SEMESTER STUDY PLAN INTRODUCTION TO TOPOLOGY (ELECTIVE 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 1	Name		Course Code	URL I-L	learn	Credits	Semester	Compilation Date		
Intoduction to	o Topology	7	MAT61223	https://sci.ilearn	n.unand.ac.id	3	5	14 May 2024		
Dorson In	Chargo		Study Pla	n Creator	Head of R	esearch Group	Head of	Study Program		
	Charge		Dr. Shelv	i Ekariani	Dr. H	aripamyu	Dr. No	overina Alfiany		
	Intended	d Learning O	utcomes							
Intended Learning	ILO-2	Possesses p	profound knowle	dge of the basic c	concept mathe	ematics				
Outcomes (ILO) and		PI-1: An al	oility to explain the	he basic concept	mathematics					
Performance Indicator		PI-2: An al	oility to give exar	nples related to t	he basic conce	ept mathematics				
(PI)		PI-3: An al	oility to determin	e solution of the	simple proble	ems using the bas	si concept ma	athematics		
	ILO-3	An ability t	to identify, explai	in and generalise	simple math	ematical	•			
		PI-1: An ab	vility to identify s	imple mathemati	cal problems					
		PI-2: An ab	-2: An ability to explain simple mathematical problems							
		PI-3: An ab	vility to generalise	e simple mathem	atical problem	ns				
	ILO-4	An ability (to use concept an	d fundamental te	echnique of m	athematics in sol	ving simple	mathematical		
		prol	blems		1		0 1			
		PI-1: An al	bility to illustrate	simple mathema	tical problem	ns based on appro	priate basic	mathematical		
		conce	epts and techniqu	ies	-		-			
		PI-2: An al	bility to illustrate	simple mathema	itical problem	ns based on appro	opriate basic	mathematical		
		conce	epts and techniqu	ies						
		PI-3: An a	bility to solve sin	nple mathematica	al problems u	sing the proper c	oncept and r	nathematical		
		funda	amental techniqu	les						
	ILO-5	An ability	formally and cor	natical statements	s using facts a	and methods that				
		have been	e been studied							
		PI-1: An a	bility to identify	the formal struct	ures and anal	ogy forms in mat	hematics			

		PI-2: An ability to use fact and apply methods in proving simple mathematical statement
		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
	Course	Learning Outcomes
	1	Students are able to master the basic concepts of set theory and vector spaces. (ILO-2: PI-1)
		Students are able to understand the concept of space and apply it to solve mathematical problems. (ILO-
	2	4: PI-1, PI-2, PI-3)
		· · ·
		Students are able to understand the generalization of the concept of sequence convergence in topological
	3	spaces. (ILO-3 : PI-3)
		Students are able to reason intuitively and analytically, and express their reasoning results in a written,
	4	systematic, and rigorous manner. (ILO-5: PI-1-3)
Brief Description	In this c	yourse, the basic theory of topological spaces and several related theories are explained. Specifically, the
Differ Description	atu da a	f this introduction to topological spaces and several related incones are explained, specifically, the
	study 0	I this introduction to topology is influent to definitions, examples, and properties contained within
	topolog	ical spaces. Therefore, foundational knowledge from the Real Analysis 1 course is required.
	The init	ial topics in this course include sets and vector spaces, inner product spaces, normed spaces; convergence
	and con	nal topics in this course include sets and vector spaces, initer product spaces, normed spaces, continuous mannings
		inpleteness, metric spaces, definitions and examples of metrics, open and closed sets, continuous mappings,
	topolog	ical spaces: definitions and examples, basic concepts, bases, and sub-bases of open sets.
	To enha	ance students' understanding, this course is also supplemented with auizzes and assignments, both group
	and ind	ividual
	1	

Course Materials	Set theory, vector space, inner pro	duct space, metric space, topological space.
References	Main:	
	1. E. Kreyszig. (1978). Introductory	Functional Analysis with Application. John & Wiley, New York
	2. G. F. Simmons, Introduction to T	opology and Modern Analysis, 1983.
	Additional:	
	3. N. Young. (1988). An Introductio	n to Hilbert Space. Cambridge University Press
Learning Media	Software:	Hardware:
	• LMS Unand	Computer/Laptop
	(<u>http://fmipa.ilearn.unand.ac.id</u>	• Smartphone
	L)	
	Whatsapp	
Team Teaching	Dr. Shelvi Ekariani	
	Line and A. Outerra Mid Tana	
Assessment	Homework, Quizzes, Mid-Term exar	n, Final exam
	L Calculura 1 Calculura 7	

Weekly Study Plan

			_			Subject,	Weight			
Week/ Meet	Course Outcomes (2)	Indicator	Assessmen	Synchro	onus*	Asynchi	ronus**	Media (9)	references (10)	(11)
(1)	outcomes (2)	(5)		Face to face Offline (5)	Face to face Online (6)	Individual (7)	Collaboration (8)			
1	CLO-1 Ability to master the basic concepts of inner product spaces, Hilbert spaces, normed spaces, Banach spaces, Banach spaces, functionals and operators, as well as their related	 Discipline in carrying out the course contract. Accuracy in understanding related material. 	Non test: - Test Mid-Term exam: 3%	 Teaching and discussion: Explanation of Semester Learning Plan explanation of learning material explanation of the task explanation of the assessment [1 × 3 × 50 minutes] 	 Teaching and discussion: Explanation of Semester Learning Plan explanation of learning material explanation of the task explanation of the task explanation of the task (Specific conditions: The total number of blended learning 	Students read and study learning materials related to real number systems and their properties		 PPT I learn (LMS Unand) (Specific condition Zoom meeting, WA group, learning video) 	 Course Introductio n Definition, properties, and examples of sets and vector spaces References: Main Reference 1. 	3%

	properties. (ILO-2 : PI- 1, PI-2, PI-3)				meetings is 40% of the total number of meetings)				
2	CLO-1 Ability to master the basic concepts of inner product spaces, Hilbert spaces, normed spaces, Banach spaces, Banach spaces, metric spaces, functionals and operators, as well as their related properties.	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Test Mid-Term exam: 7%	Lectures and discussions [1 × 3 × 50 minutes]		Students read and study materials from the main reference and others.	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	 Definition of inner product space Examples of inner product spaces Properties of inner product spaces Reference: Main Reference 1. 	7%

	(ILO-2: PI-1, PI-2, PI-3) CLO-2 Ability to apply the basic properties learned to solve problems related to the course material. (ILO-4: PI-1, PI-2, PI-3)								
3-4	CLO-1 Ability to master the basic concepts of inner product spaces, Hilbert spaces, normed spaces, Banach	•	Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments	Non test: Test Mid-Term exam: 3%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others.	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	 Definition of normed spaces Examples of normed spaces Properties of normed spaces Parallelogr am inequality 	3%

spaces, metric spaces, functionals and operators, as well as their related properties. (ILO-2 : PI-1,	•	Originality of assignment results				 Polarizatio n Identity Definition of continuous function Reference: Main Reference 1. 	
CLO-2 Ability to apply the basic properties learned to solve problems related to the course material. (ILO-4 : PI-1, PI-2, PI-3)							
CLO-4 Ability to identifying							

	the formal structure of statements related to the course material and their analogous forms. (ILO- 5 : PI-1-4)							
5	CLO-2 Ability to apply the basic properties learned to solve problems related to the course material. (ILO-4 : PI-1, PI-2, PI-3) CLO-4 Ability to identifying the formal structure of	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Test: Mid-Term exam: 5%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video 	 Definition of metric spaces Examples of metric spaces Reference: Main Reference 1. 	5%

	statements related to the course material and their analogous forms. (ILO- 5 : PI-1-4)							
6	CLO-3 Ability to generalizing problems related to the subject matter of this course. (ILO-3 : PI-1, PI-2, PI-3)	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Test Mid-Term exam: 5%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	 Open sets Closed sets Reference: Main Reference 1. 	5%
7	CLO-4 Ability to identifying the formal structure of statements	 Accuracy in understandin g related material Accuracy in answering 	Non test: Test Mid-Term exam: 7%	Lectures and discussions $[1 \times 3 \times 50$ minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, 	Definition of continuous function	7%

	related to the course material and their analogous forms. (ILO- 5 : PI-1-4)	 assignment questions Neatness in completing assignments Originality of assignment results 					WA group, learning video)		
8			·	·	MID-TERM	EXAM		· /	
9	CLO-2 Ability to apply the basic properties learned to solve problems related to the course material. (ILO-4 : PI- 1, PI-2, PI-3)	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test : Test Final exam: 7% Quizzes: 3%	Lectures and discussions [1 × 3 × 50 minutes]		Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	 Definition of topology Examples of topology spaces Reference: Main Reference 1. 	10%
10	CLO-3 Students are able to understand the generalizati	 Accuracy in understandin g related material Accuracy in answering 	Non test: Test Final exam: 2%	Lectures and discussions $[1 \times 3 \times 50$ minutes]		Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom 	 Concept of open set Concept of closed set Examples and related 	2%

	on of the concept of sequence convergenc e in topological spaces. (ILO-3 : PI- 3)	 assignment questions Neatness in completing assignments Originality of assignment results 				meeting, WA group, learning video)	properties of open and closed set	
11	CLO-3 Students are able to understand the generalizati on of the concept of sequence convergenc e in topological spaces. (ILO-3: PI- 3) CLO-4 Ability to identifying the formal structure of	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Test Final exam: 1%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	 Concept of topological spaces Examples and related properties of topological spaces 	1%

	statements related to the course material and their analogous forms. (ILO- 5 : PI-1-4)							
12	CLO-4 Ability to identifying the formal structure of statements related to the course material and their analogous forms. (ILO- 5: PI-1-4)	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Test Final exam: 5%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	Definition of bases and open sub bases	5%
13	CLO-4 Ability to identifying the formal structure of	 Accuracy in understandin g related material Accuracy in answering 	Non test: Test Final exam: 5% Quizzes: 2%	Lectures and discussions $[1 \times 3 \times 50$ minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: 	Examples of bases and sub bases	7%

	statements related to the course material and their analogous forms. (ILO-5 : PI- 1-4)	 assignment questions Neatness in completing assignments Originality of assignment results 				Zoom meeting, WA group, learning video)		
14	CLO-4 Ability to identifying the formal structure of statements related to the course material and their analogous forms. (ILO- 5: PI-1-4) Analysis. (ILO-9: PI- 1)	 Accuracy in understandin g related material Accuracy in answering assignment questions Neatness in completing assignments Originality of assignment results 	Non test: Homework : 15% Test Final exam: 5% Quizzes: 5%	Lectures and discussions [1 × 3 × 50 minutes]	Students read and study materials from the main reference and others	 PPT I learn (LMS Unand) (Specific condition: Zoom meeting, WA group, learning video) 	Examples of bases and sub bases	25%
15	CLO-4 Ability to identifying the formal	Accuracy in understandin	Non test: Homework : 10%	Lectures and discussions	Students read and study materials from the main	 PPT I learn (LMS Unand) 	Materi review	20%

	structure of statements related to the course material and their analogous forms. (ILO- 5 : PI-1-4)	g related material • Accuracy in answering assignment questions • Neatness in completing assignments • Originality of assignment results	Test Final exam: 5% Quizzes: 5%	[1 × 3 × 50 minutes]		reference and others	 (Specific condition: Zoom meeting, WA group, learning video) 		
								Total Weight	100%
16					FINAL EX	AM			

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	Mid-Term Exam	30
2	Final Exam	30
3	Homework	25
4	Quizzes	15
	100	

- 2. Assessment weight for Intended Learning OutcomeCLO-1: 25 %

 - CLO-2: 25 %
 - CLO-3: 25 %
 - CLO-4: 25 %

Assessment Plan Table:

No.	CLO	Homework (%)	Quizess (%)	Mid-Term Exam	Final Exam (%)	Weigth (%)
				(%)		
1	Ability to master the					
	basic concepts of					
	inner product spaces,					
	Hilbert spaces,					
	normed spaces,					
	Banach spaces,			5	5	10
	metric spaces,			5	5	10
	functionals and					
	operators, as well as					
	their related					
	properties. (ILO-2:					
	PI-1, PI-2, PI-3)					
2	Ability to apply the					
	basic properties			10	5	15
	learned to solve			10		15
	problems related to					

	the course material.					
	(ILO-4 : PI-1, PI-2, PI-					
	3)					
3	Ability to					
	generalizing					
	problems related to			10		10
	the subject matter of			10		10
	this course. (ILO-3:					
	PI-1, PI-2, PI-3)					
4	Ability to identifying					
	the formal structure					
	of statements related			5	10	20
	to the course material		Quizzes: 5	5	10	20
	and their analogous					
	forms. (ILO-5: PI-1-4)					
	Total	25	15	30	30	100

Matrix of CLO and ILO

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