Module Description of Mathematical biology

Module Name	:	Mathematical biology
Module Level	:	Bachelor
Code, if applicable	:	23H01131403
Subtitle, if applicable	:	-
Courses, if applicable	:	Mathematical biology
Semester(s) in which the module is taught	:	5 (Fifth Semester)
Module coordinator(s)	:	Prof. Dr. Kasbawati, S.Si., M.Si.
Lecturer(s)	:	Prof. Dr. Syamsuddin Toaha, M.Sc. Prof.Dr. Kasbawati, S.Si., M.Si.
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Elective course in third year for Bachelor degree in Mathematics
Type of teaching/teaching method	:	Lecturing, Small Group Discussion, Cooperative Learning, Self-Directed Learning
Contact hours	:	150 minutes lectures per week, 180 minutes structured activities per week, and 180 minutes independent study per week
Workload	:	Total workload is 135 hours per semester which consists of 40 hours per semester for Learning and Teaching, 47.5 hours per semester for Self-Study, and 47.5 hours per semester for Structured Works
Credit points	:	3 (4.8 ECTS)
Requirements according to the examination regulations	:	Students are required to attend at least 80% of the total meetings which is recorded via the attendance menu at https://sikola-v2.unhas.ac.id/, complete all mandatory assignments, and obtain permission from the lecturer to participate in the written examination.
Recommended prerequisites	:	Students have completed and taken the final for Linear Algebra I, Linear Algebra II, Advanced Mathematics, Differential Equations
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. develop the ability to translate descriptions of biological scenarios into mathematical models; CLO 2. make assumptions more flexibly and evaluate the impact of these assumptions as an integral part of the modeling process; CLO 3. learn various types of mathematical models for biological systems and apply mathematical techniques to extract meaningful information from these models; CLO 4. improve their ability to communicate mathematical ideas, including mathematical results, clearly and effectively in written form;

<table>
<tr><td></td><td></td><td>CLO 5. collaborate effectively in teams and communicate mathematical ideas clearly to peers and instructors through the use of appropriate presentation tools or software.

The following is the mapping of the ILO and the CLO of this course:
<table>
<tr><th></th><th>ILO 5</th><th>ILO 6</th><th>ILO 7</th></tr>
<tr><td>CLO 1</td><td>X</td><td>X</td><td></td></tr>
<tr><td>CLO 2</td><td>X</td><td>X</td><td></td></tr>
<tr><td>CLO 3</td><td>X</td><td>X</td><td></td></tr>
<tr><td>CLO 4</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>CLO 5</td><td>X</td><td>X</td><td>X</td></tr>
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<tr><td>Content</td><td>:</td><td>Mathematical Biology is a fifth-semester module that introduces the applications of mathematics to problems in biology, ecology, physiology, and medicine, such as molecular or protein diffusion, drug transformation (issues in pharmacokinetics), disease outbreaks, and ecological systems. The modeling process challenges students to identify a sufficiently small set of variables or aspects that allow for a mathematical approach without losing the essence of the phenomena under study. The mathematics involved includes ordinary and partial differential equations, matrix theory, and optimization theory. By the end of this module, students are expected to be able to derive mathematical models from biological phenomena, solve mathematical problems, conduct simulations, and interpret the results.</td></tr>
<tr><td>Study and examination requirements</td><td>:</td><td>Study and examination requirements:
● Students must attend 15 minutes before the class starts.
● Students must switch off all electronic devices.
● Students must inform the lecturer if they will not attend the class due to sickness, etc.
● Students must submit all class assignments before the deadline.
● Students must attend the exam to get final grade.</td></tr>
<tr><td>Exams and assessment formats</td><td>:</td><td>Participants are marked based on their performance in theory: Assignments (24%), Quizzes (24%), Reports (52%).

Assignments assess student's ability to apply concepts independently, while Reports measure analytical and writing skills. Quizzes are used to test continuous understanding of weekly content. Altogether, these components account for 100% of the final grade.

Students are marked based on their percentage of points obtained and based on the following grade scale:</td></tr>
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			Percentage of Achievement	**Grade**	**Conversion Value**	
			85 – 100	A	4.00	
			80 - <85	A-	3.75	
			75 - < 80	B+	3.5	
			70 - < 75	B	3.0	
			65 - < 70	B-	2.75	
			60 - < 65	C+	2.5	
			50 - < 60	C	2.00	
			40 - < 50	D	1.00	
			< 40	E	0.00	
Reading list	:	1. Partial Differential Equations, Jeffry Kusuma, Hasanuddin University Study and Learning Resource Center, 2018. 2. Partial Differential Equations with Fourier Series and Boundary Problems, Asmar, Nakhle, Pearson Prentice Hall. 3. Persamaan Diferensial Parsial, Jeffry Kusuma, Depublish, 2023Partial Differential Equations, Jeffry Kusuma, Depublish, 2023. 4. Partial Differential Equations for Scientists and Engineers, Farlow, Stanley J., John Wiley & Sons. 5. Advanced Engineering Mathematics, O'Neil, Peter V., Thomson. 6. Advanced Engineering Mathematics, Kreyszig, Erwin, John Wiley & Sons. 7. Other sources on the Internet.			
Last revision date	:	July 28th, 2025				