



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:	Advanced Computational Mathematics (<i>Matematika Komputasi Lanjut</i>)												
Module level, if applicable:	Doctoral Program												
Code, if applicable:	MMM 6501												
Semester(s) in which the module is taught:	I (first year)												
Person responsible for the module:	Chair of Computational Mathematics Research Group												
Lecturer(s):	Dr. Sumardi, M.Si Imam Solekhuudin, PhD												
Language:	Bahasa Indonesia												
Relation to curriculum:	Doctoral Degree in Mathematics, 1st semester												
Credit points:	3												
Type of teaching, contact hours:	3x50 minutes lectures, 3x50 minutes structured activities.												
Workload:	<ul style="list-style-type: none"> • 3x50 minutes lectures, • 3x50 minutes structured activities, • 3x50 minutes individual study, • In 16 weeks per semester (including mid-term and final examinations). 												
Recommended prerequisites:	Before taking this course, it is better that students have understood very well some concepts on Numerical Methods												
Module objectives/intended learning outcomes:	<p>After completing this course the students should have :</p> <ul style="list-style-type: none"> • CO 1 understand theory in scientific computation at doctoral level • CO 2 describe the derivation of the numerical algorithms at doctoral level • CO 3 implement and execute algorithms in Matlab/Phyton • CO 4 evaluate, contrast and reflect upon the numerical results arising from different algorithms. 												
Content:	<i>It is intended to provide doctoral students with training in algorithms and theory in scientific computation at doctoral level as a preparation for research in related areas. It covers the forllowing major topics: Iterative methods for linear systems; Numerical methods for nonlinear system of equations; Numerical methods for ordinary differential equations (ODEs); Fast numerical solvers for elliptic equations.</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>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>Final grade will be determined as follows: Grade Criteria The initial cut-off points for grades A,B,C, and D should not less than 85%, 65%, 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:	1. Richard L. Burden and J. Douglas Faires., 2016, <u>Numerical Analysis (10th Edition)</u> , Brooks/Cole Publishing Company.												

	2. L. N. Trefethen and D. Bau III., 1997, Numerical Linear Algebra, Society for Industrial and Applied Mathematics (SIAM). 3. Robert E White, 2016, Computational Mathematics, Model, Method and Analysis with MATLAB and MPI, Taylor & Francis Group, LLC
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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	V		V	V
CO 2	V	V	V			
CO 3	V		V		V	
CO 4	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.