Module Description/Course Syllabi

Study Programme: Bachelor of Mathematics
Faculty of Mathematics and Natural Sciences
Universitas Andalas

1. *Course number and name*

MAT61231 Introduction to Graph Theory

2. *Credits and contact hours/Number of ECTS credits allocated*

3 SKS / 4.52 ECTS

3. *Instructors and course coordinator*

Prof. Dr. Syafrizal Sy, Dr. Lyra Yulianti

4. *Text book, title, author, and year*

1. J.A Bondy and U.S. R. Murty, *Graph Theory with Applications*, U.S.A, 1976

5. *Recommended reading and other learning resources/tools*

N. Harsfield and G. Ringer, Pearls in Graph Theory, 2nd edition, Academic Press, New York, 2001

6. *Specific course information*

A. Brief description of the content of the course (catalogue description)

This course discusses about some basic concepts in graph theory, some properties of trees and their specialties, connectivity in graph, Eulerian tour and Hamiltonian cycle in a graph, matching, vertex coloring, chromatic number of a graph, planarity, Kuratowski Theorem, and some simple applications.

B. Prerequisites or co-requisites

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C. Indicate whether a required or elective course in the program
Elective
D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)
First Cycle Bachelor
E. Year of study when the course unit is delivered (if applicable)
2nd Year
F. Semester when the course unit is delivered
Odd Semester
G. Mode of delivery (face-to-face, distance learning)
Face to face

7. *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 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 illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques 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 the proper concept and mathematical fundamental techniques
ILO-5: An ability 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: Able 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
8. *Course Learning Outcomes*
Understand some basic concepts in graph theory
Understand some properties of trees and their specialties
Understand the concept of connectivity in graph, and able to determine the edge-connectivity and vertex-connectivity of a graph
Understand the concept of Eulerian tour and Hamiltonian cycle in a graph, and able to determine the Eulerian tour or Hamiltonian cycle in a graph
Understand the concept of vertex coloring and edge coloring in graph, and able to determine the vertex-chromatic number and edge-chromatic number of a graph
Understand the concept of matching, planarity, and its properties in graph, and able to determine maximal and perfect matching in a graph.

9. *Brief list of topics to be covered*

1. Graph and subgraph
2. Trees and their properties
3. Connectivity
4. Eulerian tour and Hamiltonian cycle
5. Matching
6. Coloring in Graphs: Vertex, edge, and map colorings
7. Vertex-chromatic and edge-chromatic numbers of graph
8. Planar graphs

10. Learning and teaching methods

Project-Based Learning, Student Centre Learning

11. Language of instruction

Bahasa

12. Assessment methods and criteria

Summative Assessment:

1. Mid-term exam: 30%
2. Final exam: 30%
3. Quiz: 30%
4. Task: 10%