CLO-3	participation	0	12	0	12		
SLO-6	CLO-2	SUB-CLO-4	participation	0	8	0	8		
SLO-11	CLO-3	SUB-CLO-5	participation	0	14	5	19		
SLO-4	CLO-1	SUB-CLO-6	participation	0	12	0	12		
SLO-11	CLO-3	SUB-CLO-7	participation	0	7	0	7		
SLO-11	CLO-3	SUB-CLO-8	participation	0	7	0	7		
SLO-13	CLO-4	SUB-CLO-9	participation	0	7	0	7		
SLO-13	CLO-4	SUB-CLO-10	participation	0	12	5	17		
				11	79	10	100		
Course Description	Soil and Rock Physics is an elective course that supports the development of solid geophysics and exploration. This coursecovers the porosity and density of rocks, several physical properties of rocks, soil characteristics and classification, several processes in soil mechanics, and soil and water conservation.								

Learning Materials/Subjects		1. Rock porosity and density 2. Physical properties of rocks (thermal, elastic properties, seismic wave attenuation, magnetism and electricity) 3. Seepage and groundwater flow network 4. Effective stress and shear strength 5. Soil consolidation and bearing capacity and slope stability 6. Soil and water conservation					
Reference		Main References					
		Gagal diterjemahkan					
		Additional References					
		7. Rochmad, M.N., 2014, Rock Physics: Physical Properties of Rocks, ITS, Surabaya. 8. Fitrianto, T., 2011, Rock Physics Modeling in Reservoir Characterization Using Elastic Impedance to Map Distribution of Reservoirs and Oil in the Gumai Formation in the Jura Field, UI, Jakarta 9. Hardjowigeno, S., 2010, "Soil Science", Academic Pressindo, Jakarta. 10. Hutagalung, A.S., 2007, "Release, Settlement, and Agreement in Land Consolidation for Flat Construction Viewed from Civil Law", BPN, Jakarta 11. Mega, I M., et al, 2010, "Soil Classification and Land Suitability", Teaching Materials, Udayana University, Denpasar 12. Puja, I N., 2008, "Soil Physics Practical Guide", Soil Department, Udayana University, Denpasar					
Teaching Team		Drs. Erfan, M.Si., Syamsuddin, S.Si.,MT.					
Course requirement							
Week	Sub CPMK (End-of-stage learning ability)	Penilaian (Assesment)		Learning Forms and Methods [time estimate]		Content	Weight of Assessment (%)
		Indicator	Techniques & Criteria	Offline	Online		
1	2	3	4	5	6	7	8

1	Students know the composition of materials, methods and evaluation of learning as well as the scope of soil and rock physics (CPMK-1)	Formative: Precision in explaining the definition hydrometeorology, and types of cycles hydrology Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Task (3) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Learning Materials IContract Information And Strategy Learning Understanding and scope Libraries: 1 – 6	3
2	Students are able to explain what is related to porosity, permeability, inter-pore space, density, and the elements that make up rocks. (CPMK-1)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions Collecting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Task (8) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Pore space of rock, Density of rock References: 1 + 7	8
3-4	Students are able to explain the thermal and elastic properties of rocks and their relationship to minerals and pore and fluid content within them (CPMK-2)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Submitting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (12) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [2 x 2 x 50"]		Elastic properties of rocks, Thermal properties of rocks Reference: 1 + 7	12

5	Students are able to explain the attenuation properties of seismic waves in rocks, minerals and the pore content of rocks (CPMK-2)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Submitting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (8) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Attenuation properties of seismic waves in rocks Reference: 1 + 7	8
6-8	Students are able to explain the magnetic and electrical properties of rocks and minerals as well as the contents in rock pores (CPMK-3)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Collecting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (14) dinilai dengan rubrik 1 Summative Test (5) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [3 x 2 x 50"]		Magnetic properties of rocks, Electrical properties of rocks Reference: 1 + 7	19

9-10	Students are able to explain the physical properties, morphology, composition, structure and classification of soil (CPMK-1)	Formative: Activity and attitude in the learning process Participation in presentations and/or discussions Collecting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 2 Sumative Criteria: Project/Case Study (12) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [2 x 2 x 50"]		Basic characteristics or physical properties of soil, composition, structure and classification of soil References: 2, 3, 4, & 6	12
11	Students are able to explain seepage and groundwater flow networks and the types of aquifers (CPMK-3)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Submitting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (7) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Seepage and groundwater flow networks References: 2, 3, 4, & 6	7
12	Students are able to explain normal pressure, shear stress, effective stress, and shear stress (CPMK-3)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Submitting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (7) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Normal stress, shear stress, and shear strength	7

13	Students are able to explain the principles of consolidation and soil bearing capacity as well as slope stability and safety factors (CPMK-4)	Formative: Activity and attitude in the learning process, Participation in presentations and/or discussions, Submitting papers Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (7) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [1 x 2 x 50"]		Consolidation, bearing capacity and slope stability	7
14-16	Students are able to explain the meaning, types and processes of soil and water conservation and water use efficiency (CPMK-4)	Formative: Activity and attitude in progress learning, Opt in presentation and/or discussion, Collect paper Sumative: -	Formative Criteria: participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (12) dinilai dengan rubrik 1 Summative Test (5) dinilai dengan rubrik 1 Assessment Technique: Non Test	Studying: Cooperative learning (Cooperative learning) [2 x 2 x 50"]		Conservation soil, Water conservation Library: 5	17
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4
CPL-4 (P1)	Task (Weight 3%) Task (Weight 8%) Project/Case Study (Weight 12%)			
CPL-6 (P3)		Project/Case Study (Weight 12%) Project/Case Study (Weight 8%)		
CPL-11 (KK1)			Project/Case Study (Weight 14%) Summative Test (Weight 5%) Project/Case Study (Weight 7%) Project/Case Study (Weight 7%)	
CPL-13 (KK3)				Project/Case Study (Weight 7%) Project/Case Study (Weight 12%) Summative Test (Weight 5%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Task	11
Project/Case Study	79
Summative Test	10
Total	100

Assessment and Evaluation of Student Achievement of CLOs

SLOs that are charged on the Course	CLO	SUB CLO	Form of Assessment*				Weight	Value	Student Score
			Formative	Sumative					
				Task	Project/Case Study	Summative Test			
SLO-4	CLO-1	SUB-CLO-1	participation	3	0	0	3		
SLO-4	CLO-1	SUB-CLO-2	participation	8	0	0	8		
SLO-6	CLO-2	SUB-CLO-3	participation	0	12	0	12		
SLO-6	CLO-2	SUB-CLO-4	participation	0	8	0	8		
SLO-11	CLO-3	SUB-CLO-5	participation	0	14	5	19		
SLO-4	CLO-1	SUB-CLO-6	participation	0	12	0	12		
SLO-11	CLO-3	SUB-CLO-7	participation	0	7	0	7		
SLO-11	CLO-3	SUB-CLO-8	participation	0	7	0	7		
SLO-13	CLO-4	SUB-CLO-9	participation	0	7	0	7		
SLO-13	CLO-4	SUB-CLO-10	participation	0	12	5	17		
				11	79	10	100		

Lampiran Rubrik 1 | Rubrik Holistik

Tabel 6. 1 Rubrik Holistik		
Grade Capaian	Skor	Uraian
Sangat Baik	≥ 85	Memperlihatkan pemahaman yang lengkap tentang permasalahan. Semua metode dan persyaratan tentang tugas terdapat dalam jawaban
Baik	71 - 84	Memperlihatkan cukup pemahaman tentang permasalahan. Semua persyaratan tentang tugas terdapat dalam jawaban
Cukup Baik	61 - 70	Memperlihatkan hanya sebagian pemahaman tentang permasalahan. Kebanyakan persyaratan tentang tugas terdapat dalam jawaban
Kurang	51 - 60	Memperlihatkan sedikit pemahaman tentang permasalahan. Banyak persyaratan tugas yang tidak ada
Sangat kurang	< 51	Memperlihatkan tidak ada pemahaman tentang permasalahan