SEMESTER STUDY PLAN
CAPITA SELECTA ON COMBINATORICS 2
(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 Name	Course Code	URL *I-Learn*	Credits	Semester	Compilation Date
CAPITA SELECTA ON COMBINATORICS 2	MAT61233	https://sci.ilearn.unand.ac.id/	3	7	12 May 2024

Person In Charge	Study Plan Creator	Head of Research Group	Head of Study Program
	Dr. Lyra Yulianti, Dr. Des Welyyanti	Prof. Syafrizal Sy	Dr. Noverina Alfiany

Intended Learning Outcomes (ILO) and Performance Indicator (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 mathematical problems 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

	ILO-5	An ability to formally and correctly proves a simple mathematical statement 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: Able to use data and technology and apply them to solve simple mathematical statements or other areas PI-3: Able to process data using available technology in simple mathematical problems or other fields PI-4: Able to conclude and interpret data processing results for simple mathematical problems or other fields PI-5: Able to design an algorithm to solve simple mathematical problems or other fields
	Course Learning Outcomes	
	1	Have the understanding about the metric dimension of a graph and determine the metric dimension of a given graph.
	2	Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph
	3	Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph
Brief Description	This course discusses about the metric dimension, partition dimension and locating chromatic number of a graph. This course also gives some newest results related to metric dimension, partition dimension and locating chromatic number.	

<table>
<tr><td>Course Materials</td><td colspan="2">1. Connectivity
2. Metric dimension of a graph
3. Partition dimension of a graph
4. Coloring in Graphs: Vertex, edge, and map colorings
5. Vertex-chromatic, edge-chromatic, and locating chromatic number of graphs</td></tr>
<tr><td>References</td><td colspan="2">Main:
1. Chartrand, G., Zhang, P., Introduction to Graph Theory, McGraw-Hill, New York, 1st ed, 2005
2. Chartrand, G., Zhang, P., Chromatic Graph Theory, CRC Press, Taylor and Francis Group, New York, 1st ed, 2009
Additional:
Recent papers in metric dimension, partition dimension, and locating chromatic numbers.</td></tr>
<tr><td>Learning Media</td><td>Software:
• LMS Unand (http://fmipa.ilearn.unand.ac.id/)
• Zoom meeting
• Whatsapp</td><td>Hardware:
• Computer/Laptop
• Smartphone</td></tr>
<tr><td>Team Teaching</td><td colspan="2">1. Dr. Lyra Yulianti
2. Dr. Des Welyyanti</td></tr>
<tr><td>Assessment</td><td colspan="2">Homework, Quiz, Mid-Term exam, Final exam</td></tr>
<tr><td>Required courses</td><td colspan="2">MAT Introduction to Graph Theory, MAT62131 Discrete Mathematics</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)	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)			
1/1	Review some materials in Graph Theory and Discrete Mathematics	• Discipline in carrying out course contracts • Accurate understanding of related material	Activeness in lectures	Teaching and discussion: - Introduction to SSP - material explanation - task explanation - discussion and question-and-answer lecture material - brief explanation of the final project [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video	• Assessment Rules, SSP, Syllabus, Tuition Contract • Review of some definitions in graph theory	
2/2	**CLO-1** Have the understanding about the metric dimension of a	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually	Students discuss in groups about lecture material	• PPT • i-learn (LMS Unand) Specific	Definition of metric dimension, resolving set and basis	

	graph and determine the metric dimension of a given graph					[1 x 3 x 60 minute]	[1 x 3 x 60 minute]	condition: Zoom meeting, WA group, learning video	Some previous results on metric dimension of graphs	
3/3	**CLO-1** Have the understanding about the metric dimension of a graph and determine the metric dimension of a given graph	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	● PPT ● i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video	Determine the metric dimension of given graphs	
4/4	**CLO-2** Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	● PPT ● i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	The partition dimension of a connected graph and the resolving partition of a given graph	
5/5	**CLO-2** Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	● PPT ● i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	Determine the partition dimension of given connected graphs	

6/6	**CLO-2** Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph	Accurate understanding of related material	Task 1	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	The partition dimension of a disconnected graph and the resolving partition of a given graph	10%
7/7	**CLO-2** Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness of task execution • Originality of task	Quiz 1	Teaching and discussion: • explanation of learning material • explanation of the task • explanation of the assessment [1 x 3 x 50 minutes]		• Students read and study learning materials • Students do assignments independently [1 x 3 x 120 minute]		• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	Determine the partition dimension of given disconnected graphs	10 %
8 and 9	**MID-TERM EXAM**									
10/10	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) • Specific condition: Zoom meeting, WA	Vertex coloring, locating chromatic number and color code	

	number of a given graph							group, learning video)		
11/11	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph	Accurate understanding of related material	Activeness in lectures		Teaching and discussion: explanation of learning material [1 x 3 x 50 minutes] (Specific conditions: The total number of blended learning meetings is 40 % of the total number of meetings)	Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	The locating chromatic number of some simple graphs	
12/12	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph	Accurate understanding of related material	Activeness in lectures		Teaching and discussion: explanation of learning material [1 x 3 x 50 minutes] Specific conditions: The total number of blended	Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	Some previous results on the characterizations of graphs with certain given locating chromatic number	

					learning meetings is 40 % of the total number of meetings)					
13/13	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph	Accurate understanding of related material	Activeness in lectures		Teaching and discussion: explanation of learning material [1 x 3 x 50 minutes] (Specific conditions: The total number of blended learning meetings is 40 % of the total number of meetings)	Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	The locating chromatic number of disconnected graphs	
14/14	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph.	Accurate understanding of related material	Activeness in lectures	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	Some previous results on the locating chromatic number of disconnected graphs	

15/15	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph	Accurate understanding of related material	Task 2	Teaching and discussion: material explanation [1 x 3 x 50 minute]		Students read and study the learning materials individually [1 x 3 x 60 minute]	Students discuss in groups about lecture material [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) Specific condition: Zoom meeting, WA group, learning video)	Determination of the locating chromatic number of homogeneous disconnected graphs	
16/16	**CLO-3** Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph.	• Accurate understanding of related material • Accuracy in answering assignment questions • Neatness of task execution • Originality of task	Quiz 2	Teaching and discussion: • explanation of learning material • explanation of the task • explanation of the assessment [1 x 2 x 50 minutes]		• Students read and study learning materials • Students do assignments independently [1 x 3 x 60 minute]	Students discuss in groups about lecture material and assignment [1 x 3 x 60 minute]	• PPT • i-learn (LMS Unand) • Specific condition: Zoom meeting, WA group, learning video)	Determination of the locating chromatic number of non-homogeneous disconnected graphs	10 %
17 s/d 18	**FINAL EXAMINATION**									**30 %**

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	30
2	Final Exam	30
3	Homework	20
4	Quiz	20
TOTAL		**100**

2. Assessment weight for Intended Learning Outcome
   a) CLO-1: 25 %
   b) CLO-2. 25 %
   c) CLO-3: 50 %

Assessment Plan Table:

ASSESSMENT	Task		Quiz		Mid-term Exam	Final Exam	TOTAL
CLO	1	2	1	2			
CLO-1 Have the understanding about the metric dimension of a graph and determine the metric dimension of a given graph.	5%		5%		15%		25%
CLO-2 Have the understanding about the partition dimension of a graph and determine the partition dimension of a given graph	5%		5%		15%		25%
CLO-3 Have the understanding about the locating chromatic number of a graph and determine the locating chromatic number of a given graph		10%		10%		30%	50%
TOTAL BOBOT	**20%**		**20%**		**30%**	**30%**	**100%**

Matrix of CLO and ILO

CLO	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				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											