SEMESTER STUDY PLAN

CALCULUS 1

(COMPULSORY COURSE)

DEPARTMENT OF MATHEMATICS AND DATA SCIENCE

FACULTY OF MATHEMATICS AND NATURAL SCIENCES

UNIVERSITAS ANDALAS

2024

SEMESTER STUDY PLAN (SSP)
BACHELOR PROGRAM OF MATHEMATICS
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS ANDALAS

Course Name	Course Code	URL *I-Learn*	Credits	Semester	Compilation Date
Calculus 1	MAT61121	https://sci.ilearn.unand.ac.id	3	1	May 11th, 2024

Person In Charge	Study Plan Creator	Head of Research Group	Head of Study Program
	Dr. Haripamyu Prof. Dr. Admi Nazra Narwen, M.Si	Dr. Haripamyu	Dr. Noverina Alfiany

Intended Learning Outcomes (ILO) and Performance Indicator (PI)	Intended Learning Outcomes	
	ILO-2	Possesses profound knowledge of the basic concept of mathematics PI-1: An ability to explain basic mathematical concepts PI-2: An ability to provide examples that are relevant to basic mathematical concepts PI-3: An ability to determine solutions to simple problems using basic mathematical concepts
	ILO-3	An ability to identify, explain, and generalize simple mathematical PI-1: An ability to identify simple mathematical problems PI-2: An ability to explain simple mathematical problems PI-3: An ability to generalize simple mathematical problems

	ILO-4	An ability to use concept and fundamental technique of mathematics in solving simple mathematical problems PI-1: An ability to choose appropriate basic mathematical concepts and techniques in solving simple mathematical problems PI-2: An ability to illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques PI-3: An ability to solve simple mathematical problems using appropriate basic mathematical concepts and techniques
	Course Learning Outcomes	
	1	Students are able to explain the solution of simple mathematical problems using the concept of real numbers and their properties and mathematical logic. (ILO-2:PI-1, PI-2, PI-3)
	2	Students are able to solve a simple mathematical problem related to equations (a geometric object) and functions in the Cartesian coordinate system. (ILO-2:PI-3, ILO-3:PI-1).
	3	Students are able to explain solutions to problems related to the limit of functions and the continuity of a function using appropriate concepts and methods. (ILO-2:PI-1, PI-2, PI-3, ILO-4: PI-1, PI-2, PI-3)
	4	Students are able to explain the concept of function derivatives and determine their derivatives at a point. (ILO-2:PI-1,PI-2, PI-3)
	5	Students are able to identify and explain simple mathematical problems related to derivative concepts. (ILO-3: PI 1, PI-2, PI-3)
	6	Students are able to solve derivative problems using the right mathematical concepts and techniques (ILO-4: PI-1, PI-2, PI-3)
	Sub-Course Learning Outcomes	
	1.1	Students are able to explain the concept of real numbers and their properties in solving a simple mathematical problem (ILO-2:PI-1)
	1.2	Students are able to explain a mathematical statement, especially implications using mathematical logic related to real numbers and their properties.(ILO-2: PI-2)

	1.3	Students are able to determine and explain solutions to inequalities (one modifier) including those involving absolute values using the concept of real numbers and their properties as well as the logic of mathematical statements. .(ILO-2:PI-3)
	2.1	Students are able to determine the solution of a simple mathematical problem related to equations (a geometric object) and functions in the Cartesian coordinate system (ILO-2:PI-3)
	2.2	Students are able to explain the characteristics of equation graphs and function graphs. (ILO-3:PI-1)
	3.1	Students are able to determine the limit value of a function and explain it intuitively (ILO-2: PI-1, PI-2, PI-3).
	3.2	Students are able to prove the limit of a simple function using formal definitions (ILO-3: PI-1, PI-2, PI-3).
	3.3	Students are able to determine various limits of algebraic functions and trigonometric functions using appropriate methods (ILO-4: PI-1, PI-3).
	3.4	Students are able to check the continuity of a function at a point and at an interval using the appropriate method. (ILO-4: PI-1, PI-2, PI-3).
Brief Description	This course contains discussions about real number systems, inequalities, absolute values, and straight-line equations; Functions and operations on functions: trigonometric functions, limits and continuity functions; derivatives: child search rules, chain rules, high-level derivatives, implicit differential, differential and overlay; Use of derivatives: monotony, maximum-minimum, advanced graphing, mean theorem for derivatives, anti-derivatives, and introduction to differential equations	
Course Materials	1. Real Number System 2. Function Limits and continuity 3. Derivative	
References	**Main:** 1. D. Verberg, E. J. Purcell, S. E. Rigdon, Calculus, Prentice Hall International, Inc., USA, 9th Edition, 2006 **Additional:**	

	2. J. Stewar, Calculus, Cengange Learning, Boston, USA, 2015.	
Learning Media	**Software:**	**Hardware:**
	• LMS Unand (http://fmipa.ilearn.unand.ac.id/) • Zoom Meeting • Whatsapp	• Computer/Laptop • Smartphone
Team Teaching	1. Dr. Haripamyu 2. Prof. Dr. Admi Nazra 3. Narwen, M.Si.	
Assessment	Homework, Quizzes, Mid-Term exam, Final exam	
Required courses	-	
Academic Norms	https://akademik.unand.ac.id/images/2022-03-30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-khusus%20Bab%20II.pdf	

Weekly Study Plan

Week / Meet (1)	Course Outcomes (2)	Indicator (3)	Assessment (4)	Activities/Forms of Learning [Time estimated]			
				Synchronous*		Asynchronous	
				Face to face Offline (5)	Face to face Online (6)	Individual (7)	
1-2/1-2	Sub-CLO-1.1 Students are able to explain the concept of real numbers and their properties in solving a simple mathematical problem (ILO-2:PI-1) Sub-CLO-1.2 Students are able to explain a mathematical statement, especially implications using mathematical logic related to real numbers and their properties.(ILO-2: PI-2)	• Discipline in carrying out college contracts • Accurate understanding of related material	Non test: Test 1st Quiz: 1% Mid-term: 5%	Teaching and discussion: • Explanation of Semester Study Plan • Explanation of learning material • explanation of the task • explanation of the assessment [$2 \times 3 \times 50$ minutes]	Teaching and discussion: • Explanation of Semester Study Plan • Explanation of learning material • Explanation of the task • explanation of the assessment [$2 \times 3 \times 50$ minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials • Students do assignments independently related to real number systems, estimation and logic • Students solve problems related to inequalities and absolute values [$2 \times 3 \times 120$ minutes]	
2/3	Sub-CLO-2.1 Students are able to determine the solution of a simple mathematical problem related to equations (a geometric	• Accurate understanding of related material • Accuracy in answering assignment questions	Non test : 1st Task: (1,5%) Test 1st Quiz: 1% Mid-term: 2%	Teaching and discussion: • explanation of learning material	Teaching and discussion: • explanation of learning material	• Students read and study learning materials • Students do assignments independently	

	object) and functions in the Cartesian coordinate system (CP-2:IK-3) Sub-CLO-2.2 Students are able to explain the characteristics of equation graphs and function graphs. (CP-3:IK-1)	• - Neatness in completing tasks • - Originality of task results		• explanation of the task • explanation of the assessment [*1 × 3 × 50* minutes]	• explanation of the task • explanation of the assessment [*1 × 3 × 50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	[*1 × 3 × 120* minutes]	
3/ 4	Sub-CLO-2.1 Students are able to determine the solution of a simple mathematical problem related to equations (a geometric object) and functions in the Cartesian coordinate system (CP-2:IK-3) Sub-CLO-2.2 Students are able to explain the characteristics of equation graphs and function graphs. (CP-3:IK-1)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 2nd Task (1,5%) Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study material from the main and additional references • Students work on assignments individually [*1 × 3 × 120* minutes]	
4/5	Sub-CLO-2.1 Students are able to determine the solution of	• Accurate understanding of related material	Non test : - Test	Teaching and discussion:	Teaching and discussion:	Students read and study material from the main and additional references	

	a simple mathematical problem related to equations (a geometric object) and functions in the Cartesian coordinate system (CP-2:IK-3)	• Accuracy in answering assignment questions • - Neatness in completing tasks - Originality of task results	1st Quiz: 1% Mid-term: 2%	• explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	• explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	[1× *3* × *120* minutes]	
4/6	Sub-CLO-3.1 Students are able to determine the limit value of a function and explain it intuitively (CP-2: IK-1, IK-2, IK-3). Sub-CLO-3.2 Students are able to prove the limit of a simple function using formal definitions (CP-3: IK-1, IK-2, IK-3).	• Accurate understanding of related material • Accuracy in answering assignment questions • - Neatness in completing tasks • - Originality of task results	Non test : 3rd Task (2%) Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials from the main and additional references • Students do assignments independently [*1* × *3* × *120* minutes]	
5-6/7-8	Sub-CLO-3.3 Students are able to determine various limits of algebraic functions and trigonometric functions using	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing	Non test : 4th Task (1,5%) Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task	Teaching and discussion: • explanation of learning material • explanation of the task	• Students read and study learning materials from the main and additional references	

	appropriate methods (CP-4: IK-1, IK-3).	tasks • Originality of task results		[2 × 3 × 50 minutes]	[2 × 3 × 50 minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students do assignments independently [2 × 2 × 120 minutes]	
6/8	Sub-CLO-3.4 Students are able to check the continuity of a function at a point and at an interval using the appropriate method. (CP-4: IK-1, IK-2, IK-3).	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : - Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task [1 × 3 × 50 minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [1 × 3 × 50 minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	Students read and study learning materials from the main and additional references [1 × 3 × 120 minutes]	
6/9	Sub-CLO-3.3 Students are able to determine various limits of algebraic functions and trigonometric functions using appropriate methods (CP-4: IK-1, IK-3).	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test: - Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task [1 × 3 × 50 minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [1 × 3 × 50 minutes] (Specific conditions: The total number of	Students read and study learning materials from the main and additional references [1 × 3 × 120 minutes]	

					blended learning meetings is 40% of the total number of meetings)		
7/10	Review materi	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 5th Task (2%) Test 1st Quiz: 1% Mid-term: 3%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials from the main and additional references [*1* × *3* × *120* minutes]	-
MID-TERM EXAM							
8/11	ILO-4 Students are able to explain the concept of function derivatives and determine their derivatives at a point .(ILO-2:PI-1,PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : Test 2nd Quiz : 1% Final exam: 0%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the	• Students read and study learning materials from the main and additional references • Student do assignment [*1* × *3* × *120* minutes]	

					total number of meetings)		
8/12	ILO-4 Students are able to explain the concept of function derivatives and determine their derivatives at a point .(ILO-2:PI-1,PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 7th Task (1,5%) Test 2nd Quiz: 1% Final exam: 2%	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials from the main and additional references • Student do assignment [*1 × 3 × 120* minutes]	-
9/13	ILO-5 Students are able to identify and explain simple mathematical problems related to derivative concepts .(ILO-3: PI 1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 8th Task (1,5%) Test 2nd Quiz: 1% Final exam: 2%	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials from the main and additional references • Student do assignment [*1 × 3 × 120* minutes]	
10/14	ILO-6	• Accurate understanding of related material	Non test: 9th Task (1,5%)	Teaching and discussion:	Teaching and discussion:	• Students read and study learning materials from	

	Students are able to solve derivative problems using the right mathematical concepts and techniques (ILO-4: PI-1, PI-2, PI-3)	• Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Test 2nd Quiz: 1% Final exam: 3%	• explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	• explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	the main and additional references • Student do assignment [*1* × *3* × *120* minutes]	
10/15	ILO-6 Students are able to solve derivative problems using the right mathematical concepts and techniques (ILO-4: PI-1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 10th Task (1,5%) Test 2nd Quiz: 1% Mid-term: 7%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Students read and study learning materials from the main and additional references • Student do assignment [*1* × *3* × *120* minutes]	
11/16	ILO-6 Students are able to solve derivative problems using the right mathematical concepts and techniques	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing	Non test : - Test 2nd Quiz :1,5% Final exam: 4%	Teaching and discussion: • explanation of learning material • explanation of the task	Teaching and discussion: • explanation of learning material • explanation of the task	• Students read and study learning materials from the main and additional references • Student do assignment	

	(ILO-4: PI-1, PI-2, PI-3)	tasks • Originality of task results		[*1* × *3* × *50* minutes]	[*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	[*1* × *3* × *120* minutes]	
12/ 17	ILO-6 Students are able to solve derivative problems using the right mathematical concepts and techniques (ILO-4: PI-1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : Tugas 11 (1,5%) Test Kuis 2:1,5% UAS: 4%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	Students read and study learning materials from the main and additional references [*1* × *3* × *120* minutes]	
12/18	ILO-6 Students are able to solve derivative problems using the right mathematical concepts and techniques (ILO-4: PI-1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 12th Task (1,5%) Test 2nd Quiz: 1% Final exam: 4%	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1* × *3* × *50* minutes]	• Students read and study learning materials from the main and additional references • Student do assignment [*1* × *3* × *120* minutes]	

					(Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)		
13/19	ILO-5 Students are able to identify and explain simple mathematical problems related to derivative concepts .(ILO-3: PI 1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results	Non test : 13th Task (1%) Test 2nd Quiz: 1% Final exam: 4%	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes]	Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes] (Specific conditions: The total number of blended learning meetings is 40% of the total number of meetings)	• Mahasiswa Students read and study learning materials from the main and additional references • Students do assignment [*1 × 3 × 120* minutes]	
14/20	ILO-5 Students are able to identify and explain simple mathematical problems related to derivative concepts .(ILO-3: PI 1, PI-2, PI-3)	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness in completing tasks • Originality of task results		Teaching and discussion: • explanation of learning material • explanation of the task [*1 × 3 × 50* minutes]		• Mahasiswa Students read and study learning materials from the main and additional references • Students do assignment [*1 × 3120* minutes]	
14/21	Review materi		Quiz				
	Final Exam						

1 credit = 50 minutes face-to-face meeting, 60 minutes structured study, 60 minutes independent study

Each meeting duration is 3 credits = 3×50 minutes

Indicators, Criteria, and Assessment Weights

1. Assessment weight for each Assessment

NO	Assessment	Weight (%)
1	Homework	15
2	Quizzes	20
3	Mid Term Exam	30
4	Final Exam	35
TOTAL		**100**

2. Assessment weight for Intended Learning Outcome
   - Sub-CLO-1.1: 6 %
   - Sub-CLO-1.2: 6 %
   - Sub-CLO-1.3: 6 %
   - Sub-CLO-2.1: 6 %
   - Sub-CLO-2.2: 5 %
   - Sub-CLO-3.1: 5 %
   - Sub-CLO-3.2: 5 %
   - Sub-CLO-3.3: 5 %
   - Sub-CLO-3.4: 6 %
   - CLO-4. 16 %
   - CLO-5: 15 %
   - CLO-6 : 19 %

Assessment Plan Table:

No.	CLO	Assessment				Weigth (%)
		Homework (%)	Quizzes (%)	Mid-Term Exam (%)	Final Exam (%)	
1	Sub-CLO 1.1 Students are able to explain the concept of real numbers and their properties in solving a simple mathematical problem (ILO-2:PI-1)	1st Task : 1,0	1st Quiz : 2	3		6%
2	Sub-CLO 1.2 Students are able to explain a mathematical statement, especially implications using mathematical logic related to real numbers and their properties.(ILO-2: PI-2)	1st Task : 1,0	1st Quiz : 2	3		6%
3	Sub-CLO 1.3 Students are able to determine and explain solutions to inequalities (one modifier) including those involving absolute values using the concept of real numbers and their properties as well as the logic of mathematical statements. .(ILO-2:PI-3)	2nd Task : 1,0	1st Quiz : 2	3		6%
4	Sub-CLO 2.1 Students are able to determine the solution of a simple mathematical problem related to equations (a geometric object) and functions in the Cartesian coordinate system (ILO-2:PI-3)	3rd Task : 0,5 4th Task : 1,0	1st Quiz : 2	2,5		6%
5	Sub-CLO 2.2 Students are able to explain the characteristics of equation graphs and function graphs. (ILO-3:PI-1)	3rd Task : 1,0 4th Task : 0,5	1st Quiz : 2	1,5		5%
6	Sub-CLO 3.1 Students are able to determine the limit value of a function and explain it intuitively (ILO-2: PI-1, PI-2, PI-3).	5th Task : 1,0		4%		5%
7	Sub-CLO 3.2 Students are able to prove the limit of a simple function using formal definitions (ILO-3: PI-1, PI-2, PI-3).	5th Task : 1,0		4%		5%
8	Sub-CLO 3.3 Students are able to determine various limits of algebraic functions and trigonometric functions using appropriate methods (ILO-4: PI-1, PI-3).	7th Task : 1,0	2nd Quiz : 1	4%		5%
9	Sub-CLO 3.4 Students are able to check the continuity of a function at a point and at an interval using the appropriate method. (ILO-4: PI-1, PI-2, PI-3).	6th Task : 1,0		5%		6%

10	CLO-4	8th Task : 1,0	2nd Quiz : 3		12%	16%
11	CLO-5	9th Task : 1,0 12th Task : 1,0	2nd Quiz : 3		10%	15%
12	CLO-6	10th Task : 1,0 11th Task : 1,0	2nd Quiz : 4		13%	19%
Total		**15**	**20**	**30**	**30**	**100**

Matrix of CLO and ILO

CLO	ILO																															
	1			2			3			4			5				6					7			8				9			
	PI			PI			PI			PI			PI				PI					PI			PI				PI			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	4
1				✓	✓	✓																										
2						✓	✓																									
3				✓	✓	✓				✓	✓	✓																				
4				✓	✓	✓																										
5							✓	✓	✓																							
6										✓	✓	✓																				