SEMESTER STUDY PLAN CALCULUS 3 (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 N	Name		Course Code	URL I-I	learn	Credits	Semester	Compilation Date	
Calcult	us 3		MAT61122	https://sci.ileari	n.unand.ac.id	4	3	13 May 2024	
			Study Pla	n Creator	Head of R	esearch Group	Head of	l of Study Program	
Person In Charge			Dr. Har	ipamyu					
		Zulakm	al, M.Si	Dr. H	aripamyu	Dr. Noverina Alfiany			
			Efendi	i, M.Si					
	Intende	d Learning O	utcomes						
Intended Learning	ILO-2	Possesses p	profound knowle	dge of the basic o	concept mathe	ematics			
Outcomes (ILO) and		PI-1: An a	bility to explain b	asic mathematica	al concepts				
Performance Indicator		PI-2: An a	I-2: An ability to provide examples that are relevant to basic mathematical concepts						
(P1)		PI-3: An a	bility to determin	y to determine solutions to simple problems using basic mathematical concepts					
	ILO-3	An ability	to identify, explai	in and generalize	e simple math	ematical			
		PI-1: An at	1: An ability to identify simple mathematical problems						
		PI-2: An at	PI-2: An ability to explain simple mathematical problems						
		PI-3: An at	vility to generaliz	e simple mathem	atical probler	ns			
	ILO-4	An ability	to use concept an	d fundamental te	echnique of m	athematics in sol	lving simple	mathematical	
		problems	1		1		0 1		
		PI-1: An a	bility to choose a	ppropriate basic	mathematical	l concepts and tee	chniques in s	solving simple	
		math	ematical problem	ns		1	1	0 1	
		PI-2: An ability to illustrate simple mathematical problems based on appropriate basic mathem					mathematical		
		conce	epts and techniqu	ies	Ĩ	11	Ŧ		
		PI-3: An a	bility to solve sin	nple mathematic	al problems u	sing appropriate	basic mathe	matical concepts	
		and t	echniques		*			*	

ILO-5	An ability formally and correctly proves a simple mathematical statements using facts and methods that
	have been studied.
	PI-1: An ability to identify formal structures and analogous forms in mathematics
	PI-2: An ability to use facts and apply methods to prove simple mathematical statements
	PI-3: An ability to present simple mathematical statement proof rigorously (sequentially and conscientious)
	PI-4: An ability to conclude or interpret result of the proving simple mathematical statement
ILO-6	Have ability data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields
	PI-1: An ability to identify the right data and technology to solve simple mathematical problems or other fields
	PI-2: An ability to use data and technology and apply them to solve simple mathematical statements or
	other areas
ILO-9	An ability to apply knowledge of mathematics in career and involve in life long learning
	PI-1: An ability to carry out learning independently to deepen and expand the knowledge that has been
	obtained
Course	Learning Outcomes
1	Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3)
2	Students are able to draw graphs related to the function of two variables manually and using mathematical software. ( <b>ILO-6</b> : PI-1, PI-2)
3	Students are able to identify and solve simple mathematical problems related to limits, derivatives, and differentiability. (ILO-3: PI-1, PI-2, ILO-4: PI-1, PI-2, PI-3)
4	Students are able to identify and solve simple mathematical problems related to double integrals. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3 )

	5	Students are able to generalize simple mathematical problems related to the function from Rn to Rm (ILO-3: PI-3)			
	6	Students are able to compare solutions to problems related to vector calculus from various methods ( <b>ILO 4</b> : PI-1, PI-2, PI-3)			
	7	Students are able to prove simple mathematical statements using appropriate facts and methods (ILO 5: PI-1, PI-2, PI-3, PI-4)			
	8	Students are able to solve simple mathematical problems related to vector calculus independently ( <b>ILO-9</b> : PI-1 )			
Brief Description	In this course we will discuss functions of two or more variables, partial derivatives, limits and continuity, differentiability, directed derivatives and gradients, chain rule, tangent planes and approximations, maximum and minimum, Lagrange's method, double integrals over rectangles, repeated integrals, double integrals over non-rectangular areas, double integrals over polar coordinates, application of double integrals, surface area, triple integrals (Cartesian coordinates), triple integrals (cylindrical coordinates and spherical coordinates), vector fields, line integrals, freedom and trajectory, Green's theorem on planes, surface integrals, Gauss's divergence theorem, and Stokes' theorem.				
Course Materials	1. I a 2. I i 3. V	Derivatives in n-dimensional space : Functions of two or more variables, partial derivatives, limits and continuity, differentiability, directed derivatives and gradients, chain rule, tangent planes and approximations, maximum and minimum, Lagrange's method, integrals in n-dimensional space : Double integral over rectangular, repeated integral, double ntegral over non-rectangular areas, double integral over polar coordinates, application of double ntegral, surface area, triple integral (Cartesian coordinates), triple integral (cylindrical coordinates and coordinates ball), Vector Calculus: vector fields, line integrals, freedom and trajectories, Green's theorem on planes, surface integrals, Gauss's divergence theorem, and Stokes' theorem.			
References	Main:				

	1. Dale Varberg, Edwin Purcell and Steve Rigdon, <i>Calculus</i> , Pearson, 2007, 9 <sup>th</sup> ed			
Learning Media	Software:	Hardware:		
	• LMS Unand	• Computer/Laptop		
	(http://fmipa.ilearn.unand.ac.id/)	• Smartphone		
	• Zoom meeting			
	• Whatsapp			
Team Teaching	1. Dr. Haripamyu			
	2. Zulakmal, M.Si			
	3. Efendi, M.Si			
Assessment	Homework, Quizzes, Mid-Term exam,	Final exam		
Required courses	Calculus 1, Calculus 2, Analytical Geon	netry		
Academic Norms	https://akademik.unand.ac.id/images	/2022-03-		
	<u>30%20Peraturan%20Rektor%20Nomor</u>	%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-		
	khusus%20Bab%20II.pdf			

## Weekly Study Plan

Week / Meet (1)	Course Outcomes (2)	Indicator (3)	Assessment (4)	Synchronous* Face to face Offline Face to face to face to face face face face face face face face	
1/1,2	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3) CLO-2 Students are able to draw graphs related to the function of two variables manually and using mathematical software. ( <b>ILO-6</b> : PI-1, PI-2)	<ul> <li>Discipline in carrying out college contracts</li> <li>Accurate understanding of related material</li> </ul>	Non test : Test Kuis 1: 1% UTS: 5%	<ul> <li>(5)</li> <li>Teaching and discussion:</li> <li>Explanation of Semester Learning Plan</li> <li>explanation of learning material</li> <li>explanation of the task</li> <li>explanation of the assessment</li> <li>[2 × 2 × 50 minutes]</li> </ul>	(
2/3-4	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3)	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>- Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Non test : Tugas 1 (1,5%) Test Kuis 1: 1% UTS: 2%	<ul> <li>Teaching and discussion:</li> <li>Explanation of Semester Learning Plan</li> <li>explanation of learning material</li> <li>explanation of the task</li> <li>explanation of the assessment</li> </ul>	

Week / Meet		Indicator				
(1)	Course Outcomes (2)	(3)	Assessment (4)	Synchronous*		
				Face to face Offline (5)	Face to fac (6	
	CLO-3 Students are able to identify and solve simple mathematical problems related to limits, derivatives, and differentiability. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3 ) CLO-7 Students are able to prove simple mathematical statements using appropriate facts and methods ( <b>ILO 5</b> : PI-1, PI-2, PI-3, PI-4)			$[2 \times 2 \times 50 \text{ minutes}]$		
3/5-6	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3) CLO-3 Students are able to identify and solve simple mathematical problems related to limits,	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>Originality of task results</li> </ul>	<ul> <li>Assignment 1 (2%)</li> <li>Quiz 1 (2%)</li> <li>UTS (5%)</li> </ul>	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		

Week / Meet		Indicator				
(1)	Course Outcomes (2)	(3)	Assessment (4)	Synchro         Face to face Offline         (5)         Lecture:         Concept Explained         Discussion and Q&A of Lecture         Material         [2 x 2 x 50 minutes]         Lecture:         Concept Explained         Discussion and Q&A of Lecture         Material         [2 x 2 x 50 minutes]	Face to fa	
	derivatives, and differentiability. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3)					
4/7-8	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3) CLO-3 Students are able to identify and solve simple mathematical problems related to limits, derivatives, and differentiability. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3 )	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>Originality of task results.</li> </ul>	Kuiz 1: 1% UTS: 2%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		
5/9-10	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3)	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> </ul>	Non test : Tugas 3 (2%) Test Kuis 1: 1% UTS: 3%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		

Week/Meet	Course Outcomes (2)	Indicator	Assessment (4)	Synchronous*		
(1)		(3)		Face to face Offline (5)	Face to face to face	
	CLO-3 Students are able to identify and solve simple mathematical problems related to limits, derivatives, and differentiability. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3)					
6/11-12	CLO-1 Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3) CLO-3 Students are able to identify and solve simple mathematical problems related to limits,	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Quiz 1: 1% UTS: 3%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		
	derivatives, and differentiability. ( <b>ILO-3</b> : PI-1, PI-2, <b>ILO-4</b> : PI-1, PI-2, PI-3) CLO-5					

				Synchronous*		
Week / Meet (1)	Course Outcomes (2)	Indicator (3)	Assessment (4)			
(-)				Face to face Offline (5)	Face to fa	
	Students are able to generalize simple mathematical problems related to the function from Rn to Rm ( <b>ILO-3</b> : PI-3)					
7/13-14	CLO-4 Students are able to identify and solve simple mathematical problems related to double integrals	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Non test : -	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		
				•	MID-TERM EXA	
8/15-16	CLO-4 Students are able to identify and solve simple mathematical problems related to double integrals	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> </ul>	UAS: 7%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]		
	CLU-3	<ul> <li>- Originality of task results</li> </ul>				

XA71-/X41		Tu diastan				
(1)	Course Outcomes (2)	(3)	Assessment (4)	Synchronous*		
				Synchro         Face to face Offline         (5)         Lecture:         Concept Explained         Discussion and Q&A of Lecture         Material         [2 x 2 x 50 minutes]         Lecture:         Concept Explained         Discussion and Q&A of Lecture         Material         [2 x 2 x 50 minutes]	Face to face to face	
	Students are able to generalize simple mathematical problems related to the function from Rn to Rm ( <b>ILO-3</b> : PI-3)					
9/17-18	CLO-2 Students are able to draw graphs related to the function of two variables manually and using mathematical software. (ILO-6: PI-1, PI-2) CLO-4 Students are able to identify and solve simple mathematical problems related to double integrals	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>		Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]	Kuliah dan disk - Penjelasan m - penjelasan tu [1 × 2 × 50 mer (Kondisi tertent <i>learning</i> 40%)	
10/19-20	CLO-4 Students are able to identify and solve simple mathematical problems related to double integrals CLO-5	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Non test : Test Kuis 2 : 1% UAS: 0%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]	Kuliah dan disk - Penjelasan m - penjelasan tu [1 × 2 × 50 mer (Kondisi tertent <i>learning</i> 40%)	

Week / Meet		Indicator				
(1)	Course Outcomes (2)	(3)	Assessment (4)	Synchronous*		
Students are able to generalize		Face to face Offline (5)	Face to face to face (6			
	Students are able to generalize simple mathematical problems related to the function from Rn to Rm ( <b>ILO-3</b> : PI-3)					
11/21-22	CLO 6 Students are able to compare solutions to problems related to vector calculus from various methods ( <b>ILO 4</b> : PI-1, PI-2, PI- 3)	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Non test : Tugas 7 (1,5%) Test Kuis 2: 1% UAS: 2%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]	Kuliah dan disl - Penjelasan m - penjelasan tu [1 × 2 × 50 mer (Kondisi tertent <i>learning</i> 40%)	
12/23-24	CLO 6 Students are able to compare solutions to problems related to vector calculus from various methods ( <b>ILO 4</b> : PI-1, PI-2, PI- 3)	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>Originality of task results</li> </ul>	Non test : Tugas 8 (1,5%) Test Kuis 2: 1% UAS: 2%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [1 x 2 x 50 minutes]	Kuliah dan disl - Penjelasan m - penjelasan tu [1 × 2 × 50 mer (Kondisi tertent <i>learning</i> 40%)	
13/25-26	CLO-5 Students are able to generalize simple mathematical problems related to the function from Rn to Rm ( <b>ILO-3</b> : PI-3) CLO 6	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> </ul>	Non test : Tugas 9 (1,5%) Test Kuis 2: 1% UAS: 3%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]	Kuliah dan disk - Penjelasan m - penjelasan tu [1 × 2 × 50 mer	

Week/Meet	Course Outcomes (2)	Indicator	Assessment (4)	Synchronous*		
(1)		(3)		Synchron         Face to face Offline         (5)         Lecture:         Concept Explained         Discussion and Q&A of Lecture         Material         [2 x 2 x 50 minutes]	Face to face to face to face (6	
	Students are able to compare solutions to problems related to vector calculus from various methods ( <b>ILO 4</b> : PI-1, PI-2, PI-3)	• Originality of task results			(Kondisi tertent learning 40%)	
14/27-28	CLO 7 Students are able to prove simple mathematical statements using appropriate facts and methods ( <b>ILO 5</b> : PI-1, PI-2, PI-3, PI-4) CLO 8 Students are able to solve simple mathematical problems related to vector calculus independently ( <b>ILO-9</b> : PI-1)	<ul> <li>Accurate understanding of related material</li> <li>Accuracy in answering assignment questions</li> <li>Neatness in completing tasks</li> <li>- Originality of task results</li> </ul>	Non test : Tugas 10 (1,5%) Test Kuis 2: 1% UAS: 7%	Lecture: Concept Explained Discussion and Q&A of Lecture Material [2 x 2 x 50 minutes]	Kuliah dan disk - Penjelasan m - penjelasan tu [2 × 2 × 50 mer (Kondisi tertent <i>learning</i> 40%)	

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FIN

1 credit = 50 minutes face-to-face meeting, 60 minutes structured study, 60 minutes independent study Each meeting duration is 2 credits = 2×50 minutes

## Indicators, Criteria, and Assessment Weights

1. Assessment weight for each Assessment

NO	Assessment	Weight (%)
1	Mid-Term Exam	35
2	Final Exam	35
3	Homework	15
4	Quiz	15
	100	

2. Assessment weight for Intended Learning Outcome

- CLO-1: 15 %
- CLO-2: 15 %
- CLO-3: 15 %
- CLO- 4: 15 %
- CLO-5: 10 %
- CLO-6: 10%
- CLO-7: 10%
- CLO-8:10%

#### Assessment Plan Table:

No.	CLO	Homework (%)	Quizess (%)	Mid-Term Exam (%)	Final Exam (%)	Weigth (%)
1	Students are able to determine solutions to simple mathematical problems related to the function of two variables. ( <b>ILO-2</b> : PI-1, PI-2, PI-3)	3		12		15
2	CLO-2 Students are able to draw graphs related to the function of two variables manually and			10		15

	using mathematical software. ( <b>ILO-6</b> : PI-1, PI-2)				
3	Students are able to identify and solve simple mathematical problems related to limits, derivatives, and differentiability. (ILO- 3: PI-1, PI-2, ILO-4: PI-1, PI-2, PI-3)	3	5	15	15
4	Students are able to identify and solve simple mathematical problems related to double integrals ( <b>ILO-</b> <b>3</b> : PI-1, PI-2, <b>ILO-4</b> : PI- 1, PI-2, PI-3 )	3			15
5	CLO-5 Students are able to generalize simple mathematical problems related to the function from Rn to Rm ( <b>ILO-3</b> : PI-3)				10
6	Students are able to compare solutions to problems related to vector calculus from	3			10

	various methods (ILO					
	<b>4</b> : PI-1, PI-2, PI-3)					
7	CLO 7					
	Students are able to					
	prove simple					
	mathematical					
	statements using	3	5			10
	appropriate facts					
	and methods (ILO					
	5: PI-1, PI-2, PI-3, PI-					
	4)					
	,					
8	CLO 8					
	Students are able to					
	solve simple					
	mathematical		_			10
	problems related to		5			10
	vector calculus					
	independently					
	( <b>ILO-9</b> : PI-1)					
	Total	15	15	35	35	100

Information:

TK: Group ask

### Matrix of CLO and ILO

																IL	<i>.</i> O															
	1 2 3					4		5 6				7			8				9													
CLU	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																	$\checkmark$	✓														
3							$\checkmark$	✓		✓	✓	✓																				
4							✓	✓		$\checkmark$	~	~																				
5									$\checkmark$																							
6										~	~	~																				
7													~	~	✓	$\checkmark$																
8																													✓			