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Master in Mathematics

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MODULE HANDBOOK

Module Name	*Nonlinear Differential Equations*
Module level, if applicable	*Master Program*
Code, if applicable	*MMM-5314*
Subtitle, if applicable	
Courses, if applicable	*Nonlinear Differential Equations*
Semester(s) in which the module is taught	*I (second year)*
Person responsible for the module	*Chair of the Lab. of Applied Mathematics*
Lecturer(s)	*Dr. Fajar Adi Kusumo*
Language	*Bahasa Indonesia*
Relation to curriculum	~~*Compulsory*~~ / ***Elective*** / ~~*Specialisation*~~ *Names of other study programmes with which the module is shared: -*
Teaching methods	*lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* - *136 hours per semester* *Contact hours (please specify whether lecture, exercise, laboratory session, etc.):* - *150 minutes (2.5 hours) lectures per week for 14 weeks, 180 minutes (3 hours) structured activities per week, in total is 16 weeks per semester, including mid exam and final exam.* *Private study including examination preparation, specified in hours:* - *180 minutes (3 hours) individual study per week*
Credit points	*3*

Required and recommended prerequisites for joining the module	*Before taking this course, the students must have a good understanding about the concept of the Differential Equations and Elementary Linear Algebra.*
Module objectives/intended learning outcomes	*After completing this course, the students should have:* *CO 1. Ability to use linear analysis methods for understanding the behaviour of the solution near an equilibrium point.* *CO 2. Ability to use some methods to determine the global stability of the equilibrium point.* *CO 3. Ability to interpret the solutions of the dynamical system in geometrical point of view.* *CO 4. Ability to apply the methods for some related problems*
Content	*a. Basic concepts on Dynamical Systems* *b. Equilibrium solution and the stability* *c. First Integral and Lyapunov Function.* *d. Periodic Solution and Invariant Manifold* *e. Poincare Maps*
Examination forms	*Oral presentation, Essay*
Study and examination requirements	*The final mark will be computed from a proportional weight of assignments, mid examination and final examination. The final mark will be weighted as follows:* *No Assessment methods — Weight (percentage)* *1. Final Examination — 30 (15% case based)* *2. Mid-Term Examination — 30 (10% case based)* *3. Project and Presentation — 25* *4. Other Activities: Quiz, Homework, etc. — 15* *The initial cut-off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively.*
Media employed	*Boards, projectors, Laptop/Computer*
Reading list	*1. Wiggins, S., Introduction to Applied Nonlinear Dynamical Systems and Chaos, Springer- Verlag New York, Inc, 1990* *2. Verhulst, F., Nonlinear Differential Equations and Dynamical Systems, Springer-Verlag Berlin Heidelberg, 1996.*

CO-PLO Mapping

	CO 1	CO 2	CO 3	CO4
PLO 1	√			
PLO 2	√	√		
PLO 3	√	√	√	
PLO 4				
PLO 5			√	√
PLO 6				

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