UNIVERSITAS GADJAH MADA
Faculty of Mathematics and Natural Sciences
Department of Mathematics
Sekip Utara Bulaksumur Yogyakarta 55281 Telp: +62 274 552243 Fax: +62 274 555131 Email: math@ugm.ac.id Website: http://math.fmipa.ugm.ac.id

Master in Mathematics

Telp : +62 274 552243
Email : maths2@ugm.ac.id; kaprodi-s2-matematika.mipa@ugm.ac.id
sekprodi-s2-matematika.mipa@ugm.ac.id
Website : http://s2math.fmipa.ugm.ac.id/

MODULE HANDBOOK

Module Name	*Theory of Differential Equation*
Module level, if applicable	Master
Code, if applicable	MMM 6102
Subtitle, if applicable	
Courses, if applicable	Theory of Differential Equations
Semester(s) in which the module is taught	3rd (third)
Person responsible for the module	Chair of Analysis Research Group
Lecturer(s)	Prof. Dr. Ch. Rini Indrati, M.Si.
Language	Bahasa Indonesia
Relation to curriculum	Master Degree, Elective, 3rd semester
Teaching methods	*Lecture, Discussion, Flipped Classroom, and Presentation.*
Workload (incl. contact hours, self-study hours)	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*
Required and recommended prerequisites for joining the module	Students have taken the module of Analysis I (completeness, compactness, continuous function, and Arzelà-Ascoli Theorem) and have participated in the final exam of the module. Students have some knowledge in Linear Algebra: independence linear, bases, and matrix.

Module objectives/intended learning outcomes	After completing this course the students have ability to: CO 1. prove theorems of analysis which are used in proving the existence and uniqueness of the solution of differential equations. CO 2. prove the existence and uniqueness of the solution of initial value problem and system of differential equations with initial conditions. CO 3. Prove and justify the characteristic of solution of differential equations and systems.
Content	a. Some theories in analysis: compactness in $C(K)$ and Banach Fixed Point Theorem. b. Differential equation of order one: Peano Theorem, existence and uniqueness of the solution of initial value problem, Picard Theorem, approximation solution, and extension of the solution. c. System of differential equations-vector approach: existence and properties of solutions, system of higher order. d. Linear system of differential equations-matrix approach: i. General linear system: fundamental system, Reduction of order, Nonhomogeneous system. ii. Linear Equation of higher order: fundamental system, Wronsky determinant, Reduction of order, Nonhomogeneous system, Green's function. iii. Linear system with constant coefficients: characteristic value and vector characteristic, general solution, homogeneous equation of n^{th} order, and their applications.
Examination forms	*Oral presentation and essay*
Study and examination requirements	*Requirements for successfully passing the module is minimal C.* The final mark will be weighted as follows: No Assessment methods (components, activities) Weight (percentage) 1 Final Examination 30% 2 Mid-Term Examination 30% 3 Class Activities: Presentation and Quiz 25% 4. Homework 15%
Media employed	*White board, LCD, computer, and wifi. Platform: Zoom or google.meet*

Reading list	1. Witold Hurewicz, 1958, *Lectures on Ordinary Differential Equations*, The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons. Inc., New York. 2. Earl A. Coddington and Norman Levinson, 1955, *Theory of ordinary differential equations*, McGraw-Hill Book Company, Inc., New York-Toronto-London. 3. Earl A. Coddington and Robert Carlson, 1997, *Linear ordinary differential equations*, SIAMS, Philadelphia. 4. Royden, H.L. and Fitzpatrick, Real Analysis, Fourth Edition, English reprint edition copyright @ 2010 by Pearson Education Asia Limited and China Machine Press, 2010. 5. Teschl, G., 2012, *Ordinary Differential Equations and Dynamical Systems*, Graduate Studies in Mathematics, Volume 140, American Mathematical Society, Providence, 2012.

CO-PLO Mapping

	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**
CO 1	v	v	v			v
CO 2	v	v	v	v	v	v
CO 3	v	v	v		v	v

Modified Date : 9 August 2022