Module Description/Course Syllabi

Study Programme: Mathematics (Master Degree)
Faculty of Mathematics and Natural Sciences
Universitas Andalas

1. *Course number and name*

MAT82151 Combinatorics Theory

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

3/4,53 ECTS

3. *Instructors and course coordinator*

Dr. Des Welyyanti
Dr. Lyra Yulianti

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

J.M. Harris, J.L. Hirst, M.J. Mossinghoff, *Combinatorics and Graph Theory*, 2nd ed., Springer, 2008

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

1. R. Diestel, *Graph Theory (Graduate Text of Mathematics)*, 5th ed., Springer, 2017
2. K. H. Rosen, *Discrete Mathematics and Applications*, 7th ed., McGraw Hill, 2011

6. *Specific course information*

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

This course is related to graph theory (graph theory, planarity, colorings, matchings, Ramsey theory) and combinatorics (some essential problems, binomial coefficients, multinomial coefficients, the pigeonhole principle, principle of inclusion and exclusion, generating function, theory of counting).

B. Prerequisites or corequisites

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C. Indicate whether a required or elective course in the program

Required

D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)

Second cycle degree

E. Year of study when the course unit is delivered (if applicable)

1st year

F. Semester when the course unit is delivered

Even semester

G. Mode of delivery (face-to-face, distance learning)

Face to face

7. *Intended Learning Outcomes*

ILO-3: Able to master one or several mathematical problems in analysis, algebra, applied mathematics, statistics and combinatorics.

PI-1: Able to identify theories used in related mathematical problems.

PI-2: Able to apply theories for advancement in related fields (advanced theory).

PI-3: Able to use advanced theory to solve related mathematical problems.

ILO-4: Mastering scientific techniques and developing them in solving research problems through multidisciplinary or interdisciplinary approaches.

PI-1: Able to apply mathematical techniques in research problem-solving.

PI-2: Able to analyse research problems.

PI-3: Able to formulate theorems/models and prove their validity.

PI-4: Able to use various mathematical software to solve complex mathematical problems.

ILO-5: Able to work and conduct research in the field of mathematics and related fields of science by developing the latest issues independently or collaboratively and communicating them academically.

PI-1: Capable of formally and correctly proving mathematical statements.

PI-2: Able to employ relevant techniques for conducting research.

PI-3: Capable of communicating research findings in an academic manner.

8. *Course Learning Outcomes*

1. The student will understand the concept of planarity in graph
2. The student will understand the principles of chromatic number
3. The student will be able to determine classical Ramsey numbers and Ramsey numbers on graph
4. The student will be able to apply the pigeonhole principle, principle of inclusion and exclusion, generating function, theory of counting

9. *Brief list of topics to be covered*

Graph theory, planarity, colorings, matchings, Ramsey theory, some essential problems on combinatorics, binomial coefficients, multinomial coefficients, the pigeonhole principle, the principle of inclusion and exclusion, generating function, theory counting.

10. Learning and teaching methods

1. Small group discussion
2. PjBL
3. Directed learning

11. Language of instruction

Bahasa Indonesia

12. Assessment methods and criteria

Summative Assessment:

1. Tasks: 15%
2. Quiz: 15%
3. Mid Semester: 30%
4. Final Semester: 30%
5. Attendance: 10%

Formative Assessment:

1. Thumb up and thumb down
2. Minutes paper