SEMESTER STUDY PLAN

CALCULUS 2

(COMPULSORY COURSE)

Case-Based Method

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 2	MAT62121	https://sci.ilearn.unand.ac.id	4	2	February 17 , 2024

	Study Plan Creator	Head of Research Group	Head of the study program
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Intended Learning Outcomes (ILO) and Performance Indicators (PI)	**Intended Learning Outcomes**	
	ILO-2	Possesses profound knowledge of the basic concept 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 mathematics 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 (CLO)	
	1.	Students are able to determine solutions to simple problems related to integrals using the concept of definite integrals. (CP-2: IK-1, IK-2,IK-3)
	2.	Students are able to generalize problems related to power rules in the substitution method for integrals. (CP-3: IK-1, IK-2,IK-3)
	3.	Students have critical, logical and systematic thinking patterns, as well as creativity in solving problems related to integrals, (CP-4: IK-1, IK-2,IK-3)
	4.	Students are able to solve integrals of transcendent functions and their variants (CP-2: IK-1, IK-2,IK-3, CP-3: IK-1, IK-2,IK-3)
	5.	Students are able to solve problems related to infinite sequences and series using the concepts they have learned (CP-2: IK-1, IK-2,IK-3)
	6.	Students are able to determine the convergence of a sequence and an infinite series using the right method. (CP-4: IK-1, IK-2,IK-3)
Brief description of MK	This discuss about concept of definite integrals , Basic Theorem of Calculus First and Second , methods substitution , Mean Value Theorem for integrals, and applications of inner integrals count wide area , volume of objects turn , work style fluid , moment and center mass . The last material discussed before MIDTERM EXAM is transcendent functions. After MIDTERM EXAM, standard forms of integrals and integration techniques will be introduced, namely partial integration, trigonometric integrals, rational substitution techniques, rational function integrals and improper integrals. The last material given is infinite sequences, infinite series and their convergence.	

<table>
<tr><td>Study Materials /Sub-Study Materials</td><td colspan="2">1. Integrals: Definite Integrals , Applications of Integrals
2. Infinite Sequences and Series</td></tr>
<tr><td>References</td><td colspan="2">Main :
Dale Varberg, Edwin Purcell and Steve Rigdon, Calculus , Pearson, 2007, 9 th ed.

Additionals:
1. E. J. Herman, G. Strang, Calculus Vol.2 , Openstax , 2016, https://openstax.org/details/books/calculus-volume-2
2. JR Hass, CE Heil, and MD Weir, Thomas`Calculus , Pearson Education, 2018, 14th ed .</td></tr>
<tr><td>LearningvMedia</td><td>Device soft :
• LMS Unand (http://fmipa.ilearn.unand.ac.id/)
• Zoom meetings
• WhatsApp</td><td>Device hard :
• Computer /Laptop
• Smartphones</td></tr>
<tr><td>Team Teaching</td><td colspan="2">1.Dr. Haripamyu
2. Prof. Dr. Admi Nazra
3. Narwen , M.Sc
4. Zulakmal , M.Sc</td></tr>
<tr><td>Subject condition</td><td colspan="2">Calculus 1</td></tr>
<tr><td>Academic Norms</td><td colspan="2">https://akademik.unand.ac.id/images/2022-03-30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-khusus%20Bab%20II.pdf</td></tr>
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Weekly Study Plan

Week / Meet (1)	Course Outcomes (2)	Indicators (3)	Assessment (4)	Activities/Forms of Learning [Time estimated]				Media (9)	Subject, references (10)	Weight (11)
				Synchronous *		Asynchronous **				
				Face to face Offline (5)	Face to face Online (6)	Individual (7)	Collaborative (8)			
1/1	CLO-1 Student capable determine solution problem simple integrally related of course use concept that has been studied	• Discipline in carry out contract studying • Accuracy understand material related	MIDTERM EXAM (2%)	- introduction of RPS - Studying : concept explanation, discussion and question and answer course material [1 x 2x 50] minutes		Students look for references and study course material: calculate the area under a simple curve (either as an approximation or exactly) [2 x 2 x 120] minutes		LMS (ilearn UNAND)	• Introduction Lectures (Rules Assessment , RPS, Syllabus , Contract Studying) • Area area [1]	**2%**

1/2	CLO-1 Student capable determine solution problem simple integrally related of course use concept that has been studied	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (3%) Task (3%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes] Tutorial 1 [1 x 2 x 50 minutes]		Students look for references and study material solve definite integrals as the limit of Riemann sum [2 x 2 x 120 minutes]		LMS (ilearn UNAND)	Integral of course [1]	6%
2 /3	CLO-1 Student capable determine solution problem simple integrally related of course use concept that has been studied	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (2%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Student look for reference and study material using TDK I in finish related problems with derivative from an integral [2 x 2 x 120 minutes]			Fundamental Theorems of Calculus First	2%
2/4	CLO-1 Student capable determine solution problem simple integrally	Accuracy understand material related	Task (2%)	Studying : explanation draft discussion and question and answer		Students look for references and study material using TDK II and the substitution			Fundamental Theorems of Calculus Second	2%

	related of course use concept that has been studied	Accuracy in answer question task Neatness processing task Originality results task		course material [1 x 2 x 50 minutes] Tutorial 2 [1 x 2 x 50 minutes]		method to calculate definite integrals [2 x 2 x 120 minutes]				
	CLO-2 Student capable generalize problem related rule rank in method substitution for integral . (CP-3)	Accuracy understand material related Accuracy in answer question task	MIDTERM EXAM (4%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Student look for reference and study material use method substitution in calculating definite integrals [2 x 2 x 120 minutes]			Substitution method	4%
3/5	CLO-1 Student capable determine solution problem simple integrally related of course use concept that has been studied	Accuracy understand material related Accuracy in answer question task Neatness processing task	MIDTERM EXAM (2%) Quiz (4%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Students look for references and study material to determine the average integral value of a given function [2 x 2 x 120 minutes]			Mean Value Theorem for Integrals and Symmetries	6%

		Originality results task								
3 /6	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (3%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes] Tutorial 3 [1 x 2 x 50 minutes]		Student look for reference and study material count wide an area (on a plane) that is bounded by several curve [2 x 2 x 120 minutes]			Area Assistant	3%
4/7	CLO-3	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (3%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Students look for references and study material calculate the volume of rotating objects using the disk/ring method And calculate the volume of an object with a certain cross-section using the parallel slice method			Volume of objects turn and objects with cross section certain	3%

						[2 x 2 x 120] minutes				
4/8	CLO-3	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (2%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes] Tutorials [1 x 2 x 50 minutes]		Students look for references and study material on calculating the volume of rotating objects using the tubular shell method [2 x 2 x 120] minutes			Volume of objects turn Tutorial Lecturer	2%
5/9	CLO-3	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (1%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Student look for reference and study material count Work done by someone style (as a definite integral) [2 x 2 x 120] minutes			Work and style fluid	1%
						Students look for references			Moment and Center of Mass	

						and study the material - calculate moments and determine the center of mass of a mass distribution on lines and planes - Using Pappus' Theorem to calculate the volume of a rotating object obtained by rotating an area with a known center of mass about a rotation axis. [2 x 2 x 120] minutes			Assistant	
5/10	CLO-4	Accuracy understand material related Accuracy in answer question task	MIDTERM EXAM (2%)	Studying : explanation draft discussion and question and answer course material		Students look for references and study material determine the derivative of the natural logarithm			Function Natural logarithm	2%

		Neatness processing task Originality results task		[1 x 2 x 50 minutes]		function and its variance determine the indefinite integral of 1/u and its variants decreasing the function logarithmically [2 x 2 x 120] minutes				
6/11	CLO-4	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task	MIDTERM EXAM (4%) Task (4%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes] Tutorials [1 x 2 x 50 minutes]		Students look for references and study material determine the inverse of a function and its derivative determine the derivative of the natural exponential function and its variant determine the indefinite			Inverse functions and their derivatives Natural exponential function Tutorial Lecturer	**8%**

						integral of e^u and its variants [2 x 2 x 120] minutes				
6/12	CLO-4	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50 minutes]		Student look for reference and study material determine derivative from function logarithm general and complete equality related differentials with problem growth and decay exponential . [2 x 2 x 120] minutes			Generalized exponential and logarithmic functions Growth and decay of exponential functions	
7/13	CLO-4	Accuracy understand material related Accuracy in answer question task	MIDTERM EXAM (2%) Quiz (3%)	Studying : explanation draft discussion and question and answer course material		Student look for reference and study How finish equality 1st order linear differentials and relevant problems			Equality 1st order linear differentials and relevant problems Function inverse trigonometry	5%

		Neatness processing task Originality results task		[1 x 2 x 50] minutes		determine derivative function Inverse trigonometry and corresponding integrals [2 x 2 x 120] minutes			and its derivatives	
7/14	CLO-4	Accuracy understand material related Accuracy in answer question task Neatness processing task Originality results task		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes Tutorials [1 x 2 x 50] minutes		Student look for reference and study How determined derivative function hyperbolic and inverse [2 x 2 x 120] minutes			Hyperbolic trigonometric functions Assistant Tutorial Lecturer	
Midterm Exam (30%)										
8/15	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related	• Accuracy understand material related • Accuracy in answer	FINAL EXAM (4%)	Studying : explanation draft discussion and question and answer course material		Students look for references and study lecture material - know the standard integral form and can change		• LMS	Basic rules of integration Partial integration	4%

	problems with integral, (CP-2, CP- 4)	question task • Neatness processing task • Originality results task		[2 x 3 x 50 minutes]		the given integral form to integral form by substitution of variables. - calculating integrals using partial integration techniques. [2 x 2 x 120 minutes]				
8/16	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Students look for references and study lecture material to calculate several trigonometric integrals [2 x 2 x 120] minutes		• LMS • Zoom	Trigonometric integrals Tutorial Lecturer	
9/17	CLO-3 Student own pattern think critical , logical , and systematic , as well	• Accuracy in explaining and understanding	FINAL EXAM (4%)	Studying : explanation draft discussion and question and answer		Students look for references and study lecture material calculating integrals by rationalizing		LMS	Rationalizing substitution techniques	4%

	creativity in solve related problems with integral, (CP-2, CP- 4)	related material • Accuracy in answer question quiz		course material [1 x 2 x 50] minutes		substitution method [2 x 2 x 120 minutes]				
9/18	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Students look for references and study lecture material calculating integrals of rational functions using partial fractions [2 x 2 x 120 minutes]			Integrals of rational functions Assistant	
10/19	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •	FINAL EXAM (4%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Students look for references and study lecture material - calculate shape limits not Of course type 0/0 uses Rule l'Hopital - count limt not of course type other [2 x 2 x 120 minutes]			Indefinite form of type 0/0 Other indefinite forms	4%

10/20	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Student look for reference and study How calculating integrals reasonable with no limits finite [2 x 2 x 120 minutes]			Improper integral with infinite limit Tutorial lecturer	
11/21	CLO-3 Student own pattern think critical , logical , and systematic , as well creativity in solve related problems with integral, (CP-2, CP- 4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •		Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Student look for reference and study How calculating integrals reasonable with integrand not infinite . [2 x 2 x 120 minutes]			Improper integral with infinite integrand limit	
11/22	CLO-5 Student capable finish problem related sequence and series Infinity use	• Accuracy in explaining and understanding	FINAL EXAM (3%)	Studying : explanation draft discussion and question and answer		Students look for references and study coconvergence of a sequence, and calculating			Infinity sequence Assistant	3%

	concept that has been studied	related material • Accuracy in answer question quiz •		course material [1 x 2 x 50] minutes		the limit if it exists. [2 x 2 x 120 minutes]				
12/23	CLO-5 Student capable finish problem related sequence and series Infinity use concept that has been studied	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •	FINAL EXAM (3%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Students look for references and study the convergence of a series, and calculate the sum if possible. [2 x 2 x 120 minutes]			Infinity series	3%
13/26	CLO-6 Students are able to determine the convergence of a sequence and an infinite series using the right method. (CP-4)	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •	FINAL EXAM (4%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Students look for references and study absolute/conditional convergence of a series of signs, determine the convergence interval of a power series			Sign Substitution Series: Absolute convergence and conditional convergence Row rank	4%

						[2 x 2 x 120 minutes]				
13/27	CLO-5 Student capable finish problem related sequence and series Infinity use concept that has been studied	• Accuracy in explaining and understanding related material • Accuracy in answer question quiz •	FINAL EXAM (3%)	Studying : explanation draft discussion and question and answer course material [1 x 2 x 50] minutes		Student look for reference and study How do operation on row rank (known amount) for get row rank others and their amounts - determine the Taylor series and Maclaurin series of a function around a specified point [2 x 2 x 120 minutes]			Operations on power series Taylor Series and Maclaurin Series Assistant	3%
	CLO-5 Student capable finish problem related sequence and series Infinity use concept that has been studied	•				Student look for reference and study How determine Taylor's approach to something function all around given and			Taylor's approach to function	

						determining point estimate the mistake [2 x 2 x 120 minutes]				
14/28				Discussion Quiz 5%		Material review			Tutorial lecturer Assistant	5%

II. Weight Evaluation

1. Weight Evaluation Every Form Assessment

NO	Form Assessment	WEIGHT (%)
1	Mid-Term Exam	30 %
2	Final Exam	30%
3	Quizzes	20 %
4	Homework	20 %
TOTAL		**100**

Note: Quizzes can be carried out in tutorial classes

2. Weight Evaluation Every Achievements Course Learning

- CLO-1: 18 %
- CLO-2: 12%
- CLO-3: 22 %
- CLO-4: 15 %
- CLO-5: 18 %
- CLO-6: 15 %

I. Plan Table Assessment

CLOs	Form of assessment				
	Mid-Term Exam (%)	Final Exam (%)	Quizzes (%)	Homework (%)	Total
1. Students are able to determine solutions to simple problems related to integrals using the concept of definite integrals (CP-2)	9%		4%	5%	18%
2. Students capable generalize problem related rule rank in method substitution for integral (CP-3)	4%		3%	5%	12%

3. Students have critical, logical and systematic thinking patterns, as well as creativity in solving problems related to integrals, (CP-4)	9%	12%	1%		22%
4. Students are able to determine derivatives and integrals of transcendent functions and their variants (CP-2, CP-3)	8%		4%	3%	15%
5. Students capable finish problem related sequence and series Infinity use concept that has been studied (CP-2)		9%	4 %	5%	18%
6. Students are able to determine the convergence of an infinite series and series using the correct method. (CP-4)		9%	4%	2%	15%
Total Weight	30%	30%	20%	20%	100%

Matrix of CLOs and ILOs

CLOs	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				✓	✓	✓				✓	✓																					
7				✓	✓	✓							✓																			

Task	Task Type	Recommended Questions (reference [1])