#### **SEMESTER COURSE PLAN**

## STRUCTURAL GEOLOGY (P1) COURSES (23H06131103)



#### **TEACHING TEAM**

Prof. Dr. Ir. Muh. Altin Massinai, MT., Surv. 196406161989031006

Muhammad Fawzy Ismullah Massinai, S.Si, M.T 199111092019031010

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**

#### Misson

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-8 (KU1) Able to apply logical, critical, systematic and innovative thinking in developing or applying geophysical science by considering human values, and able to analyze and communicate case studies and research results using geophysical tools through scientific reports, international presentations and article publications, as well as uploading them on the university website.
- CPL-9 (KU2) Able to demonstrate independent, quality and measurable performance in maintaining professional collaboration with supervisors and colleagues at national and international levels, as well as completing tasks responsibly using relevant modern geophysical tools
- CPL-14 (KK4) Able to investigate potential natural resources and utilize appropriate information and computing technology-based instruments to carry out natural resource exploration and natural disaster mitigation activities

#### **Course Learning Outcomes (CLO)**

- CPMK-1: Students are able to analyze the bending of the earth that causes it and what the consequences are regarding the shape and framework of rocks and the symptoms that cause it. (CPL4 dan CPL8)
- CPMK-2: Students are able to use basic geological principles to communicate with the wider community in conveying geological phenomena related to geological structures (CPL9 dan CPL14)

#### Sub-CLO

Sub CPMK-1: Students are able to analyze the scope of structural geology (CPMK-1)

Sub CPMK-2: Students are able to identify rock structures (CPMK-1)

Sub CPMK-3: Students are able to analyze the elements of geological structure (CPMK-1)

Sub CPMK-4: Students are able to analyze force and its relationship with material properties (CPMK-1)

Sub CPMK-5: Students are able to analyze kinematics (CPMK-1)

Sub CPMK-6: Students are able to analyze dynamics (CPMK-1)

Sub CPMK-7: Students are able to analyze the relationship between stress and strain (CPMK-2)

Sub CPMK-8: Students are able to analyze fractures and joints (CPMK-2)

Sub CPMK-9: Students are able to analyze the concept of cesarean (CPMK-2)

Sub CPMK-10: Students are able to classify cesareans (CPMK-2)

Sub CPMK-11: Students are able to identify the mechanisms that form fractures and faults (CPMK-2)

Sub CPMK-12: Students are able to analyze the concept of folds (CPMK-2)

Sub CPMK-13: Students are able to identify geological structures in the field (CPMK-2)

Sub CPMK-14: Students are able to arrange and identify geological cross-sections. (CPMK-2)

### **Learning Analytics**

Structural Geology (P1)
<b>^</b>
Students are able to arrange and identify geological cross-sections. (CPMK-2)
<b>^</b>
Students are able to identify geological structures in the field (CPMK-2)
<b>^</b>
Students are able to analyze the concept of folds (CPMK-2)
<b>^</b>
Students are able to identify the mechanisms that form fractures and faults (CPMK-2)
<b>^</b>
Students are able to classify cesareans (CPMK-2)
<b>^</b>
Students are able to analyze the concept of cesarean (CPMK-2)
<b>^</b>
Students are able to analyze fractures and joints (CPMK-2)
<b>^</b>
Students are able to analyze the relationship between stress and strain (CPMK-2)
<b>^</b>
Students are able to analyze dynamics (CPMK-1)
<b>^</b>
Students are able to analyze kinematics (CPMK-1)
<b>^</b>
Students are able to analyze force and its relationship with material properties (CPMK-1)
<b>^</b>
Students are able to analyze the elements of geological structure (CPMK-1)
<b>^</b>
Students are able to identify rock structures (CPMK-1)
<b>^</b>
Students are able to analyze the scope of structural geology (CPMK-1)



# HASANUDDIN UNIVERSITY FAKULTY OF MATHEMATICS AND NATURAL SCIENCES STUDY PROGRAM OF GEOPHYSICS - S1 SEMESTER LEARNING PLAN

Course		Cod	de		Cource Group	Credits	SEMESTER	Compilation Da
Structural Geol	ogy (P1)	23H061	131103			3	5	16 Juni 2023
		SLP Deve	eloper Lec	cturer	Coordinator		Head	of Study Program
AUTHORITY		Prof. Dr. Ir. Muh. Altir Muhammad Fawzy Is M.T			Prof. Dr. Ir. Muh. Altin Massinai,	MT., Surv.	Dr. Muhar	mmad Alimuddin, Eng.
SLOs that are	imposed on	the course						
SLO-4:		sai konsep teoritis Geo an SDA serta mitigasi b			fer, prinsip-prinsip eksplorasi, dan p	erancangan	eksplorasi yang dipe	rlukan untuk identifika
SLO-8:	nilai-nila	i kemanusiaan, serta m	nampu me	enganalisis dan m	i inovatif dalam mengembangkan at engkomunikasikan studi kasus dan tel, serta mengunggahnya pada lan	hasil peneliti	an menggunakan pe	engan mempertimbang erangkat geofisika mel
SLO-9:					n terukur dalam menjaga kolaboras s secara bertanggung jawab dengal			
SLO-14:		menyelidiki potensial sı an aktivitas eksplorasi			anfaatkan instrumen yang berbasis Alam	teknologi info	rmasi dan komputas	si yang sesuai untuk
SLO ⇒ Cours	e Learning Oເ	utcomes						
After completi	ng this course,	it is expected:						
SLO-4		Students are able to ar symptoms that cause it		bending of the ea	rth that causes it and what the cons	sequences ar	e regarding the shap	oe and framework of ro
SLO-8		Students are able to ar symptoms that cause it		bending of the ea	rth that causes it and what the cons	sequences ar	e regarding the shap	oe and framework of ro
SLO-9		<b>CLO-2:</b> Students are able to use basic geological principles to communicate with the wider community in conveying geological phenomena related to geological structures						
SLO-14		Students are able to us al structures	se basic g	eological principle	s to communicate with the wider co	mmunity in co	onveying geological	phenomena related to
CLO ⇒ Sub-C	10							

	Sub-CLO-1:Students are able to analyze the scope of structural geology
	Sub-CLO-2:Students are able to identify rock structures
	Sub-CLO-3:Students are able to analyze the elements of geological structure
CLO-1	Sub-CLO-4:Students are able to analyze force and its relationship with material properties
	Sub-CLO-5:Students are able to analyze kinematics
	Sub-CLO-6:Students are able to analyze dynamics
	Sub-CLO-7:Students are able to analyze the relationship between stress and strain
	Sub-CLO-8:Students are able to analyze fractures and joints
	Sub-CLO-9:Students are able to analyze the concept of cesarean
CLO-2	Sub-CLO-10:Students are able to classify cesareans
CLU-2	Sub-CLO-11:Students are able to identify the mechanisms that form fractures and faults
	Sub-CLO-12:Students are able to analyze the concept of folds
	Sub-CLO-13:Students are able to identify geological structures in the field
	Sub-CLO-14:Students are able to arrange and identify geological cross-sections.

#### Correlation between SLOs/CLOs to Sub-CLOs

Course

SLOs that are				Form of Assessment <sup>*</sup>				Student Score
charged on the Course	CPMK SUB CPMK		Formative	Sumative			Value	
on the Course			Formative	Project/Case Study	Practicum			
SLO-8	CLO-1	SUB-CLO-1	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-2	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-3	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-4	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-5	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-6	Participation	5	0	5		
SLO-14	CLO-2	SUB-CLO-7	Participation	5	0	5		
SLO-14	CLO-2	SUB-CLO-8	Participation	5	0	5		

SLOs that are				Form of Assessment*						
charged	СРМК	SUB CPMK	Formative	Sumative		Weight	Value	Student Score		
on the Course			Formative	Project/Case Study	Practicum					
SLO-14	SLO-14 CLO-2 SUB-CLO-9 Participation		Participation	10	0	10				
SLO-14	CLO-2	SUB-CLO-10	Participation	10	0	10				
SLO-14	CLO-2	SUB-CLO-11	Participation	10	0	10				
SLO-14	CLO-2	SUB-CLO-12	Participation	10	0	10				
SLO-14	CLO-2	SUB-CLO-13	Participation	0	15	15				
SLO-14	CLO-2	SUB-CLO-14	Participation	5	0	5				
	1 1		-	85	15	100				
Learning Materials/Subjects	Deformation     Diagram Mohr     Geological stru     Kink Method, (	ucture: joints, faults, a Cross-sectional restor								
Reference	<ol> <li>Billing, M.P., 1986, Structural Geology, Third edition, Prentice-Hall of India.</li> <li>Davis, J.H., 1984, Structural Geology of Rock and Region, John Wiley &amp; Sons Inc, United States.</li> <li>Ragan, D. M., 1973, Structural Geology: An Introduction to Geometrical Techniques, 2nd Edition, John Wiley &amp; Sons Inc, New York- London- Sidney – Toronto.</li> <li>Asikin Sukendar, 1979, Basics of Structural Geology, Department of Geological Engineering, Bandung Engineering Institute.</li> <li>Hobbs, B.E., Means, W.D., and Williams, P.E., 1976, An Outline of Structural Geology, by John Wiley &amp; Sons, Inc., Printed in Singapore.</li> </ol>									
	Additional Refere	ences								
	<ol> <li>Massinai, Muhammad Altin, 2005, Tectonic Geomorphology, Jogyakarta Science Library.</li> <li>Relevant published international journals of repute Last 5 years.</li> </ol>									
Teaching Team			Prof. Dr. Ir. Muh. Altin I	Massinai, MT., Surv., Muhammad F	awzy Ismullah Mass	sinai, S.Si, M.T				
Course requirement										

Week	Sub CPMK (End-of-stage learning	Penilaian ( <i>Assesment</i> )		Learning Forms and Methods [time estimate]		Content	Weight of Assessment
	ability)	Indicator	Techniques & Criteria	Offline	Online		(%)
1	2	3	4	5	6	7	8
1	Students are able to analyze the scope of structural geology (CPMK-1)	Formative: Accuracy of application of structural geology scope concepts.  Sumative:	Formative Criteria:  Participation dinilai dengan rubrik 1  Sumative Criteria:  Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique:  Non Test	Studying: Case Study (Case Study)  1 x 2 x 50'	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  1 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer practice questions	Material: scope of structural geology, understanding, application and utilization of structural geology in life, interrelationships or connections between structural geology with other knowledge  Libraries: 1 – 5	5

2	Students are able to identify rock structures (CPMK-1)	Formative:  Precision in connecting rock structural	Formative Criteria:  Participation dinilai dengan rubrik 1	Studying: Case Study (Case Study)	Studying: Self-Directed Learning	Material: Shapes of rock structures, Geometric structures	5
		elements.	dengan rublik i	Siddy)	Reading modules/ PPT		
			Sumative Criteria:	1 x 2 x 50`	Watching Video	Libraries: 1 – 5	
		Sumative:	Project/Case Study (5) dinilai dengan rubrik 1		1 x 2 x 60`		
		-	Assessment Technique:		Studying: Case Study (Case Study)		
			Non Test		Create a resume and answer practice questions		
					1 x 2 x 60`		
3	Students are able to analyze the elements of geological	Formative:	Formative Criteria:	Studying:	Studying:	Material: Primary Structure, Secondary	5
	structure (CPMK-1)	Activity and accuracy in connecting elements of	Participation dinilai dengan rubrik 1	Case Study (Case Study)	Self-Directed Learning	Structure Secondary	
		geological structure.	dengan rubnik r	Study)	Reading modules/ PPT		
			Sumative Criteria:	1 x 2 x 50`	Watching Video	Libraries: 1 – 5	
		Sumative:	Project/Case Study (5) dinilai dengan rubrik 1		1 x 2 x 60`		
			Assessment Technique:		Studying:		
			Non Test		Case Study (Case Study)		
					Create a resume and answer practice questions		
					1 x 2 x 60`		

4	Students are able to analyze force and its relationship with material properties (CPMK-1)	Formative: Activity and accuracy in determining material (rock) properties  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  1 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer practice questions	Material: Style, firmness and straightness of materials, rock properties, definition of axes emphasis.  Libraries: 1 – 5	5
5-6	Students are able to analyze kinematics (CPMK-1)	Formative:  Activity and accuracy in analyzing kinematics using Mohr's equations and diagram analysis.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study) 2 x 2 x 50`	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  2 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer practice questions	Material: Translation, Rotation, Strain, Linear Strain, Shear Strain, Finite Ellipse Strain. Fundamental Strain Equations, Mohr Strain Diagrams, Strain Tensors, Strain in Rocks.  Libraries: 1 – 5	5

7	Students are able to analyze dynamics (CPMK-1)	Formative: Activity and accuracy in stress analysis and Mohr Diagrams  Sumative:	Formative Criteria:  Participation dinilai dengan rubrik 1  Sumative Criteria:  Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique:  Non Test	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  1 x 2 x 60' Studying: Case Study (Case Study)	Material: Stress, Stress Tensor, Diagram Mohr. Libraries: 1 – 5	5
			Non Test		Create a resume and answer practice questions  1 x 2 x 60`		
8	Students are able to analyze the relationship between stress and strain (CPMK-2)	Formative: Activity and accuracy in analyzing stress and strain relationships.  Sumative:	Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  1 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer practice questions	Material: Rock deformation, Rock strength, Rock ductility, elasticity rocks.	5

9	Students are able to analyze fractures and joints (CPMK-2)	Formative: Activity and accuracy in analyzing fractures and joints.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1  Assessment Technique:	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Reading modules/ PPT Watching Video  1 x 2 x 60' Studying: Case Study (Case Study)	Material: Fracture, Joint, Tensile joint, Joint scour.  Libraries: 1 – 5	5
			Non Test		Create a resume and answer practice questions  1 x 2 x 60`		
10	Students are able to analyze the concept of cesarean (CPMK-2)	Formative: Activity and precision in determining fault geometry and determining mylonites.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (10) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50'	Studying: Self-Directed Learning Discuss the contents of the module/PPT in the virtual meeting platform  1 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer Practice questions	Material: Fault geometry, Apparent displacement, True displacement (slip), Elements in fault structures, Fault rocks, Mylonites, Faulting process, sense of slip. style="line- height:1.2;margin- top:0pt;margin- bottom:0pt;">Libraries: 1 – 7	10

11	Students are able to classify cesareans (CPMK-2)	Formative: Activity and accuracy in fault classification.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (10) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Discuss the contents of the module/PPT in the virtual meeting platform  1 x 2 x 60` Studying: Case Study (Case Study) Create a resume and answer Practice questions	Material: Normal Fault, Thrust, Horizontal, oblique.  Libraries: 1 – 7	10
					1 x 2 x 60°		
12	Students are able to identify the mechanisms that form fractures and faults (CPMK-2)	Formative: Activity and accuracy in understanding the mechanisms of fracture and fault formation.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (10) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Discuss the contents of the module/PPT in the virtual meeting platform  1 x 2 x 60` Studying: Case Study (Case Study) Create a resume and answer Practice questions	Material: Crack formation mechanism and cesarean.  Libraries: 1 – 7	10

13	Students are able to analyze the concept of folds (CPMK-2)	Formative: Activity and accuracy in fold classification identification.  Sumative:	Formative Criteria: Participation dinilai dengan rubrik 1  Sumative Criteria: Project/Case Study (10) dinilai dengan rubrik 1  Assessment Technique: Non Test	Studying: Case Study (Case Study)  1 x 2 x 50`	Studying: Self-Directed Learning Discuss the contents of the module/PPT in the virtual meeting platform  1 x 2 x 60' Studying: Case Study (Case Study) Create a resume and answer Practice questions	Material: Fold geometry, Fold classification.  Libraries: 1 – 7	10
14-15	geological structures in the	Formative: Activity and accuracy in	Formative Criteria: Participation dinilai	Practicum, Studio Practice, Workshop Practice, Field	1 x 2 x 60`  Studying: Self-Directed Learning	Material: Use of geological compass, measurement of geological	15
	field (CPMK-2)	using tools and measuring geological structural elements.	dengan rubrik 1  Sumative Criteria:	Practice, Field Practice:  Case Study (Case Study)	Reading modules/ PPT     Watching Video	structural element data, and diagrams rosette.	
		Sumative:	Practicum (15) dinilai dengan rubrik 1 Assessment Technique:	[15 x 1 x 50`] + [1 x 3 x 50`]	[15 x 1 x 50`] + [1 x 3 x 50']  Studying:	Libraries: 1 – 7	
			Non Test		Self-Directed Learning     Perform according to the module/PPT/video instructions according to the given project		
					[15 x 1 x 50`] + [1 x 3 x 50`]		

and identify geological cross- sections. (CPMK-2)  Activ cons ident cross	ivity and accuracy in astructing and actifying geological ass-sections.  Sumative Criteria:  Participation dinilal dengan rubrik 1  Sumative Criteria:  Project/Case Study (5) dinilal dengan rubrik 1  Assessment Technique:  Non Test	Studying:  Case Study (Case Study)  Reading modu  Watching Vide  1 x 2 x 50'  1 x 2 x 60'  Studying:  Case Study (Ca  Create a resun answer practice questions  1 x 2 x 60'	les/ PPT  Libraries: 1 – 7  se Study)  ne and	5
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#### Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2
CPL-4 (P1)	Project/Case Study (Weight 5%)	
CPL-8 (KU1)	Project/Case Study (Weight 5%)	
CPL-9 (KU2)		Project/Case Study (Weight 5%) Project/Case Study (Weight 10%) Project/Case Study (Weight 5%)

SLO / CLO	CLO-1	CLO-2
CPL-14 (KK4)		Project/Case Study (Weight 5%) Project/Case Study (Weight 10%) Project/Case Study (Weight 5%)

#### **Evaluation Type and Assessment Weight**

Туре	Assessment Weight
Project/Case Study	85
Practicum	15
Total	100

#### Assessment and Evaluation of Student Achievement of CLOs

SLOs that are		SUB CLO	Form of Assessment <sup>*</sup>			Weight	Value	Student Score
charged on the Course	CLO		Sumative Sumative					
on the Course			Formative	Project/Case Study	Practicum			
SLO-8	CLO-1	SUB-CLO-1	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-2	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-3	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-4	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-5	Participation	5	0	5		
SLO-8	CLO-1	SUB-CLO-6	Participation	5	0	5		
SLO-14	CLO-2	SUB-CLO-7	Participation	5	0	5		
SLO-14	CLO-2	SUB-CLO-8	Participation	5	0	5		
SLO-14	CLO-2	SUB-CLO-9	Participation	10	0	10		
SLO-14	CLO-2	SUB-CLO-10	Participation	10	0	10		
SLO-14	CLO-2	SUB-CLO-11	Participation	10	0	10		
SLO-14	CLO-2	SUB-CLO-12	Participation	10	0	10		
SLO-14	CLO-2	SUB-CLO-13	Participation	0	15	15		
SLO-14	CLO-2	SUB-CLO-14	Participation	5	0	5		
	<u> </u>		•	85	15	100		

#### Lampiran Rubrik 1 | Rubrik Holistik

Tabel 6. 1 Rubrik Holistik					
Grade Capaian Skor		Uraian			
		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			