



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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Undergraduate Programme in Mathematics

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MODULE HANDBOOK

Module name	Introduction to Algebraic Structure I
Module level, if applicable	Bachelor
Code, if applicable	MMM-1203
Subtitle, if applicable	-
Courses, if applicable	Introduction to Algebraic Structure I
Semester(s) in which the module is taught	2 nd (second)
Person responsible for the module	Chair of the Lab. of Algebra
Lecturer(s)	Prof. Dr. Sri Wahyuni
Language	Bahasa Indonesia
Relation to curriculum	Compulsory course in the first year (2 nd semester) Bachelor Degree
Type of teaching, contact hours	100 minutes lectures and 120 minutes structured activities (homework and task) per week.
Workload	Total workload is 136 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.
Credit points	3
Requirements according to the examination regulations	Students have taken Introduction to Algebraic Structure I course (MMM-1203) and have an examination card where the course is stated on.
Recommended prerequisites	Students have taken Introduction to Mathematical Logic course (MMM-1208) and have participated in the final examination of the course.
Module objectives/intended learning outcomes	<p>Learning objectives:</p> <p>Upon successful completion of this module, students will be able to:</p> <p>CO1:</p> <p>Recognize and analyze the basic concept and the fundamental properties of groups as an algebraic structure consisting of one set and one operation, and manipulating skills in applying basic concepts, properties, techniques, and methods developed in group. The students should be able to prove simple consequences of the group axioms, such as the cancellation law;</p> <p>CO2:</p> <p>Demonstrate knowledge of basic concepts of a subgroup, generator, and their properties. The students should be familiar with group of permutations, general linear groups and symmetric groups, cyclic groups, and understand the difference between finding a proof from the axioms that works for all groups, and finding a counterexample.</p> <p>CO3:</p> <p>Demonstrate how to show that a subset of a group is a subgroup or a normal subgroup, and apply Lagrange's theorem. Derive and apply the concept of left and right coset, normal subgroup, and construction of group factor.</p> <p>CO4:</p> <p>Derive and apply the concept of group homomorphism, its kernel and image and the basic properties including the Fundamental Homomorphism Theorem and the uses. Derive and apply the Cayley's Theorem that every group is isomorphic to a group of permutations.</p>

Content	<p>Syllabus:</p> <ul style="list-style-type: none"> • Binary operations, axioms group as an algebraic structure consisting of one set and one operation. Manipulating skills in applying basic concepts, properties, Cayley table, techniques, and methods developed in group. subgroup, generator, cyclic groups. general linear groups and special subgroups. Symmetric groups: cycles, general linear groups and special subgroups. Orders of elements; cyclic groups • Lagrange's Theorem and its application. Left and right coset, normal subgroup, and construction of group factor. Group homomorphism, its kernel and image and the basic properties including the fundamental homomorphism theorem and the uses. Group isomorphism, and checking when are two groups 'the same'. Cayley theorem, the proof and the uses. 												
Study and examination requirements and forms of examination	<p>The final mark will be weighted as follows:</p> <table border="1"> <thead> <tr> <th>No</th> <th>Assessment methods (components, activities)</th> <th>Weight (percentage)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Final Examination</td> <td>40%</td> </tr> <tr> <td>2</td> <td>Mid-Term Examination</td> <td>30%</td> </tr> <tr> <td>3</td> <td>Class Activities: Quiz, Homework, etc.</td> <td>30%</td> </tr> </tbody> </table> <p>The initial cut-off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively</p>	No	Assessment methods (components, activities)	Weight (percentage)	1	Final Examination	40%	2	Mid-Term Examination	30%	3	Class Activities: Quiz, Homework, etc.	30%
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1	Final Examination	40%											
2	Mid-Term Examination	30%											
3	Class Activities: Quiz, Homework, etc.	30%											
Media employed	Board, LCD Projector, Laptop/Computer												
Reading List	<ol style="list-style-type: none"> 1. John B. Fraleigh, 1999; <i>A First Course in Abstract Algebra</i>; Fourth Edition; Addison-Wesley Publishing Company, Inc. 2. I. N. Herstein, 1975, <i>Topics in Algebra</i>, John Wiley and Sons Inc., New York 3. David S. Dummit, and Richard M. Foote, 1999, <i>Abstract Algebra</i>, 3rd Ed., John Wiley and Sons, Inc., New York 4. D.S. Malik, John M. Mordeson, and M.K. Sen, 1998, <i>Fundamental of Abstract</i>, Fourth Edition, Addison-Wesley Publishing Company, Inc. 5. Landin. J., 2010, <i>An Introduction to Algebraic Structure</i>, Dover Book on Mathematics, New York 												

PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CO 1			v			v			v
CO 2			v			v			v
CO 3			v			v			v
CO 4			v			v			v
CO 5			v			v			v