Module Description of Mathematical Modeling

Module Name	:	Mathematical Modelling
Module Level	:	Bachelor
Code, if applicable	:	23H01121203
Subtitle, if applicable	:	-
Courses, if applicable	:	Mathematical Modelling
Semester(s) in which the module is taught	:	4 (Fourth 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., Dr. Khaeruddin, M.Sc.
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Compulsory Course in second year for Bachelor degree in Mathematics
Type of teaching/teaching method	:	Lecturing, Small Group Discussion, Cooperative Learning, Self-Directed Learning, Project Base 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 examination.
Recommended prerequisites	:	Completion of modules Advanced Mathematics and Differential Equation
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. identify simple problems in natural phenomena that can be studied and solved mathematically, either independently or collaboratively, through discussion, exchanging ideas, and respecting each other's opinions; CLO 2. construct mathematical models of simple problems in natural phenomena by applying mathematical tools that are relevant and up to date with current developments;

<table>
<tr><td></td><td></td><td>CLO 3. apply appropriate fundamental mathematical concepts in solving mathematical models, with or without the aid of computational tools, interpret the solutions, and validate them using the available data.
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><th>ILO 8</th><th>ILO 9</th></tr>
<tr><td>CLO 1</td><td></td><td></td><td>X</td><td>X</td><td></td></tr>
<tr><td>CLO 2</td><td>X</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>CLO 3</td><td></td><td>X</td><td></td><td></td><td>X</td></tr>
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<tr><td>Content</td><td>:</td><td>The course focuses on the application of mathematical theory to various real-world problems, including spring/pendulum systems, interaction dynamics (such as population dynamics, kinetic reactions, metabolic systems, and the spread of diseases), traffic flow problems, as well as other complex issues that can be mathematically analyzed and solved. This course serves as a core subject in the Mathematics Program and functions as a prerequisite for subsequent courses, such as Special Topics in Applied Mathematics.</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 Assignments (15%), Report (50%), and Presentation (35%).

Assignments assess student's ability to apply concepts independently, while Reports measure analytical and writing skills. Presentations evaluate oral communication, organization of ideas, and confidence in delivering academic material. 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:
<table>
<tr><th>Percentage of Achievement</th><th>Grade</th><th>Conversion Value</th></tr>
<tr><td>85 – 100</td><td>A</td><td>4.00</td></tr>
<tr><td>80 - <85</td><td>A-</td><td>3.75</td></tr>
<tr><td>75 - < 80</td><td>B+</td><td>3.5</td></tr>
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<tr><td>70 - < 75</td><td>B</td><td>3.0</td></tr>
<tr><td>65 - < 70</td><td>B-</td><td>2.75</td></tr>
<tr><td>60 - < 65</td><td>C+</td><td>2.5</td></tr>
<tr><td>50 - < 60</td><td>C</td><td>2.00</td></tr>
<tr><td>40 - < 50</td><td>D</td><td>1.00</td></tr>
<tr><td>< 40</td><td>E</td><td>0.00</td></tr>
</table>
</td></tr>
<tr><td>Reading list</td><td>:</td><td>1. Haberman, R. 1998. Mathematical Models: Mechanical Vibrations, Population Dynamics, and Traffic Flow. SIAM. Philadelphia.
2. Edward, B. 1987. Mathematics for Dynamic Modeling. Academic Press, Inc. San Diego, California.
3. Toaha, S. 2013. Pemodelan Matematika dalam Dinamika Populasi. Dua Satu Press, Makassar.
4. Scientific Journals that related to the topic of the Project</td></tr>
<tr><td>Last revision date</td><td>:</td><td>February 5th, 2025</td></tr>
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