SEMESTER COURSE PLAN

HYDRO-METEOROLOGY (P2) COURSES
(23H06132003)

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

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 science and technology, SBUD BMI;

2. Carrying out research to produce reliable and competitive scientific work oriented towards scientific development 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-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-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 detail meteorological variables (quantities and processes) from various hydrological cycles correctly (CPL4)

CPMK-2: Students are able to analyze precipitation and evaporation processes in a river basin area (DAS) correctly (CPL8)

CPMK-3: Students are able to analyze river basin parameters correctly (CPL11 dan CPL14)

Sub-CLO

Sub CPMK-1: Students analyze the scope of meteorology in the hydrological cycle correctly (CPMK-1)

Sub CPMK-2: Students analyze meteorological quantities and processes from the hydrological cycle images provided accurately and in accordance with international units (CPMK-1)

Sub CPMK-3: Students apply arithmetic, polygon and isohyet methods in calculating regional rainfall (CPMK-2)

Sub CPMK-4: Students predict the number of rain measurement networks (CPMK-2)

Sub CPMK-5: Students analyze methods in calculating evaporation (CPMK-2)

Sub CPMK-6: Students analyze water discharge measurements and rainfall frequency (CPMK-3)

Sub CPMK-7: Students identify climate classifications from various classification methods (CPMK-3)

Sub CPMK-8: Students analyze the concept of groundwater as part of the hydrological cycle (CPMK-3)

Learning Analytics

Hydro-Meteorology (P2)

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Students analyze the concept of groundwater as part of the hydrological cycle (CPMK-3)

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Students identify climate classifications from various classification methods (CPMK-3)

↑

Students analyze water discharge measurements and rainfall frequency (CPMK-3)

↑

Students analyze methods in calculating evaporation (CPMK-2)

↑

Students predict the number of rain measurement networks (CPMK-2)

↑

Students apply arithmetic, polygon and isohyet methods in calculating regional rainfall (CPMK-2)

↑

Students analyze meteorological quantities and processes from the hydrological cycle images provided accurately and in accordance with international units (CPMK-1)

↑

Students analyze the scope of meteorology in the hydrological cycle correctly (CPMK-1)

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

Course	Code	Cource Group	Credits	SEMESTER	Compilation Date
Hydro-Meteorology (P2)	23H06132003		3	5	1 Juli 2025

AUTHORITY	SLP Developer Lecturer	Coordinator	Head of Study Program
	Dr. Sakka, M.Si., Saaduddin. S.Pd., M.Sc	Dr. Sakka, M.Si.	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-8:	Mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam mengembangkan atau menerapkan ilmu geofisika dengan mempertimbangkan nilai-nilai kemanusiaan, serta mampu menganalisis dan mengkomunikasikan studi kasus dan hasil penelitian menggunakan perangkat geofisika melalui laporan ilmiah, presentasi internasional, dan publikasi artikel, serta mengunggahnya pada laman universitas.
	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-14:	Mampu menyelidiki potensial sumberdaya alam dan memanfaatkan instrumen yang berbasis teknologi informasi dan komputasi yang sesuai untuk melakukan aktivitas eksplorasi SDA dan Mitigasi Bencana Alam
	SLO ⇒ Course Learning Outcomes	
	After completing this course, it is expected:	
	SLO-4	**CLO-1:** Students are able to detail meteorological variables (quantities and processes) from various hydrological cycles correctly
	SLO-8	**CLO-2:** Students are able to analyze precipitation and evaporation processes in a river basin area (DAS) correctly
	SLO-11	**CLO-3:** Students are able to analyze river basin parameters correctly
	SLO-14	**CLO-3:** Students are able to analyze river basin parameters correctly
	CLO ⇒ Sub-CLO	
	CLO-1	**Sub-CLO-1:**Students analyze the scope of meteorology in the hydrological cycle correctly
		Sub-CLO-2: Students analyze meteorological quantities and processes from the hydrological cycle images provided accurately and in accordance with international units
		Sub-CLO-3: Students apply arithmetic, polygon and isohyet methods in calculating regional rainfall

	CLO-2	**Sub-CLO-4:**Students predict the number of rain measurement networks
		Sub-CLO-5: Students analyze methods in calculating evaporation
	CLO-3	**Sub-CLO-6:**Students analyze water discharge measurements and rainfall frequency
		Sub-CLO-7: Students identify climate classifications from various classification methods
		Sub-CLO-8: Students analyze the concept of groundwater as part of the hydrological cycle
	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-4	CLO-1	SUB-CLO-1	Participation	10	10		
SLO-4	CLO-1	SUB-CLO-2	Participation	10	10		
SLO-8	CLO-2	SUB-CLO-3	Participation	15	15		
SLO-8	CLO-2	SUB-CLO-4	Participation	15	15		
SLO-8	CLO-2	SUB-CLO-5	Participation	10	10		
SLO-14	CLO-3	SUB-CLO-6	Participation	15	15		
SLO-14	CLO-3	SUB-CLO-7	Participation	10	10		
SLO-14	CLO-3	SUB-CLO-8	Participation	15	15		
				100	100		

Course Description	The Hydrometeorology course discusses the role of meteorological parameters in analyzing the hydrological cycle with a load of 3 credits. The content of this course is presented for fifth semester students in the Geophysics Undergraduate study program. Those in charge of the course are lecturers from the Hydrometeorology and Coastal and Ocean Dynamics laboratories. The method used in the learning process is class lectures and efforts are made to make visits to institutions related to hydrological management in the South Sulawesi region.
Learning Materials/Subjects	1. Parameters meteorology 2. Calculation precipitation and evaporation 3. Cycle hydrology, from upstream to downstream (River Watershed) 4. Measurements water discharge 5. System climate classification

Reference	**Main References**
	1. Pukh Raj Rakhecha, 2009, Applied Hydrometeorology, Springer. 2. C. Donald Ahrens, 2009, Meteorology Today – An Introduction to Weather, Climate, and the Environment, Brooks/Cole Cengage Learning. 3. Indarto, 2016, Hydrology: Analytical Methods and Tools for Interpreting River Flow Hydrographs, Jember 4. Asdak, C,. 2002, Hydrology and Watershed Management, Yogyakarta, Gadjah Mada University Press
	Additional References
	1. Raghunath, HM, 2006, Hydrology: Design Analysis Principles, New Age International (P) Limited, Publisher 2. Todd DK, and Mays LW, 2005, Groundwater Hydrology, John Wiley & Sons, Inc. 3. Kevin Sene, 2010, Hydrometeorology – Forecasting and Applications, Springer . 4. Triatmodjo, B,. 2010, Applied Hydrology, Beta Offset Yogyakarta
Teaching Team	Dr. Sakka, M.Si., Saaduddin. S.Pd., M.Sc
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**
1-2	Students analyze the scope of meteorology in the hydrological cycle correctly (CPMK-1)	**Formative:** Accuracy in analyzing hydrometeorological definitions, scope of study, and types of cycles hydrology **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) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:** Case Study (Case Study) Create a resume and answer practice questions  1x3x60`	Material: • Contract lecture • Concept hydrogy • Definition hydrometeorology • Disaster hydrometeorology Library: 1, 2	10

3-4	Students analyze meteorological quantities and processes from the hydrological cycle images provided accurately and in accordance with international units (CPMK-1)	**Formative:** Accuracy in analyzing physical meteorological parameters with appropriate units, and meteorological processes related to cycles hydrology **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) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:**  Case Study (Case Study)  Create a resume and answer practice questions  1x3x60`	Material: • Variable meteorology • Processes meteorology • Cycle hydrology • Types hydrologic cycle Library: 1, 2	10
5-6	Students apply arithmetic, polygon and isohyet methods in calculating regional rainfall (CPMK-2)	**Formative:** Accuracy in calculating regional rainfall using arithmetic, polygon and isohyet methods in a river basin **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (15) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:**  Case Study (Case Study)  Create a resume and answer practice questions  1x3x60`	Material: • Parameters precipitation • Method Arithmetic • Method Polygon • Method Isohiet Library: 1, 3	15

7-8	Students predict the number of rain measurement networks (CPMK-2)	**Formative:** Accuracy in determining the number of rainfall measurement stations for a watershed area **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (15) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60` **Studying:** Case Study (Case Study) Create a resume and answer practice questions 1x3x60`	Material: • Tools measuring rainfall • Station rainfall measurement • Data rainfall Meteorological BMKG Station Library: 1, 2, 3	15
9-10	Students analyze methods in calculating evaporation (CPMK-2)	**Formative:** Accuracy in defining the concepts of evaporation, transpiration and evapotranspiration as well as the concept of calculating them using appropriate methods different **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) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60` **Studying:** Case Study (Case Study) Create a resume and answer practice questions 1x3x60`	Material: • Evaporation, transpiration, evapotranspiration • Paramater evaporation physics • Calculation evaporation Library: 1, 2, 3	10

11-13	Students analyze water discharge measurements and rainfall frequency (CPMK-3)	**Formative:** Accuracy in analyzing water discharge and rainfall frequency in a watershed area **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (15) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Case Study (Case Study) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:** Case Study (Case Study) Create a resume and answer practice questions  1x3x60`	Material: • Measurements direct water discharge • Method indirect measurement of water discharge • Method Manning • Method Darcy-Weishbarc • Method critical depth Library: 3, 4	15
14	Students identify climate classifications from various classification methods (CPMK-3)	**Formative:** Accuracy in identifying differences in climate, weather and seasons; as well as climate classification **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (10) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:** Case Study (Case Study) Create a resume and answer practice questions  1x3x60`	Material: • Difference weather and climate • Classification Koppen and Thornwaite • Climate Indonesia Library: 1, 2	10

15-16	Students analyze the concept of groundwater as part of the hydrological cycle (CPMK-3)	**Formative:** Accuracy in analyzing the concept of groundwater and its processes in the hydrological cycle **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (15) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Case Study (Case Study) 1x3x50`	**Studying:** Self-Directed Learning • Reading module/PPT • Watch Video 1x3x60`  **Studying:**  Case Study (Case Study)  Create a resume and answer practice questions  1x3x60`	Material: • Definition groundwater • Aquifer • Method groundwater search • Decrement groundwater level • Intrusion sea water • Subsidence Library: 3, 4	15
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3
CPL-4 (P1)	Project/Case Study (Weight 10%) Project/Case Study (Weight 10%)		
CPL-8 (KU1)		Project/Case Study (Weight 15%) Project/Case Study (Weight 15%) Project/Case Study (Weight 10%)	
CPL-11 (KK1)			Project/Case Study (Weight 15%) Project/Case Study (Weight 10%) Project/Case Study (Weight 15%)
CPL-14 (KK4)			Project/Case Study (Weight 15%) Project/Case Study (Weight 10%) Project/Case Study (Weight 15%)

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-4	CLO-1	SUB-CLO-1	Participation	10	10		
SLO-4	CLO-1	SUB-CLO-2	Participation	10	10		
SLO-8	CLO-2	SUB-CLO-3	Participation	15	15		
SLO-8	CLO-2	SUB-CLO-4	Participation	15	15		
SLO-8	CLO-2	SUB-CLO-5	Participation	10	10		
SLO-14	CLO-3	SUB-CLO-6	Participation	15	15		
SLO-14	CLO-3	SUB-CLO-7	Participation	10	10		
SLO-14	CLO-3	SUB-CLO-8	Participation	15	15		
				100	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