



# UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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## Doctoral Program in Mathematics

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MODULE HANDBOOK

Doctoral in Mathematics

<b>Module name:</b>	Graph Theory												
<b>Module level, if applicable:</b>	Doctoral Program												
<b>Code, if applicable:</b>													
<b>Semester(s) in which the module is taught:</b>													
<b>Person responsible for the module:</b>	Chair of Algebra Research Group												
<b>Lecturer(s):</b>	1. Dr. Diah Junia Eksi Palupi, M.S. 2. Dr.rer.nat. Yeni Susanti, M.Si												
<b>Language:</b>	Indonesian												
<b>Relation to curriculum:</b>	Doctoral Degree in Mathematics, Compulsory / Elective Course												
<b>Credit points:</b>	3 Semester Credit Unit												
<b>Type of teaching, contact hours:</b>	3x50 minutes lectures, 3x60 minutes structured activities.												
<b>Workload:</b>	<ul style="list-style-type: none"> <li>• 3x50 minutes lectures,</li> <li>• 3x60 minutes structured activities,</li> <li>• 3x60 minutes individual study,</li> <li>• In 16 weeks per semester (including assignments and examinations)</li> </ul>												
<b>Recommended prerequisites:</b>	Logic and Set												
<b>Module objectives/intended learning outcomes:</b>	On successful completion of this course, students should be able to: CO.1. prove rigorously the fundamental properties of graph CO.2. do some development works on graph theory CO.3. apply graph theory on other area												
<b>Content:</b>	Basic concept of graph theory, Simple Graph, Multiple Graph, Isomorphic Graph, Types of Graph, Complement of Graph, Planar Graph, Euler Formula, Subgraph, Connected Graph, Path, Trail, Circuit, Cut sets, Bridge of Konigsberg, Eulerian Graph, Eulerian Trail, Hamiltonian Graph, Tree, Minimum spanning tree, Kruskal Algorithm, Prime Algorithm, Planarity and Duality, Coloring of Graph, Directed Graph, Prunning Algorithm, Matrix and Graphs/Digraphs, Shortest Distance Tree. Some numerical quantities of graphs, Review on some actual topics such as labeling and algebraic graphs												
<b>Study and examination requirements and forms of examination:</b>	<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>35</td> </tr> <tr> <td>2</td> <td>Midterm Examination</td> <td>35</td> </tr> <tr> <td>3</td> <td>Quiz/Presentation/Homework</td> <td>30</td> </tr> </tbody> </table> <p>Final grade will be determined as follows: Grade Criteria The initial cut-off points for grades A, B, C, and D should not be less than 80%, 65%, 50%, and 40%, respectively.</p>	No	Assessment methods (components, activities)	Weight (percentage)	1	Final Examination	35	2	Midterm Examination	35	3	Quiz/Presentation/Homework	30
No	Assessment methods (components, activities)	Weight (percentage)											
1	Final Examination	35											
2	Midterm Examination	35											
3	Quiz/Presentation/Homework	30											
<b>Media employed:</b>	projector, board, laptop, e-learning <a href="http://elisa.ugm.ac.id">http://elisa.ugm.ac.id</a>												

<b>Reading List:</b>	<ol style="list-style-type: none"> <li>1. Robin J. Wilson, 1972; Introduction to Graph Theory, Longman Group Limited.</li> <li>2. Joan M. Aldous, Robin J. Wilson, 2000, Graph and Applications: An Introductory Approach, Springer, London.</li> <li>3. Seymour Lipschutz, 1976; Theory and Problems of Discrete Mathematics; Schaum's Outline Series; McGraw-Hill Book Company.</li> <li>4. B. Andrasfai, 1977, Introductory Graf Theory, Acade'miaiKiado', Budapest</li> <li>5. RMJT Soehakso, Teori Graf, FMIPA UGM.</li> <li>6. R. B. Bapat, 2010, Graphs and Matrices, Springer.</li> <li>7. Gary Chartrand, 1977, Introductory Graph Theory, Dower Publications, Inc.</li> <li>8. Chris Godsil and Gordon Royle, 2001, Algebraic Graph Theory, Springer</li> </ol>
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### Mapping of The COs and PLOs

	PLO - 1 S3 Mat	PLO - 2 S3 Mat	PLO - 3 S3 Mat	PLO - 4 S3 Mat	PLO - 5 S3 Mat	PLO -6 S3 Mat
CO 1		v	v			
CO 2			v	v		
CO 3					v	v

#### Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

<b>PLO-1</b>	:	<p><b>Attitude:</b></p> <p>Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.</p>
<b>PLO-2</b>	:	<p><b>Knowledge:</b></p> <p>Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).</p>
<b>PLO-3</b>	:	<p><b>Knowledge:</b></p> <p>Able to think logically, analytically, inductively, deductively, and structured; having the ability to manage, lead, and develop research programs independently, and able to communicate the thoughts as well as his work to the scientific community and the general public.</p>
<b>PLO-4</b>	:	<p><b>Skill:</b></p> <p>Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.</p>
<b>PLO-5</b>	:	<p><b>Skill:</b></p> <p>Able to apply mathematics according to their field of expertise to solve problems including those that require a multidisciplinary, cross-disciplinary, or trans-disciplinary approach.</p>
<b>PLO-6</b>	:	<p><b>Life Long Learning:</b></p> <p>Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.</p>