

Module Descriptions

A **module** is a self-contained **learning unit** within a higher education program that includes thematically related courses and is assigned a **fixed number of credits**. It follows specific **learning objectives**, includes an **assessment component**, and contributes to achieving the qualifications of a degree program. In some countries, “modules” are also named “courses”.

Please provide a module description for each module. In addition to the compulsory and elective modules, this also includes credited internships and the final thesis.

Please summarize all module descriptions in one document (Module Handbook) and create a table of contents so that the modules can be found easily.

Module designation	<i>Dynamic System</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Prof. Dr. Hartono, M.Si. Dr. Eminugroho Ratna Sari, M.Sc.</i>
Language	<i>Indonesian.</i>
Relation to curriculum	<i>Elective.</i>
Teaching methods	<i>Lecture, discussion, and project.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload is 90.67 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.</i>
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<i>After taking this course the students have ability to:</i> <i>CO1. Demonstrate the ability to explain key terms and interpret the meaning of theorems and properties in Dynamical Systems.</i> <i>CO2. Demonstrate the ability to formulate mathematical models from simple real-world problems that lead to dynamical systems, and to analyze, simulate, and interpret the models effectively.</i>
Content	<i>This course covers linear and nonlinear dynamical systems, as well as bifurcation theory. The course begins with an introduction to dynamical systems through mathematical modeling and formal definitions. It then explores solutions and phase portraits of 2D linear systems, examining their stability based on eigenvalues. For nonlinear systems, topics include equilibrium points, linearization, the Jacobian matrix, stable and center manifold theorems. The course concludes with an introduction to one-parameter bifurcations.</i>
Examination forms	<i>Assignments, quizzes, and projects.</i>

Study and examination requirements	<i>The course assessment is divided into two main components:</i> Cognitive Assessment (50%) <i>This includes the following elements:</i> - Attendance: 0% - Quiz: 10% - Assignment: 40% - Midterm Exam (UTS): 0% - Final Exam (UAS): 0% Participatory Assessment (50%) <i>This includes:</i> - Case Study: 25% - Team-Based Project: 25% Total: 100%
Reading list	- Perko, L. 2000. <i>Differential Equations and Dynamical Systems</i>. Springer-Verlag: New York. - Kuznetsov, Y.A. 1998. <i>Elements of Applied Bifurcation Theory</i>. Second edition. Springer-Verlag: New York. - Wiggins, S. 1990. <i>Introduction to Applied Nonlinear Dynamical Systems and Chaos</i>. Springer-Verlag: New York - Hartono, Kus Prihantoso Krisnawan, Husna Arifah. 2021. <i>Using Perturbation Method to Identify Periodic Solutions in Mass-Spring System when Perturbed by A Wind Force</i>, Research Report.