**UNIVERSITAS NEGERI PADANG**
FACULTY OF MATHEMATICS AND NATURAL SCIENCES MATHEMATICS
DEPARTMENT, MATHEMATICS STUDY PROGRAM
Main Campus Universitas Negeri Padang.
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**Bachelor of Science in Mathematics**                    MODULE HANDBOOK

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| Module name: | Abstract Algebra |
| Module level, if applicable: | Bachelor |
| Code: | MAT1.62.4002 |
| Subheading, if applicable: | - |
| Classes, if applicable: | Abstract Algebra |
| Semester: | $4^{th}$ (Fourth) |
| Module coordinator: | Head of Algebra Expertise group |
| Lecturer(s): | Dr. Irwan, M.Si., Drs. Yusmet Rizal, M.Si. and Defri Ahmad, S.Pd.,M.Si. |
| Language: | Indonesian Language and English |
| Classification within the curriculum: | Compulsory Courses in the second year ($4^{th}$ semester) Bachelor Degree |
| Teaching format / class hours per week during the semester: | a. Lectures : Cooperative learning with methods such as expository and discussion. (4 x 50 minutes = 200 minutes)<br>b. Structured assignment : Weekly individual written assignment.  (4 x 60 minutes = 240 minutes)<br>c. Individual study. (4 x 60 minutes = 240 minutes) |
| Workload: | Total workload is 181,33 hours per semester, which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes individual study for 16 weeks per semester, including mid exam and final exam |
| Credit points: | 4 SKS = 6.04 ECTS |
| Prerequisites course(s): | Introduction to Foundation of Mathematics and Elementary Linear Algebra |

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| Course Outcomes: | After finishing this course, students will be able to do the following:<br>● CO 1. Display communication skill orally and written in explaining solutions of problems about group and ring.<br>● CO 2. Demonstrate knowledge of basic concepts of binary operation, groups, subgroups, homomorphism, rings, subring, fields, and integral areas and their properties.<br>● CO 3. Apply Lagrange Theorems, Cayley Theorems, coset, group homomorphism, ring homomorphism kernel, image, and construction of group factor.<br>● CO 4. Prove simple consequences of the group and ring concept. |
| Content: | 1. Function, Equivalent Relation, mathematics induction Binary operations, axioms group as an algebraic structure consisting of one set and one operation. group. subgroup, generator, cyclic groups.<br>2. General linear groups and special subgroups. Symmetric groups: cycles, general linear groups and special subgroups.<br>3. Orders of elements; cyclic groups<br>4. Lagrange's Theorem and its application.<br>5. Left and right coset, normal subgroup, and construction of group factor.<br>6. Group homomorphism<br>7. Ring<br>8. Subring<br>9. Integral Domain<br>10. Ideal dan Ring faktor<br>11. Ring Homomorphism |
| Study/exam achievements: | The final mark will be weighted as follows:<br><br>The assessment consists of final exam (30 %), mid term exam (30%), assignment (20 %), and discussion (20%).<br><br>Final and mid term exams are in the form of a closed book essay written test (120 minutes).<br><br>Weekly assignments (solving selected problems) are given in two forms; group or individual assignments.<br><br>To further understand the topic, a classroom discussion is held. |

| Form of Media | White Board, laptop, Projector, e-learning via elearning2.unp.ac.id, and zoom meeting. |
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| Literature: | 1. Gallian, Joseph A. (2016). Contemporary Abstract Algebra 9th ed., Boston: Houghton Mifflin Company. 2. Paulsen W (2016). Abstract Algebra: An Interactive Approach 2nd ed, CRC Press. 3. Fraleigh, J.B, (2003), A First Course in Abstract Algebra, 7th ed, Addison Wesley, New York.. 4. Herstein, I.N,(1975), Topic in Algebra, 2nd ed, John Wiley & Sons, New York. |

**PLO and CO Mapping**

|  | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 |  |  |  |  |  |  | √ |  |  |  |
| CO2 |  |  |  |  |  |  |  |  | √ |  |
| CO3 |  |  | √ |  |  |  |  |  |  |  |
| CO4 |  |  |  | √ |  |  |  |  |  |  |