



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	Elementary Differential Equations
Module level, if applicable	Bachelor
Code, if applicable	MMM-2301
Subtitle, if applicable	-
Courses, if applicable	Elementary Differential Equations
Semester(s) in which the module is taught	3 rd (third)
Person responsible for the module	Chair of the Lab. of Applied Mathematics
Lecturers	Dr. Fajar Adi Kusumo, M.Si., Dr. Lina Aryati, M.S., Prof. Dr. Ch. Rini Indrati, M.Si., Dr. Imam Solekhudin, M.Si., Prof. Dr. Widodo, M.S., Dr. Sumardi, M.Si.
Language	Bahasa Indonesia
Relation to curriculum	Compulsary course in the second year (3 rd semester) Bachelor Degree
Type of teaching, contact hours	150 minutes lectures and 180 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 Elementary Differential Equations course (MMM-2301) and have an examination card where the course is stated on.
Recommended prerequisites	Students have taken Calculus II course (MMM-1102) and have participated in the final examination of the course. Before taking this course, students must have a good understanding about concepts of limit, derivative, and integral.
Module objectives/intended learning outcomes	Upon successful completion, students will have: CO1. ability to solve the types of Ordinary Differential Equations (ODE), e.g. separable differential equations, exact and non-exact differential equations, linear differential equations, linear system of Differential Equations, etc. CO2. ability to solve n -order linear differential equations. CO3. ability to solve the differential equations about ordinary points using power series. CO4. ability to solve linear system of ODE using differential operator and matrices methods. CO5. Ability to prove some properties of Laplace transform and to apply the properties of Laplace transform, then to solve differential equations with initial conditions and linear systems with constant coefficients with initial conditions.
Content	a. Introduction: i. Motivation of emergence of differential equations from real life problems. ii. Definition of differential equations and their solutions. b. First order differential equations: separable equations, homogeneous equations, exact equations and integrating factors, linear equations, Bernoulli's differential equation. c. Higher order linear differential equations: Reduction of order, nonhomogeneous differential equations and their method of solutions-the method of undetermined

	<p>coefficients, the method of variation of parameters-, the method of differential operators (optional), Cauchy-Euler equations.</p> <p>d. Series solutions.</p> <p>e. Systems of differential equations and their methods of solution.</p> <p>f. Laplace transform and its applications for solving differential equations and systems of differential equations.</p> <p>g. Simple applications of differential equations.</p>															
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>35</td> </tr> <tr> <td>2</td> <td>Mid-Term Examination</td> <td>25</td> </tr> <tr> <td>3</td> <td>Presentation</td> <td>20</td> </tr> <tr> <td>4</td> <td>Class Activities: Quiz, Homework, etc.</td> <td>20</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	35	2	Mid-Term Examination	25	3	Presentation	20	4	Class Activities: Quiz, Homework, etc.	20
No	Assessment methods (components, activities)	Weight (percentage)														
1	Final Examination	35														
2	Mid-Term Examination	25														
3	Presentation	20														
4	Class Activities: Quiz, Homework, etc.	20														
Media employed	White/Black Board, LCD Projector, Laptop/Computer, e-Learning via http://elisa.ugm.ac.id															
Reading List	<ol style="list-style-type: none"> William E. Boyce, and Richard C. DiPrima, 2012, <i>Elementary Differential Equations and Boundary Value Problems</i>, 10th Edition, J.Wiley, New York. George F. Simmons and Steven G. Krantz, 2007, <i>Differential Equations: Theory, Technique, and Practice</i>, McGraw-Hill International Edition, New York. Robert L. Borelli, and Courtney S. Coleman, 1996, <i>Differential Equations: A modeling perspective, Preliminary Edition</i>, John Wiley & Sons, New York. Shepley L. Ross, 1984, <i>Differential Equations, 3rd Edition</i>, J. Wiley, 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	v		v	v
CO 2		v	v		v	v		v	
CO 3		v	v		v			v	
CO 4		v	v			v		v	v
CO 5		v	v			v		v	