

SEMESTER COURSE PLAN

**GEOPHYSICAL FLUID DYNAMICS COURSES
(23H06120703)**



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-5 (P2) - Mastering Geophysical concepts and principles in applying applied mathematics in the field of Geophysics

CPL-10 (KU3) - Able to make the right decisions in solving problems, verifying information, and analyzing data in the field of applied geophysics—especially in land use studies and environmental studies—by using modern geophysical analysis and computing tools based on the results of information and data analysis, to carry out the process of evaluating, documenting, and rediscovering data to ensure validity and prevent plagiarism

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)

Course Learning Outcomes (CLO)

CPMK-1: Students are able to analyze fluid flow and its characteristics (CPL5)

CPMK-2: Students are able to solve fluid dynamics equations (CPL10)

CPMK-3: Students are able to complete dynamic fluid modeling using a CFD approach (CPL11)

Sub-CLO

Sub CPMK-1: Apply basic concepts and properties of fluids (CPMK-1)

Sub CPMK-2: Completes the pressure distribution in a stationary fluid (CPMK-2)

Sub CPMK-3: Analyzing fluid motion without paying attention to the cause (CPMK-3)

Sub CPMK-4: Applying fluid motion that takes into account the cause (CPMK-3)

Learning Analytics

Geophysical Fluid Dynamics



Applying fluid motion that takes into account the cause (CPMK-3)



Analyzing fluid motion without paying attention to the cause (CPMK-3)



Completes the pressure distribution in a stationary fluid (CPMK-2)



Apply basic concepts and properties of fluids (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
Geophysical Fluid Dynamics		23H06120703		3	3	1 Juli 2025
AUTHORITY		SLP Developer Lecturer	Coordinator		Head of Study Program	
		Dr. Sakka, M.Si., Prof. Dr. Eng. Amiruddin, S.Si, M.Si., Drs. Erfan, M.Si.	Dr. Sakka, M.Si.		Dr. Muhammad Alimuddin, Eng.	
Learning Outcomes Course	SLOs that are imposed on the course					
	SLO-5:	Menguasai konsep Geofisika dan prinsip dalam mengaplikasikan matematika terapan dalam bidang Geofisika				
	SLO-10:	Mampu mengambil keputusan yang tepat dalam memecahkan masalah, memverifikasi informasi, dan menganalisis data pada bidang geofisika terapan—khususnya dalam kajian tata guna lahan dan studi lingkungan—dengan menggunakan perangkat analisis dan komputasi geofisika modern berdasarkan hasil analisis informasi dan data, untuk melaksanakan proses evaluasi, pendokumentasian, serta penemuan kembali data guna menjamin validitas dan mencegah plagiasi				
	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 ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-5	CLO-1: Students are able to analyze fluid flow and its characteristics				
	SLO-10	CLO-2: Students are able to solve fluid dynamics equations				
	SLO-11	CLO-3: Students are able to complete dynamic fluid modeling using a CFD approach				
	CLO ⇒ Sub-CLO					
	CLO-1	Sub-CLO-1:Apply basic concepts and properties of fluids				
	CLO-2	Sub-CLO-2:Completes the pressure distribution in a stationary fluid				
	CLO-3	Sub-CLO-3:Analyzing fluid motion without paying attention to the cause				
		Sub-CLO-4:Applying fluid motion that takes into account the cause				
	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			
				Project/Case Study			
SLO-5	CLO-1	SUB-CLO-1	Technique: Participation Assessment Criteria: Rubric System	30	30		
SLO-10	CLO-2	SUB-CLO-2	Technique: Participation Assessment Criteria: Rubric System	20	20		
SLO-11	CLO-3	SUB-CLO-3	Technique: Participation Assessment Criteria: Rubric System	15	15		
SLO-11	CLO-3	SUB-CLO-4	Technique: Participation Assessment Criteria: Rubric System	35	35		
				100	100		
Course Description	Geophysical Fluid Dynamics as a course that studies the dynamic properties of fluids in the earth, including the properties of flow and transport of mass and energy. This science studies various aspects of geophysical fluid dynamics, including the nature of magma flow beneath the earth's surface, the nature of groundwater and surface water flow, and the nature of wind flow in the earth's atmosphere. This course is a supporting course which is expected to be an introduction for students who will apply CFD in geophysical modeling dynamic.						
Learning Materials/Subjects	1. Various types of Density and Density, and Viscosity. 2. Compressibility and Elasticity, and Surface Tension. 3. Fluid Statics: Hydrostatic, Hypometric Equations, Air Column Stability, and Hydrostatic Pressure on a Plane Plane. 4. Stability of Objects, Archimedes' Principle, and Specific Gravity. 5. Fluid Kinematics: Several Definitions Describing Fluid Motion, Total Derivatives (Derived Materials), Conservation of Mass, and Movement by Rotation. 6. Vortex Field, Velocity Potential, Flow Function, and Deformation. 7. Fluid Dynamics: Flow Without the Effect of Friction, Euler's Equations, and Application of Euler's Equations to Fluids in Moving Solid Objects. 8. Bernoulli's Equation, Application of Bernoulli's Equation to Pitot Tube Problems, and Bernoulli's Equation for Steady, Irrotational, and Compressible Flows 9. Viscous Fluids and Viscous Fluid Motion Equations (Navier-Stokes Equations)						
Reference	Main References						
	1. von Schwind, (1980), Geophysical Fluid Dynamics for Oceanographers White, F., M., (1986), Fluid Mechanics 3. Daugherty,R.L., (1985), Fluid Mechanics with Engineering Applications, McGraw-Hill Book Company						
	Additional References						

		1. Djojodihardjo, H., (1983), Fluid Mechanics 2. Tjasyono, B., (2001), Atmospheric Science, ITB Publisher. Bandung					
Teaching Team		Dr. Sakka, M.Si., Prof. Dr. Eng. Amiruddin, S.Si, M.Si., Drs. Erfan, M.Si.					
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
1-4	Apply basic concepts and properties of fluids (CPMK-1)	Formative: Accuracy in analyzing and explaining and making conclusions Sumative: -	Formative Criteria: Technique: Participation Assessment Criteria: Rubric System Sumative Criteria: Project/Case Study (30) Assessment Technique: Non Test	Studying: Group discussion (Small Group Discussion), Case Study (Case Study) BP: Lectures and discussions None		Material 1, 2, 3, 5	30
5-8	Completes the pressure distribution in a stationary fluid (CPMK-2)	Formative: Accuracy in analyzing and explaining and making conclusions Sumative: -	Formative Criteria: Technique: Participation Assessment Criteria: Rubric System Sumative Criteria: Project/Case Study (20) Assessment Technique: Non Test	Studying: Group discussion (Small Group Discussion), Case Study (Case Study) BP: Lectures and discussions None		Material 4, 6, 7	20

9-12	Analyzing fluid motion without paying attention to the cause (CPMK-3)	Formative: Accuracy in analyzing and explaining and making conclusions Sumative: -	Formative Criteria: Technique: Participation Assessment Criteria: Rubric System Sumative Criteria: Project/Case Study (15) Assessment Technique: Non Test	Studying: Group discussion (Small Group Discussion), Case Study (Case Study) BP: Lectures and discussions None		Material 10, 11,	15
13-16	Applying fluid motion that takes into account the cause (CPMK-3)	Formative: Accuracy in analyzing and explaining and making conclusions Sumative: -	Formative Criteria: Technique: Participation Assessment Criteria: Rubric System Sumative Criteria: Project/Case Study (35) Assessment Technique: Non Test	Studying: Group discussion (Small Group Discussion), Case Study (Case Study) BP: Lectures and discussions None		Material 8, 9, 12, 13	35
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3
CPL-5 (P2)	Project/Case Study (Weight 30%)		
CPL-10 (KU3)		Project/Case Study (Weight 20%)	
CPL-11 (KK1)			Project/Case Study (Weight 15%) Project/Case Study (Weight 35%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Project/Case Study	100
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			
				Project/Case Study			
SLO-5	CLO-1	SUB-CLO-1	Technique: Participation Assessment Criteria: Rubric System	30	30		
SLO-10	CLO-2	SUB-CLO-2	Technique: Participation Assessment Criteria: Rubric System	20	20		
SLO-11	CLO-3	SUB-CLO-3	Technique: Participation Assessment Criteria: Rubric System	15	15		
SLO-11	CLO-3	SUB-CLO-4	Technique: Participation Assessment Criteria: Rubric System	35	35		
				100	100		

