

SEMESTER COURSE PLAN

**BASIC MATHEMATICS COURSES
(23H01110103)**



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 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.

Course Learning Outcomes (CLO)

- CPMK-1: Students are able to determine solutions to problems related to the concept of one change calculus. (CPL4 dan CPL8)
- CPMK-2: Students are able to apply the concepts of function, derivative and integral, both to more complex calculus problems and problems related to their field. (CPL4 dan CPL8)

Sub-CLO

- Sub CPMK-1: Students are able to use the properties of real numbers and functions in determining the domain and range of functions, as well as the solution set for root, square and absolute value inequalities. (CPMK-1)
- Sub CPMK-2: Students are able to describe functions through algebraic operations and through graphs. (CPMK-1)
- Sub CPMK-3: Students are able to investigate the existence of limits and continuity of a function, both analytically and graphically. (CPMK-1)
- Sub CPMK-4: Students are able to determine the first derivative and higher order derivatives of a real

function (both explicit and implicit functions) through the limit approach, derivative theorems and the chain rule. (CPMK-1)

Sub CPMK-5: Students are able to demonstrate the application of the first derivative and the second derivative through systematic steps in determining monotone intervals, extreme points/values, turning points, concavity, and sketching graphs of real functions (CPMK-2)

Sub CPMK-7: Students are able to describe the solution of definite integrals through Riemann sum limits. (CPMK-1)

Sub CPMK-8: Students are able to determine appropriate integration techniques in solving integrals of algebraic, transcendental and trigonometric functions. (CPMK-2)

Sub CPMK-9: Students are able to apply definite integrals to determine the area of closed areas, average values, curve lengths and lamina mass points. (CPMK-2)

Sub CPMK-6: Students are able to find a polynomial representation in the form of a Taylor series of n th derived functions (CPMK-2)

Learning Analytics

Basic Mathematics



Students are able to apply definite integrals to determine the area of closed areas, average values, curve lengths and lamina mass points. (CPMK-2)



Students are able to determine appropriate integration techniques in solving integrals of algebraic, transcendental and trigonometric functions. (CPMK-2)



Students are able to describe the solution of definite integrals through Riemann sum limits. (CPMK-1)



Students are able to find a polynomial representation in the form of a Taylor series of nth derived functions (CPMK-2)



Students are able to demonstrate the application of the first derivative and the second derivative through systematic steps in determining monotone intervals, extreme points/values, turning points, concavity, and sketching graphs of real functions (CPMK-2)



Students are able to determine the first derivative and higher order derivatives of a real function (both explicit and implicit functions) through the limit approach, derivative theorems and the chain rule. (CPMK-1)



Students are able to investigate the existence of limits and continuity of a function, both analytically and graphically. (CPMK-1)



Students are able to describe functions through algebraic operations and through graphs. (CPMK-1)



Students are able to use the properties of real numbers and functions in determining the domain and range of functions, as well as the solution set for root, square and absolute value inequalities. (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
Basic Mathematics		23H01110103		3	1	1 Juli 2025
AUTHORITY		SLP Developer Lecturer	Coordinator		Head of Study Program	
		Jusmawati Massalesse, S.Si.,M.Si., Naimah Aris, S.Si.,M.Math.	Jusmawati Massalesse, S.Si.,M.Si.		Prof. Dr. Nurdin, S.Si., M.Si.	
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 ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-4	CLO-1: Students are able to determine solutions to problems related to the concept of one change calculus.				
		CLO-2: Students are able to apply the concepts of function, derivative and integral, both to more complex calculus problems and problems related to their field.				
	SLO-8	CLO-1: Students are able to determine solutions to problems related to the concept of one change calculus.				
		CLO-2: Students are able to apply the concepts of function, derivative and integral, both to more complex calculus problems and problems related to their field.				
	CLO ⇒ Sub-CLO					
	CLO-1	Sub-CLO-1:Students are able to use the properties of real numbers and functions in determining the domain and range of functions, as well as the solution set for root, square and absolute value inequalities.				
		Sub-CLO-2:Students are able to describe functions through algebraic operations and through graphs.				
		Sub-CLO-3:Students are able to investigate the existence of limits and continuity of a function, both analytically and graphically.				
		Sub-CLO-4:Students are able to determine the first derivative and higher order derivatives of a real function (both explicit and implicit functions) through the limit approach, derivative theorems and the chain rule.				

				Sub-CLO-7:Students are able to describe the solution of definite integrals through Riemann sum limits.								
			CLO-2	Sub-CLO-5:Students are able to demonstrate the application of the first derivative and the second derivative through systematic steps in determining monotone intervals, extreme points/values, turning points, concavity, and sketching graphs of real functions								
				Sub-CLO-8:Students are able to determine appropriate integration techniques in solving integrals of algebraic, transcendental and trigonometric functions.								
				Sub-CLO-9:Students are able to apply definite integrals to determine the area of closed areas, average values, curve lengths and lamina mass points.								
				Sub-CLO-6:Students are able to find a polynomial representation in the form of a Taylor series of nth derived functions								
			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	Gagal diterjemahkan	Gagal diterjemahkan	Quiz	Summative Test				
SLO-8	CLO-1	SUB-CLO-2		0	5	0	0	0	5			
SLO-8	CLO-1	SUB-CLO-3		5	0	0	0	0	5			
SLO-8	CLO-1	SUB-CLO-4		0	5	5	0	25	35			
SLO-8	CLO-2	SUB-CLO-5		5	0	0	0	0	5			
SLO-8	CLO-2	SUB-CLO-6		0	0	0	0	15	15			
SLO-8	CLO-1	SUB-CLO-7		10	0	0	5	0	15			
SLO-8	CLO-2	SUB-CLO-8		0	5	0	10	0	15			
SLO-8	CLO-2	SUB-CLO-9		0	5	0	0	0	5			
				20	20	5	15	40	100			
Course Description		This course provides students with cognitive experience in learning mathematics. Reasoning materials in the basic mathematics course I include: Real Number System, Functions from real space to real space, Function Limits, Derivatives, and Integral functions. The course is presented in the form of interactive lectures with an emphasis on axiomatic, deductive and logical and systematic reasoning. Strengthening factual knowledge and conceptual understanding is carried out using learning methods: Interactive Lectures, Collaborative Learning, and Case Method.										

Learning Materials/Subjects		1. Real Number System: Algebraic properties of real numbers, intervals and absolute values 2. Real Functions and Their Graphs 3. Limits and Continuity of Functions 4. Function Derivatives 5. Function Derivative Applications 6. Definite Integral as a Riemann Sum 7. Indefinite Integrals 8. Integral Applications					
Reference		Main References					
		1. Thomas G.B., Weir, M.D. , Hass, J.R. "Thomas Calculus early transcendentals (13th Edition)", Pearson. 2013. 2. Chris McMullen, "Essential Calculus Skills Practice Workbook with Full Solutions", Zishka Publishing, 2018. 3. James Stewart, Single Variable Calculus: Early Transcendentals, Thomson Brooks/Cole, 2015. 4. Mathematics Lecturer Team, "Basic Mathematics", 2023.					
		Additional References					
		Khan Academy: https://www.khanacademy.org/math/calculus-1 . Mathematics Lecture Series - Prof. Hendra Gunawan Bandung Institute of Technology,					
Teaching Team		Prof. Dr. Nurdin, S.Si., M.Si., Naimah Aris, S.Si.,M.Math.					
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 are able to use the properties of real numbers and functions in determining the domain and range of functions, as well as the solution set for root, square and absolute value inequalities. (CPMK-1)	Formative: Accuracy in understanding the algebraic properties of real numbers, properties of roots and squares, and distances in R^2. Sumative: The accuracy of the description in finish dissimilarity in root shape, squared and absolute value.	Formative Criteria: None Short question and answer dinilai dengan rubrik 1 Sumative Criteria: Assessment Technique: Non Test	Studying: Collaborative learning (Collaborative Learning) 1x3x50	Studying: Other methods - 1x3x60	Tuition contract, RPS, CPMK, Real Number System: Set of numbers real, algebraic operations and number fields reals, axioms and properties order of Real Numbers, interval, Absolute value, Distance and straight lines. [1] pp. 1-23 [4] pp. 1-14	0
2-3	Students are able to describe functions through algebraic operations and through graphs. (CPMK-1)	Formative: - Sumative: Accuracy of interpretation equation of a function and determine the value of the function for any real point. Accuracy depict graphs function using formulas shift. Precision in Write the result function composition. Precision in determine an inverse function and its graph.	Formative Criteria: Sumative Criteria: Case Studies (5) Assessment Technique: Non Test	Studying: Case Study, Cooperative learning 2x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 2x3x60	Real Functions and The graph Function, domain and range, algebraic operations and functional composition, special functions and polynomials, functions transcendent, graphic functions and the shift against the axis coordinates. [1] page 1-41 [3] page 10-45 [4] page 15-46	5

4-5	Students are able to investigate the existence of limits and continuity of a function, both analytically and graphically. (CPMK-1)	Formative: - Sumative: Accuracy of steps and writing on proof existence of left limit, limit right and limits on functions with one or some rules definition. Clarity of description in verify the continuity of a function at a point Clarity of description in verify the continuity of a function at a point. Internal accuracy depict graphs continuous function, discontinuous, incl discontinuous that can be abolished.	Formative Criteria: Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1 Assessment Technique: Test	Studying: Collaborative learning (Collaborative Learning) 2x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 2x3x60	Limits and Continuity of Functions Limits and Limit Theorems, Continuity and the conditions [1] pp 59-1104 [3] pp. 78-138 [4] pp. 47-59	5
6-7	Students are able to determine the first derivative and higher order derivatives of a real function (both explicit and implicit functions) through the limit approach, derivative theorems and the chain rule. (CPMK-1)	Formative: - Sumative: Inner completion explain the concept and derivative interpretation Inner accuracy using the theorem derivative or method Accuracy of obtaining higher order derivatives of functions explicit and implicit functions given	Formative Criteria: Sumative Criteria: Case Studies (5) dinilai dengan rubrik 01 Quiz (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Collaborative learning (Collaborative Learning) 2x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 2x3x60	Function Derivative Definition of derivative, theorems derivative, derivative composition function, implicit functions and higher order derivatives [1] pp. 123-176 [2] Section 1-Section 6 [3] pp. 172-266. [4] pp. 60-84	10

8	Students are able to determine the first derivative and higher order derivatives of a real function (both explicit and implicit functions) through the limit approach, derivative theorems and the chain rule. (CPMK-1)	Formative: - Sumative: Completeness in explaining the concept and interpretation of derivatives Precision in using derivative theorems or methods Accuracy in obtaining high-level derivatives of given explicit and implicit functions	Formative Criteria: Sumative Criteria: Summative Test (10) dinilai dengan rubrik 1 Summative Test (10) dinilai dengan rubrik 1 Summative Test (5) dinilai dengan rubrik 1 Assessment Technique: Test			-	25
9-10	Students are able to demonstrate the application of the first derivative and the second derivative through systematic steps in determining monotone intervals, extreme points/values, turning points, concavity, and sketching graphs of real functions (CPMK-2)	Formative: - Sumative: Deep precision determine extreme points, turning point, monotonous interval and concave hose function Precision and thoroughness in an approach function as a series with higher order derivatives	Formative Criteria: Sumative Criteria: Project/Case Study (5) dinilai dengan rubrik 1 Assessment Technique: Test	Studying: Collaborative learning (Collaborative Learning) 3x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 3x3x60	Derivative Applications Extreme value problems, monotony and concavity, Test derivatives I and II, Mean value theorem, Drawing function graphs, applications deep derivative several fields [1] pp. 223 - 263 [3] pp. 276-329 [4] pp. 85-120	5

11-12	Students are able to describe the solution of definite integrals through Riemann sum limits. (CPMK-1)	Formative: - Sumative: Accuracy of use, methods and techniques integration on anti-derivative determination a function Deep precision calculate definite integrals using concepts Riemann sum	Formative Criteria: Sumative Criteria: Quiz (5) dinilai dengan rubrik 1 Project/Case Study (10) dinilai dengan rubrik 1 Assessment Technique: Test and Non-Test	Studying: Collaborative learning (Collaborative Learning) 2x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 2x3x50	Integral Integral Of course as Riemann sum, integral properties, Basic Theorem Integral Indefinite Integral, Method integration, Integration Techniques Rational Functions [1] pg 299 - 347 [2] Chapter 9 - Cahpter 14 [3] pp. 366-421 [4] pp. 132-141	15
13-14	Students are able to determine appropriate integration techniques in solving integrals of algebraic, transcendental and trigonometric functions. (CPMK-2)	Formative: - Sumative: Clarity of description on determining the area of a closed area bounded by curves, average value, length curves and mass points lamina.	Formative Criteria: Sumative Criteria: Quiz (10) dinilai dengan rubrik 1 Case Studies (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Collaborative learning (Collaborative Learning) 2x3x50	Studying: Problem-Based Learning (Problem-based Learning) - 3x3x60	Integral Applications The area covered below the curves, average value, curve length and point mass of the lamina. [1] pp. 365 - 404 [3] pp. 428-461 [4] pp. 142-151	15
15	Students are able to apply definite integrals to determine the area of closed areas, average values, curve lengths and lamina mass points. (CPMK-2)	Formative: - Sumative: End of Semester Evaluation	Formative Criteria: Sumative Criteria: Case Studies (5) dinilai dengan rubrik 01 Assessment Technique: Non Test			-	5

16	Students are able to find a polynomial representation in the form of a Taylor series of nth derived functions (CPMK-2)	Formative: - Sumative: -	Formative Criteria: Sumative Criteria: Summative Test (15) dinilai dengan rubrik 1 Assessment Technique: Test			-	15
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2
CPL-4 (P1)	data not found (Weight 5%) Project/Case Study (Weight 5%) data not found (Weight 10%) Summative Test (Weight 25%) Quiz (Weight 5%) Project/Case Study (Weight 10%)	Project/Case Study (Weight 5%) Quiz (Weight 10%) data not found (Weight 5%) data not found (Weight 5%) Summative Test (Weight 15%)
CPL-8 (KU1)	data not found (Weight 5%) Project/Case Study (Weight 5%) data not found (Weight 10%) Summative Test (Weight 25%) Quiz (Weight 5%) Project/Case Study (Weight 10%)	Project/Case Study (Weight 5%) Quiz (Weight 10%) data not found (Weight 5%) data not found (Weight 5%) Summative Test (Weight 15%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Project/Case Study	20
Case Studies	20
Quiz	5
Quiz	15
Summative Test	40
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	Gagal diterjemahkan	Gagal diterjemahkan	Quiz	Summative Test			
SLO-8	CLO-1	SUB-CLO-2		0	5	0	0	0	5		
SLO-8	CLO-1	SUB-CLO-3		5	0	0	0	0	5		
SLO-8	CLO-1	SUB-CLO-4		0	5	5	0	25	35		
SLO-8	CLO-2	SUB-CLO-5		5	0	0	0	0	5		
SLO-8	CLO-2	SUB-CLO-6		0	0	0	0	15	15		
SLO-8	CLO-1	SUB-CLO-7		10	0	0	5	0	15		
SLO-8	CLO-2	SUB-CLO-8		0	5	0	10	0	15		
SLO-8	CLO-2	SUB-CLO-9		0	5	0	0	0	5		
				20	20	5	15	40	100		

Lampiran Rubrik 01 | ASSESMENT TERTULIS

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1/0
Konsep/ metode yang digunakan	Penjelasan konsep /metode (*) sangat lengkap dan akurat	Penjelasan konsep/metode (*) cukup jelas tetapi beberapa informasi tidak dituliskan secara lengkap.	Penjelasan konsep/metode (*) kurang jelas dan banyak informasi yang tidak dituliskan	Penjelasan yang dituliskan hampir tidak berkaitan dengan konsep/ metode (*)	Tidak memberikan konsep yang dibutuhkan
Sistematika penulisan/ pembuktian	Sistematika penulisan/ pembuktian sangat jelas dan terstruktur	Sistematika penulisan/ pembuktian cukup jelas namun ada langkah yang hilang	Sistematika penulisan/ pembuktian kurang jelas	Sistematika penulisan/ pembuktian tidak jelas	Jawaban tidak benar/ tidak ada
Interpretasi geometri/ kualitatif/ kuantitatif.	Interpretasi geometri/ kualitatif/ kuantitatif (*) tepat dan lengkap	Interpretasi geometri/ kualitatif/ kuantitatif (*) cukup lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif (*) kurang lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif(*) tidak lengkap/ tepat	Interpretasi geometri/ kualitatif/kuantitatif(*) tidak benar
Perhitungan/kesimpulan	Perhitungan/ kesimpulan sangat akurat/tepat dan disertai alasan yang mendasarinya	Perhitungan/ kesimpulan cukup akurat/tepat dan disertai alasan yang mendasarinya	Kesimpulan cukup tepat, namun tidak disertai alasan yang jelas	Perhitungan/ kesimpulan kurang akurat/tepat dan tidak disertai alasan yang mendasarinya	Perhitungan/kesimpulan salah

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