

SEMESTER STUDY PLAN
CAPITA SELECTA ON ANALYSIS
(ELECTIVE COURSE)
(Project Based Learning 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
Capita Selecta on Analysis		MAT62225	https://sci.ilearn.unand.ac.id	3	6	11 May 2024
Person In Charge		Study Plan Creator		Head of Research Group		Head of Study Program
		Dr. Shelvi Ekariani Dr. Haripamyu		Dr. Haripamyu		Dr. Noverina Alfiany
Intended Learning Outcomes (ILO) and Performance Indicator (PI)	Intended Learning Outcomes					
	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				
	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-7	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
	ILO-8	An ability to work in 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
	Course Learning Outcomes	
	1	An ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4 : PI-1, PI-2)
	2	An ability to prove applicable properties. (ILO-5 : PI-1, PI-2, PI-3)
	3	An ability to solve problems related to the applications of Analysis. (ILO-8 : PI-1, PI-2)
	4	An ability to present research reports and produce significant outcomes. (ILO-7 : PI-1, PI-2)
	5	An ability to work independently. (ILO-8 : PI-1, PI-2)
Brief Description	Project-Based Learning (PjBL) is a teaching method that utilizes projects/activities as a medium. Students engage in exploration, assessment, interpretation, synthesis, and gathering information to produce various forms of learning outcomes. In this course, students learn about the concepts of convexity, convergence, compactness, and completeness in normed linear spaces; Geometry, orthogonality, linear functionals in Hilbert spaces, Basic approximation methods in analysis. Furthermore, students independently study articles related to the basic concepts covered.	

Course Materials	1. Convexity, convergence, compactness, and completeness in normed linear spaces 2. Geometry, orthogonality, linear functionals in Hilbert spaces 3. Basic approximation methods in analysis 4. Material covered in articles related to the basic concepts discussed	
References	Main:	
		1. W. Cheney. (2001). <i>Analysis for Applied Mathematics</i> . 2 nd edition. Springer, New York.
	Additional:	
		2. E. Kreyszig. (1978). <i>Introductory Functional Analysis with Applications</i> . John Wiley & Sons. Inc.
Learning Media	Software:	Hardware:
	• LMS Unand (http://fmipa.ilearn.unand.ac.id/) • Zoom meeting • Whatsapp	• Computer/Laptop • Smartphone
Team Teaching	Dr. Shelvi Ekariani Dr. Haripamyu	
Assessment	Homework, Mid-Term exam, Final exam/ Project Presentation, Project Report	
Required courses	Real Analysis 1, Real Analysis 2	
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]					Subject, references (10)	Weight (11)
				Synchronous*		Asynchronous**		Media (9)		
				Face to face Offline (5)	Face to face Online (6)	Individual (7)	Collaboration (8)			
1-2	CLO-1 Ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4: PI-1, PI-2)	● Discipline in carrying out the course contract. ● Accuracy in understanding related material.	Non Test: Test: Mid-Term exam: 10%	Teaching and discussion: - Explanation of Semester Learning Plan - explanation of learning material - explanation of the task - explanation of the assessment [2 × 3 × 50 minutes]	Teaching and discussion: - Explanation of Semester Learning Plan - explanation of learning material - explanation of the task - explanation of the assessment [2 × 3 × 50 minutes] (Specific conditions: The total number of	Students read and study learning materials related to real number systems and their properties. [2 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken. [2 × 3 × 60 minutes]	● PPT ● I learn (LMS Unand) ● (Specific condition: Zoom meeting, WA group, learning video)	● Course Introduction ● Reviewing the material on concepts, definitions, and examples of normed spaces. ● Convexity, convergence, compactness, and completeness References: Main Reference 1.	10%

					blended learning meetings is 40% of the total number of meetings)					
3-4	CLO-2 Ability to prove applicable properties. (ILO-5: PI-1, PI-2, PI-3)	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness in completing assignments • Originality of assignment results	Non Test : Homework 1: 5% Test: Mid-Term exam: 10%	Lectures and discussions [2 × 3 × 50 minutes]		Students read and study materials from the main reference and others. [2 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken. [2 × 3 × 60 minutes]	• PPT • I learn (LMS Unand) • (Specific condition: Zoom meeting, WA group, learning video)	• Reviewing the material on Hilbert spaces and examples. • Approximation methods in analysis. Reference: Main Reference 1.	15%
5-7	CLO-3 Ability to solve problems related to the applications of Analysis.	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness in completing assignments	Non test: Homework 2: 5% Test	Lectures and discussions [3 × 3 × 50 minutes]		Students read and study materials from the main reference and others. [3 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken.	• PPT • I learn (LMS Unand) • (Specific condition: Zoom meeting, WA group,	• Fourier Transform • Additional Topics Reference: Main Reference 1.	5%

	(ILO-8: PI-1, PI-2)	• Originality of assignment results					[3 × 3 × 60 minutes]	learning video)	Additional Reference 2.	
8	MID-TERM EXAM									
9-10	CLO-1 Ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4: PI-1, PI-2)	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness in completing assignments • Originality of assignment results	Non Test: Test Progress of Project Report: 5%	Lectures and discussions [2 × 3 × 50 minutes]		Students read and study materials from the main reference and others [2 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken. [2 × 3 × 60 minutes]	• PPT • I learn (LMS Unand) • (Specific condition: Zoom meeting, WA group, learning video)	• Identification and formulation of project problems, • Identification of method selection, • Project scheduling determination Reference: Main Reference 1. Additional Reference 2.	5%
11-12	CLO-2 Ability to prove applicable properties. (ILO-5: PI-1, PI-2, PI-3) CLO-5	• Accuracy in understanding related material • Accuracy in answering assignment questions	Non test: Test Progress of Project Report: 20%	Lectures and discussions [2 × 3 × 50 minutes]		Students read and study materials from the main reference and others [2 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken.	• PPT • I learn (LMS Unand) • (Specific condition: Zoom meeting, WA group,	Progress of project tasks	20%

	Ability to work independently. (ILO-8: PI-1, PI-2)	• Neatness in completing assignments • Originality of assignment results					[2 × 3 × 60 minutes]	learning video)		
13-14	CLO-3 Ability to solve problems related to the applications of Analysis. (ILO-8: PI-1, PI-2) CLO-5 Ability to work independently. (ILO-8: PI-1, PI-2)	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness in completing assignments • Originality of assignment results	Non test: Test Progress of Project Report: 20%	Lectures and discussions [2 × 3 × 50 minutes]		Students read and study materials from the main reference and others [2 × 3 × 60 minutes]	Students discuss in groups about course materials and the project work to be undertaken. [2 × 3 × 60 minutes]	• PPT • I learn (LMS Unand) • (Specific condition: Zoom meeting, WA group, learning video)	Evaluation of project tasks	20%
15	CLO-4 Ability to present research reports and produce	• Accuracy in understanding related material • Accuracy in answering	Non test: Test Presentation of Project Report: 15%				Students discuss in groups about course materials and the project	• PPT • I learn (LMS Unand) • (Specific condition:	Presentation of project report	15%

	significant outcomes. (ILO-7: PI-I, PI-2)	assignment questions • Neatness in completing assignments					work to be undertaken. [1 × 3 × 120 minutes]	Zoom meeting, WA group, learning video)		
16	CLO-5 Ability to work independently. (ILO-8: PI-1, PI-2)	Accuracy in communicating project tasks in writing.	Non test: Test Project Report: 10%						Submission of project report/ Final exam	10%
									Total Weight	100%

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	20
2	Project Presentation/ Final Exam	15
3	Homework	10
4	Project Report	55
TOTAL		100

2. Assessment weight for Intended Learning Outcome

- CLO-1: 15 %
- CLO-2: 20 %
- CLO-3: 25 %
- CLO-4: 15 %
- CLO-5: 25 %

Assessment Plan Table:

No.	CLO	Homework 1 (%)	Homework 2 (%)	Mid-Term Exam (%)	Progress of Project Report (Rubric 1) (%)	Presentation of Project Report (Rubric 2) (%)	Project Report/ Final Exam (Rubric 3) (%)	Total
1	Ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4: PI-1, PI-2)			10	5			15
2	Ability to prove applicable properties. (ILO-5: PI-1, PI-2, PI-3)	5		10	10			25
3	Ability to solve problems related to the applications of Analysis. (ILO-8: PI-1, PI-2)		5		15			20

4	Ability to present research reports and produce significant outcomes. (ILO-7: PI-I, PI-2)					15		15
5	Ability to work independently. (ILO-8: PI-1, PI-2)				15		10	25
Total		5	5	20	45	15	10	100

CLO	ILO																															
	1			2			3			4			5				6					7			8				9			
	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																									□	□						

Project Assignment Format

	Subject: Mathematics
	Faculty: Mathematics and Natural Sciences
	Universitas Andalas
Name Course	Selected Topics in Analysis
Lecturer	Dr. Haripamyu, Dr. Shelvi Ekariani
Project	Mandiri
CLO	
1. Ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4: PI-1, PI-2)	
2. Ability to prove applicable properties. (ILO-5: PI-1, PI-2, PI-3)	
3. Ability to solve problems related to the applications of Analysis. (ILO-8: PI-1, PI-2)	
4. Ability to present research reports and produce significant outcomes. (ILO-7: PI-I, PI-2)	
5. Ability to work independently. (ILO-8: PI-1, PI-2)	
Project Assignment Description	
In this project assignment, students are required to solve problems related to Analytical Applications. Each group is given the opportunity to identify their respective case problems. From the identification and formulation of these problems, each group proposes a better solution method by considering various existing facts. The resulting solutions are presented in the form of a report along with other relevant formats.	
Steps in Completing the Project Assignment	
1. Identification and formulation of analysis application problems related to Banach or Hilbert space case studies. 2. Identification of project assignment needs. 3. Selection of methods, models, and relevant data for the problem. 4. Development of project assignment work schedule. 5. Execution of project assignment tasks. 6. Monitoring and evaluation of project assignment implementation by the lecturer, including encountered constraints and challenges. 7. Project assignment report and final results. 8. Presentation of project report/final design results. 9. Analysis and final evaluation of project assignment.	
Outputs Format	

Report
Indicators, Criteria, and Weight of Assessment
- Homework: 10% - Mid-Term Exam: 20% - Progress of Project Report: 45% - Project Report : 10% - Presentation of Project Report/ Final Exam: 15%
CLO Weight of Assesment - CLO-1: 15% - CLO-2: 20% - CLO-3: 25% - CLO-4: 15% - CLO-5: 25%
Implementation Schedule: (synchronized with the weeks in the Course Syllabus)
Duration: 16 weeks
References
[1], [2]

Rubric of Progress Report (Rubric 1)					
Group Number:					
Name/Register Number:					
1.					
2.					
CLO:					
CLO-1	Ability to identify the basic concepts and problems related to Banach Spaces, Hilbert Spaces, and Fourier Transform. (ILO-4: PI-1, PI-2)				
CLO-2	Ability to prove applicable properties. (ILO-5: PI-1, PI-2, PI-3)				
CLO-3	Ability to solve problems related to the applications of Analysis. (ILO-8: PI-1, PI-2)				
CLO-5	Ability to work independently. (ILO-8: PI-1, PI-2)				
Name Course: Selected Topics in Analysis					
CLO	Criteria	1	2	3	4
		Inferior	Average	Good	Excellent

1	a. Problem Identification	The identified problem does not align with the theme of the design project.	The identified problem aligns with the theme of the design project but is not well-explained.	The identified problem aligns with the theme of the design project and has been well-explained.	The identified problem aligns with the theme of the design project, has been well-explained, and presented systematically.
	b. Identification of the required concepts related to the problem	Not able to explain the aspect of identifying project needs well.	Only able to explain one out of three aspects of identifying project needs well.	Capable of explaining two out of three aspects of identifying project needs well.	Capable of explaining all aspects of identifying project needs well.
2	a. Identification of the formal structure of a mathematical statement	Not able to explain the formal structure of a mathematical statement well.	Only able to explain one out of three aspects of identifying project needs well.	Capable of explaining two out of three aspects of identifying project needs well.	Capable of explaining all aspects of identifying project needs well.
	b. The proof methods used	The methods used in the proof are not appropriate.	The methods used in the proof are appropriate but not applied correctly.	The methods used in the proof are appropriate and applied correctly.	The methods used in the proof are appropriate, applied correctly, and systematic.
	c. Facts and data used	The data used in the design project is not appropriate.	The data used in the design project is appropriate but incomplete.	The data used in the design project is appropriate and complete.	The data used in the design project is appropriate, complete, and presented.
	d. Presentation of statement proofs	The presentation of proofs is not appropriate.	The presentation of proofs is complete but not systematic or rigorous.	The presentation of proofs is appropriate and complete, presented systematically but not rigorous.	The presentation of proofs is appropriate and complete, presented systematically and rigorously.
3,5	<i>Accepting input, sharing information, and listening to other team members (peers)</i>	The team members are reluctant to accept input, share information, and listen to other team members.	Some team members are partially willing to accept input, share information, and listen to other team members.	The team members willingly accept input, share information, and listen to other team members.	The team members excel at accepting input, sharing information, and listening to other team members.

	<i>Completion of tasks according to the set schedule</i>	Team members are always late in completing assigned tasks.	Team members frequently late in completing assigned tasks.	Team members rarely late in completing assigned tasks.	Team members are always on time in completing assigned tasks.
	<i>Participation in work with full responsibility</i>	Team members do not participate in the work.	Team members participate in the work but not with full responsibility.	Team members participate in the work with full responsibility.	Team members participate in the work with full responsibility and dedication.
	<i>Response to each other team member</i>	Team members are less responsive to other team members in work.	Team members respond adequately to other team members in work.	Team members respond well to other team members in work.	Team members respond very well to other team members in work.

Rubric of Project Report Presentation (Rubric 2)					
Group Number:					
Name/Registration Number:					
1.					
2.					
Evaluated CLO (Course Learning Outcome)					
CLO-4	Ability to present research reports and produce significant outcomes. (ILO-7: PI-I, PI-2)				
Name Course: Selected Topics in Analysis					
CLO	Criteria	1	2	3	4
		Inferior	Average	Good	Excellent

4	<i>Arrangement of Presentation Material</i>	The presentation material is not arranged sequentially or logically.	Most of the presentation material is arranged sequentially.	Most of the presentation material is arranged sequentially and logically.	The presentation material is arranged sequentially and logically.
	<i>Presentation of material</i>	Not able to explain the aspect of identifying project needs well.	Only able to explain one out of three aspects of identifying project needs well.	Capable of explaining two out of three aspects of identifying project needs well.	Capable of explaining all aspects of identifying project needs well.
	<i>Completeness of presentation material</i>	The presentation material only covers a small part of the project report.	The presentation material covers most of the project report.	The presentation material covers all of the project report.	The presentation material covers all of the project report, supplemented with relevant supporting information.
	<i>The presented material</i>	The presented material is not relevant.	The presented material is relevant but presented uninterestingly and inadequately.	The presented material is relevant and presented in an engaging manner.	The presented material is relevant, engaging, and presented systematically.
	<i>Mastery of presentation material</i>	The presenter does not/mostly does not master the presented material.	The presenter partially masters the presented material.	The presenter masters the presented material.	The presenter has mastered the presented material and can connect it to relevant information.
	<i>Ability to answer questions</i>	The presenter is unable to answer audience questions.	The presenter answers audience questions poorly.	The presenter is able to answer audience questions well.	The presenter is able to answer audience questions very well.
	<i>Presentation skills</i>	The presentation is delivered uninterestingly/poorly.	The presentation is delivered fairly interestingly.	The presentation is delivered engagingly.	The presentation is delivered very engagingly.

	<i>The speed and clarity of material delivery</i>	The material is delivered quickly and the pronunciation is unclear.	The material is delivered quickly with clear pronunciation.	The material is delivered at an appropriate pace but with unclear pronunciation.	The material is delivered at an appropriate pace with clear pronunciation.

Rubric 3

Final Report Assesment

a. Assignment Form

Group	Criteria Score					Final Grade
	1 (20%)	2 (30%)	3 (20%)	4 (20%)	5 (10%)	
1						
2						
3						

b. Scoring Guidelines

No	Criteria	Score				Weight
		1	2	3	4	
1	Article Writing Structure	Includes 2 of the following: - Title, - Author, - Abstract, - Introduction, - Basic Theory	Includes 5 of the following: - Title, - Author, - Abstract, - Introduction, - Basic Theory	Includes 7 of the following: - Title, - Author, - Abstract, - Introduction, - Basic Theory	Includes all of the following: - Title, - Author, - Abstract, - Introduction, - Basic Theory	5%

		- Data and Research Methods, - Results and Discussion, - Conclusion, and - References	- Data and Research Methods, - Results and Discussion, - Conclusion, and - References	- Data and Research Methods, - Results and Discussion, - Conclusion, and - References	- Data and Research Methods, - Results and Discussion, - Conclusion, and - References	
2	Alignment with the given format	Not in accordance with the format	Only a small portion is in accordance with the format.	Mostly in accordance with the format.	In accordance with the format.	10%
3	Good use of academic language.	More than 75% use passive sentences, more than 75% of Subject-Predicate-Object-Keterangan (SPOK) structures are inaccurate, more than 75% of foreign terms are inaccurate, and there are typos/spelling errors.	50% of the sentences are passive, 50% of Subject-Predicate-Object-Keterangan (SPOK) structures are inaccurate, 50% of foreign terms are inaccurate, and there are 50% typos/spelling errors.	Uses active sentences less than 25% of all sentences, there are Subject-Predicate-Object-Keterangan (SPOK) structures that are inaccurate (less than 25% of all sentences), there are inaccurate foreign terms, and there are 25% typos/spelling errors.	Uses active sentences, clear and correct use of Subject-Predicate-Object-Keterangan (SPOK) structures, correct use of terms (both in foreign languages), and no typos or spelling errors.	10%

4	Introduction	Contains 1 of the following: - The background of the problem is clearly stated. - The problem is formulated accurately. - The research objectives are stated accurately. - Identifies research gap.	Contains 2 of the following: - The background of the problem is clearly stated. - The problem is formulated accurately. - The research objectives are stated accurately. - Identifies research gap.	Contains 3 of the following: - The background of the problem is clearly stated. - The problem is formulated accurately. - The research objectives are stated accurately. - Identifies research gap.	Contains all of the following: - The background of the problem is clearly stated. - The problem is formulated accurately. - The research objectives are stated accurately. - Identifies research gap.	10%
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5	Theoretical Framework	Only contains <25% of the theoretical framework required for discussion.	Contains 25-50% of the theoretical framework required for discussion.	Contains 50-75% of the theoretical framework required for discussion.	Complete theoretical framework	10%
6	Data and Methods	Contains 1 of the following: - Data and data sources - Research variables and operational definitions - Appropriate data collection methods - Appropriate data analysis methods	Contains 2 of the following: - Data and data sources - Research variables and operational definitions - Appropriate data collection methods - Appropriate data analysis methods	Contains 3 of the following: - Data and data sources - Research variables and operational definitions - Appropriate data collection methods - Appropriate data analysis methods	Contains all of the following: - Data and data sources - Research variables and operational definitions - Appropriate data collection methods - Appropriate data analysis methods	10%
7	Results and Discussion	The analysis results are incomplete, and the interpretation of the majority of the results is not precise.	The analysis results are incomplete, and there are errors in interpretation	The analysis results are presented comprehensively, with only a small portion having interpretation errors.	The analysis results are presented comprehensively, and the interpretations are accurate.	25%
8	Conclusion	There are no conclusions that correspond to the analysis objectives.	The conclusions partially address the analysis objectives.		The conclusions address all the analysis objectives.	10%
9	References	Using more than five references that are over ten years old.	Using 5-7 reference sources, mostly from the last 10	Using 5-7 reference sources, mostly from the last < 10 years.	Using > 10 reference sources, mostly < 10 years old.	10%

			years.			
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