



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

Module name:	Dual Reciprocity Boundary Element Methods (DRBEM)												
Module level, if applicable:	Doctoral Program												
Code, if applicable:	MMM-5526												
Semester(s) in which the module is taught:	First Year												
Person responsible for the module:	Chair of Computational Mathematics Research Group												
Lecturer(s):	Imam Solekudin, Ph.D.												
Language:	Bahasa Indonesia												
Relation to curriculum:	Doctoral Degree in Mathematics, Compulsory / Elective Course												
Credit points:	3 Semester Credit Unit												
Type of teaching, contact hours:	3x50 minutes lectures, 3x60 minutes structured activities.												
Workload:	<ul style="list-style-type: none"> • 3x50 minutes lectures, • 3x60 minutes structured activities, • 3x60 minutes individual study, • In 16 weeks per semester (including assignments and examinations) 												
Recommended prerequisites:	Before taking this course, students must have a good understanding about the divergence theorem. Students have sufficient knowledge about partial differential equation and programming using MATLAB.												
Module objectives/intended learning outcomes:	<p>After completing this course, students should have:</p> <p>CO 1: Ability to understand derivation of the DRBEM for modified Helmholtz equations.</p> <p>CO 2: Ability to derive DRBEM for other types equations and time-dependent equations.</p> <p>CO 3: Ability to understand the implementation of DRBEM to solve problems in selected papers.</p>												
Content:	<i>Modified Helmholtz equation; Dual reciprocity boundary element procedure for modified Helmholtz equation: reciprocal relation, basis radial function, dual reciprocal, system of linear algebraic equations; Implementation of DRBEM on Matlab; Implementation of DRBEM on real life problems.</i>												
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>Assignment 1</td> <td>20 %</td> </tr> <tr> <td>2</td> <td>Assignment 2</td> <td>35 %</td> </tr> <tr> <td>3</td> <td>Assignment 3</td> <td>45 %</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	Assignment 1	20 %	2	Assignment 2	35 %	3	Assignment 3	45 %
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1	Assignment 1	20 %											
2	Assignment 2	35 %											
3	Assignment 3	45 %											

Media employed:	Board, LCD Projector, Laptop/ Computer
Reading List:	<ol style="list-style-type: none"> 1. Ang, W. T., <i>A Beginner's Course in Boundary Element Methods</i>, Universal Publishers, Boca Raton, USA, 2007. 2. Katsikadelis, J. T., <i>Boundary Elements: Theory and Applications</i>, Elsevier, 2002. 3. Selected Papers.

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			V
CO 2		V	V			V
CO 3		V	V		V	V

Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

PLO-1	:	Attitude: Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.
PLO-2	:	Knowledge: Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).
PLO-3	:	Knowledge: 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.
PLO-4	:	Skill: Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.
PLO-5	:	Skill: 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.
PLO-6	:	Life Long Learning: Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.