Module Description/Course Syllabi

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

1. *Course number and name*

MAT81211 Combinatorial Group Theory

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

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

Dr. Yanita

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

R. C. Lyndon & P. E. Schupp. 2001. *Combinatorial Group Theory.* Berlin: Springer-Verlag.

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

1. C. F. Miller III. 2004. *Combinatorial Group Theory*. Lecture notes of University of Melbourne.
2. W. Magnus, A. Karras, & D. Solitar. 1976. *Combinatorial Group Theory*: *Presentations of Groups in Terms of Generator and Relations*. New York: Dover Publications, Inc

6. *Specific course information*

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

This course discusses several concepts about combinatorial groups. This course also provides a vehicle for students to think about the other side of group theory, namely studying groups geometrically. Regarding the targets above, this course is given with an emphasis on providing students relatively a lot of time to carry out problem-solving ranging from simple problems to quite complex ones. The material for this course includes a review of group theory (equivalence relations and equivalence classes, coset subgroups, normal subgroups), words, independent groups, groups of graphs, group presentations, 2-complexes, van-Kampen diagrams, pictures, second fundamental groups, and group diagrams.

B. *Prerequisites or co-requisites*

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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 Master

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

2nd 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 Leening Outcomes

ILO 2 Mastering mathematical concepts and applications (real analysis, advanced linear algebra, and statistics) in solving complex mathematical problems.

PI-1   Able to explain mathematical concepts (Real   Analysis, Advanced Linear Algebra, and Statistics).

PI-2   Able to identify complex mathematical problems.

PI-3   Able to solve complex mathematical problems.

ILO 3: Comprehensive mastery of one or several theories for development in the fields of analysis, algebra, applied mathematics, statistics and combinatorial mathematics.

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

PI-2 Able to apply the approach for development in associated fields (advance theory).

8. Course Learning Outcomes

1.   Able to differentiate types of words and able to use operations on words in group presentations (ILO 2: PI-1, PI-2)
2.   Able to determine the fundamental group of a graph and determine the free generator of the fundamental group (ILO 2: PI-1, PI-2 PI-3)
3.   Able to determine the first fundamental group (ILO 2: PI-1, PI-2 PI-3, PI-1, Pi-2, PI-3)
4.   Able to determine the second fundamental group (ILO 2: PI-1, PI-2 PI-3, PI-1, Pi-2, PI-3)

9. Brief list of topics to be covered

1. Review group theory
2. Word and free group
3. Graph theory
4. Group from graph
5. Group presentation
6. Tietze Transformation
7. 2-complexes
8. Picture

10. Learning and teaching methods

Small group discussion, Directed Learning

11. Language of instruction

Bahasa Indonesia

12. Assessment methods and criteria

Summative Assessment :

1. Tasks : 40%
2. Mid Semester : 30%
3. Final Semester : 30%