



Module Description/Course Syllabi

Study Programme: Bachelor of Mathematics
Faculty of Mathematics and Natural Sciences
Universitas Andalas

1. Course number and name

MAT62243 Introduction to Dynamical Systems

2. Credits and contact hours/Number of ECTS credits allocated

3 sks / 4,53 ECTS

3. Instructors and course coordinator

1. Dr. Arrival Rince Putri; 2. Dr. Noverina Alfiany

4. Text book, title, author, and year

1. M. W. Hirsch, Differential Equations, Dynamical Systems, and Introduction to Chaos, Elsevier, 2004.
2. W. E. Boyce dan R. C. DiPrima, *Elementary Differential Equations and Boundary Value Problems*, John Wiley & Sons, 2009.

5. Recommended reading and other learning resources/tools

3. Lynch, S. 2007. *Dynamical System With Applications Using Matematica*. Boston: Birkhauser.

6. Specific course information

A. Brief description of the content of the course (catalog description)

This elective course covers one-dimensional linear equations and systems of equations, two-dimensional dynamic systems, phase portraits, nonlinear systems of equations, and equilibrium solutions and their stability/linearization. The course employs the Case Based Method (CBM) as a teaching approach. Students will understand and solve given cases related to the material they have studied.

<i>B. Prerequisites or co-requisites</i>
Ordinary Differential Equations MAT61142
<i>C. Indicate whether a required or elective course in the program</i>
Elective
<i>D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)</i>
First Cycle Bachelor
<i>E. Year of study when the course unit is delivered (if applicable)</i>
3rd Year
<i>F. Semester when the course unit is delivered</i>
Even Semester
<i>G. Mode of delivery (face-to-face, distance learning)</i>
Face to face
<i>7. Intended Learning Outcomes</i>
ILO-1: Possesses good ethics and integrity. PI-2: An ability to act in accordance with academic ethics PI-3: An ability to act in accordance with academic integrity
ILO-4: An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems. PI-1: An ability to choose the appropriate basic mathematical concepts and techniques to solve simple mathematical problems; PI-2: An ability to illustrate simple mathematical problems based on the appropriate basic mathematical concepts and techniques;

<p>ILO 6: Have ability in data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields. PI-1: Able to identify appropriate data and technology to solve simple mathematical problems or in other fields.</p>
<p>ILO 7: An ability to communicate effectively especially in the area of mathematics with diverse communities. PI-1: An ability to present ideas or research findings orally, especially in the field of mathematics; PI-2: An ability to present ideas or research findings in writing, particularly in the field of mathematics;</p>
<p>ILO 8: An ability to work in a team PI-1: An ability to actively participate in a team with full responsibility; PI-2: An ability to respond well to any feedback in team; PI-3: An ability to complete tasks according to the set schedule; PI-4: An ability to adapt in team.</p>
<p>8. Course Learning Outcomes</p>
<p>1. Students will be able to use basic mathematical concepts for one-dimensional and two-dimensional linear systems, as well as nonlinear systems.</p>
<p>2. Students will be able to identify different types of phase portraits of linear and nonlinear systems.</p>
<p>3. Students will be able to analyze the stability of linear and nonlinear systems.</p>
<p>4. Students will be able to explain the physical aspects and interpret the phase portraits of systems related to real-world problems.</p>
<p>9. Brief list of topics to be covered</p>
<p>1. Review of Differential Equations 2. One-Dimensional Linear Differential Equation Systems 3. Two-Dimensional Dynamical Systems 4. Phase Portraits 5. Nonlinear Differential Equation Systems</p>
<p>10. Learning and teaching methods</p>
<p>Small group discussion, CBM, Directed Learning</p>
<p>11. Language of instruction</p>

Bahasa and English
<i>12. Assessment methods and criteria</i>
Summative Assessment : 1. Mid Test : 20% 3. Final Test : 20% 4. Group Report (based on case study) : 60%
Formative Assessment : -