SEMESTER STUDY PLAN (SSP) APPLIED ABSTRACT ALGEBRA (ELECTIVE COURSES)



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
APPLIED ABSTRACT	Г ALGEBRA	MAT61213	https://sci.ilea	rn.unand.ac.id	3	5	14 May 2024
Person in Charge		Study Plan Creator Head of Res			search Group	Head of	Study Program
		Prof. Dr. I Made	e Arnawa, M.Si.	Nova Noliz	a Bakar, M.Si	Dr. No	overina Alfiany
Intended Learning Outcomes (ILO) and	Intended Lea	rning Outcome	s				
Performance	ILO-1	Possesses a good ethics and integrity					
Indicator (PI)		PI-1: An ability	to explain acad	emic ethics and	l integrity		
		PI-2: An ability	to act in accord	ance with acad	emic ethics		
		PI-3: An ability to act in accordance with academic integrity					
	ILO-2	Possesses	profound know	ledge of the ba	sic concept math	nematics	
		PI-1: An a	bility to explain	basic mathema	atical concepts		
		PI-2: An a	ability to provide	e examples that	are relevant to b	oasic mathema	tical concepts
		PI-3: An ability to determine solutions to simple problems using basic mathematical					nathematical
		concepts					
	ILO-3	An ability	v to identify, exp	lain and genera	alize simple mat	hematical	

	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 basic mathematical concepts and techniques in solving simple mathematical
	problems.
	PI -1: An ability to choose the right basic mathematical concepts and techniques in solving
	simple mathematical problems.
	PI -2: An ability to illustrate simple mathematical problems based on basic concepts and
	techniques of appropriate mathematics.
	PI -3: An ability to solve simple mathematical problems using appropriate basic mathematical
	concepts and techniques.
ILO-5	An ability to 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

PI-3: An ability to process data using available technology in simple mathematical
problems or other fields
PI-4: An ability to conclude and interpret data processing results for simple mathematical
problems or other fields
PI-5: An ability to design an algorithm to solve simple mathematical problems or other
fields
An ability to communicate effectively especially in the area of mathematics in with diverse
communities
PI-1: An ability to convey ideas or study results orally, especially in the field of mathematics
PI-2: An ability to present ideas or study results in writing, especially in the field of mathematics
PI-3: An ability to respond to feedback given
Able to work in a team.
PI-1: An ability to actively participate in a team with full responsibility
PI-2: An ability to respond well to any feedback within the team
PI-3: An ability to complete tasks according to the set schedule
PI-4: An ability to adapt in a team
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
PI-2: An ability to carry out literature studies
PI-3: An ability to prepare and realize final project plans
PI-4: An ability to use mathematical concepts in identifying business opportunities
ning Outcomes (CLO)
Students are able to explain concepts in number theory along with related properties (ILO-3)

1	CIO_2	Students can understand the concept of cryptology, how to change ordinary manuscripts into						
	CLO-2	source arrives and how to charge source menuscripts into andinamy menuscripts into						
		secret scripts, and now to change secret manuscripts into ordinary manuscripts with various						
		classical cryptographic methods (ILO-3, ILO-4)						
	CLO-3	Students can find the forms of linear congruence needed to inscribe and or decrypt manuscripts						
		(ILO-4, ILO-5)						
	CLO-4	Students can understand the concept of lattice and related properties (ILO-4, ILO-5)						
	CLO-5	Students able to understand the concepts of Boolean Algebra and related properties (ILO-4,						
		ILO-5, ILO-6)						
	CLO-6	Students can explain the application of Boolean Algebra to logic circuits (ILO-4, ILO-5, ILO-6)						
Brief Description	The Applied abstract Alge history of cry and its prop- equipped wi Euclid algori	Abstract Algebra course aims to introduce the basics of applying the concepts and properties of ebra, in this case, to cryptography and to simplify a series of logical gates. In Cryptography, the ptography and classical cryptography will be discussed. In contrast, the concept of Boolean Algebra erties will be discussed in simplifying the series of logic gates. In this lecture, students will be the mathematical concepts needed in cryptography: basic number theory, ring integer modulo n, thm, inverse multiplication in ring modulo n, and introduction to the finite field.						
Course Materials	1.Basics2ring ir3Group4Histor5Monog6Polygr7Lattice8Boolea9Logic	of number theory ateger modulo n and inverse multiplication in ring modulo n Matrix on ring \Box_n y of cryptography graphic encoding raphic coding e in algebra gates						

References	Main: [1] Judson, T. W. 2020. Abstract Algebra [2] Kromodimoeljo, S. 2009. Teori dan Ag Aditional: [3] Lidl, R. & Pilz, G. 2009. Applied Abstract	dson, T. W. 2020. <i>Abstract Algebra Theory and Applications</i> . Texas: PWS Publishing omodimoeljo, S. 2009. <i>Teori dan Aplikasi Kriptografi</i> . Jakarta: SPK IT Consulting I: II, R. & Pilz, G. 2009. Applied Abstract Algebra. New York: Springer-Verlag Inc.					
Learning Media	Hardware:						
	 LMS Unand (<u>https://sci.ilearn.unand.ac.id/</u>) Zoom Meeting / Microsoft Teams WhatsApp 	 Computer / Laptop Smartphone LCD Projector 					
Team Teaching	◆ Prof. Dr. I Made Arnawa, M.Si.						
Required courses	Algebraic Structures (MAT62112)						
Academic Norms	<u>nttps://akademik.unand.ac.id/images/2022-03-</u> 30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan- khusus%20Bab%20II.pdf						

Weekly Study Plan

Week/ Meet	Course Learning	Indicator (3)	Assessment	Activi	Subject, references (10)	Weight
(1)	Outcomes (2)		(±)	Synchronous*		

				Face to face Offline (5)	Face to face Online (6)	Individual (7)	Collaboratio n (8)	Media (9)		
1/1	CLO-1	Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 				 Learning Slides / Videos LMS (iLearn Unand) 	Assessment Rules, RPS, Syllabus; Tuition Contract; Course overview; Largest common factor, division algorithm [1],[2],[3]	25%
2/2	CLO-1	Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 				 Learning Slides / Videos LMS (iLearn Unand) 	addition and multiplication modulo 26 [1],[2],[3]	
3/3	CLO-1	Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 				 Learning Slides / Videos LMS (iLearn Unand) 	Linear congruence and linear congruence systems [1],[2],[3]	

4 / 4	CLO-1	Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 menit 	1.Structured Assignment [1 x 3 x 120 minutes]		 Learning Slides / Videos LMS (iLearn Unand) 	Addition, multiplication, determinants of m x m matrices whose entries are elements in \Box_n (GL(m,n \Box)) [1],[2],[3]	
5 / 5	CLO-2	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 	1.Self-Paced Learning [1 x 3 x 120 minutes]		 Learning Slides / Videos LMS (iLearn Unand) 	History of cryptography [1],[2],[3]	15%
6 / 6	CLO-2	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 	1.Structured Assignment [1 x 3 x 120 minutes]		 Learning Slides / Videos LMS (iLearn Unand) 	Crypto monograph [1],[2],[3]	
7 / 7	CLO- 3	 Accuracy, depth, and completeness in understanding 	Activeness in lectures; Homework, Quiz, Mid- term Exam	 Explanation of Lecture Material Discussion and Q&A of 		1. Collaborati ve Learning [1 x 3 x 120 minutes]	1. Learning Slides / Videos	Polygraphic Cryptography [1],[2],[3]	15%

		and applying mathematical concepts and properties		Lecture Material [1 x 3 x 50 minutes]			◆ LMS (iLearn Unand)		
8				Γ	Mid-Term Exan	ı			30%
9 / 8	CLO-4	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures, Homework, Quizzes, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 			 Learning Slides / Videos LMS (iLearn Unand) 	Partially ordered set (poset) [1],[2],[3]	15%
10 / 9	CLO-4	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures, Homework, Quizzes, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 			 Learning Slides / Videos LMS (iLearn Unand) 	Define of Laticce [1],[2],[3]	
11 / 10	CLO-4	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures; Homework, Quiz, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 		1.Self-Paced Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn Unand) 	Hasse and Sub laticce diagrams [1],[2],[3]	

12 / 11	CLO-5	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Keaktifan Activeness in lectures; Homework, Quiz, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 	1.Structured Assignment [1 x 3 x 120 minutes]		 Learning Slides / Videos LMS (iLearn Unand) 	Properties of two values Laticce [1],[2],[3]	15%
13 / 12	CLO-5	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures; Homework, Quiz, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 		1. Collaborati ve Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn Unand) 	Properties of two values Laticce [1],[2],[3]	
14 / 13	CLO-6	 Accuracy, depth, and completeness in understanding and applying mathematical concepts and properties 	Activeness in lectures; Homework, Quiz, Final Exam	 Explanation of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 			 Learning Slides / Videos LMS (iLearn Unand) 	Types of basic gates of logic [1],[2],[3]	15%
15 / 14	CLO-6	 Accuracy, depth, and completeness in understanding 	Activeness in lectures, Homework, Quizzes, Final Exam	 Explanation of Lecture Material Discussion and Q&A of 			1. Learning Slides / Videos	Application of the properties of two-value Laticce in the simplification of	

	and applying mathematical concepts and properties	Lecture Material [1 x 3 x 50 minutes]		◆ LMS (iLearn Unand)	basic gate circuits of logic	
16 - 18 -		Final Exan	L			30%

1. Indicators, Criteria, and Assessment Weights

1. Assessment Weights of Each Form of Assessment:

 1) Homework
 : 30%

 2) Quiz
 : 10%

 3) Mid-term Exam
 : 30%

 4) Final Exam
 : 30%

1. Assessment Weight of Each Course Learning Outcome (CLO):

1)	CLO-1	: 20%
2)	CLO-2	: 15%
3)	CLO-3	: 15%
4)	CLO-4	: 20%
5)	CLO-5	: 15%
6)	CLO-6	: 15%

1. Assessment Plan Table

Forms of Assessment	Homework			Quiz		Mid- Term	Final	Total
CLO	1	2	3	1	2	Exam	Exam	Weight
CLO-1								
Students can explain concepts in number theory	5%			5%		10%		20%
along with related properties (ILO-3)								
CLO-2								
Students can understand the concept of cryptology,								
how to change ordinary manuscripts into secret	5%					100/		1 - 0/
scripts, and how to change secret manuscripts into						10%		15%
ordinary manuscripts with various classical								
cryptographic methods (ILO-3, ILO-4)								
CLO-3								
Students can find the forms of linear congruence	5%					10%		15%
needed to inscribe and or decrypt manuscripts (ILO-								
4, ILO-5)								
CLO-4								
Students can understand the concept of lattice and	5%			5%			10%	20%
related properties (ILO-4, ILO-5)								
CLO-5								
Students can understand the concepts of Boolean	5%						10%	15%
Algebra and related properties (ILO-4, ILO-5, ILO-6)								

CLO-6								
Students can explain the application of Boolean	5%						10%	15%
Algebra to logic circuits (ILO-4, ILO-5, ILO-6)								
Total Weight	30%	0	0	10%	0	30%	30%	100%