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Faculty of Mathematics and Natural Sciences
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Doctoral Program in Mathematics

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MODULE HANDBOOK
Doctoral in Mathematics

Module name:	Numerical Differential Equations (*Persamaan Diferensial Numerik*)
Module level, if applicable:	Doctoral Program
Code, if applicable:	MMM 5527
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
Language:	Bahasa Indonesia
Relation to curriculum:	Master Degree in Mathematics, Elective, 1st semester
Credit points:	3
Type of teaching, contact hours:	3x50 minutes lectures, 3x50 minutes structured activities.
Workload:	• 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 Differential Equation
Module objectives/intended learning outcomes:	After completing this course the students should have : • CO 1 describe the derivation of the numerical algorithms for the solution of initial and boundary value problems for systems of ordinary differential equations • CO 2 describe the derivation of the numerical algorithms for the solution of boundary and initial-boundary value problems for partial differential equations. • CO 3 implement and execute algorithms in Matlab / Phyton • CO 4 understand the error concept, analyze, and predict it.
Content:	In this course we will be concerned with numerical methods for the solution of initial and boundary value problems for systems of ordinary differential equations, and with numerical methods for boundary and initial-boundary value problems for partial differential equations.
Study and examination requirements and forms of examination:	The final mark will be weighted as follows: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination — 40% 2 — Mid-Term Examination — 30% 3 — Class Activities: Quiz, Homework, etc — 30% 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.
Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Granville Sewell, 2005, The numerical solution of ordinary and partial differential equations, John Wiley & Sons, Inc,

	2. Mark H. Holmes, 2007, Introduction to Numerical Methods in Differential Equations, Springer Science+Business Media, LLC 3. Stanoyevich A., 2005, Introduction to Numerical Ordinary and Partial Differential Equations Using MATLAB, John Wiley & Sons, Inc, 4. John C. Strikwerda, Finite Difference Schemes and Partial Differential Equations, SIAM

Mapping of The COs and PLOs

	PLO – 1 S2 Mat	PLO – 2 S2 Mat	PLO – 3 S2 Mat	PLO – 4 S2 Mat	PLO – 5 S2 Mat	PLO –6 S2 Mat
CO 1	V	V	V	V		
CO 2	V	V	V	V		
CO 3	V		V		V	
CO 4	V	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.