Module Description of Stochastic Processes

Module Name	:	Stochastic Processes
Module Level	:	Bachelor
Code, if applicable	:	23H01130203
Subtitle, if applicable	:	-
Courses, if applicable	:	Stochastic Processes
Semester(s) in which the module is taught	:	6 (Sixth Semester)
Module coordinator(s)	:	Jusmawati Massalesse, M.Si.
Lecturer(s)	:	Jusmawati Massalesse, M.Si., Dr. Firman, S.Si., M.Si.
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Compulsory course in third 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	:	Advanced mathematics, Probability Theory
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. Students are able to explain the terminology related to various types of stochastic processes and the characteristics that differentiate the types of stochastic processes from each other.; CLO 2. Students are able to apply the concept of probability distribution to determine the properties associated with a stochastic process; CLO 3. Student are able to model the dynamics of random events in various fields of science, as well as interpret the long-run behavior of random events using different types of stochastic processes.

<table>
<tr><td></td><td></td><td>The following is the mapping of the ILO and the CLO of this course:

	ILO 4	ILO 5	ILO 7	ILO 8	ILO 9
CLO 1	X			X	
CLO 2	X	X	X		
CLO 3		X	X		X

</td></tr>
<tr><td>Content</td><td>:</td><td>The Stochastic Processes course introduces students to the fundamental concepts and techniques for analyzing random phenomena that evolve over time. The course begins with the basic definition of stochastic processes and their relationship with random variables and probability distributions. It then explores joint probabilities and distributions, conditional probabilities and moments, and advances to classical stochastic models such as Markov chains, Poisson processes, and Markov processes. Further topics include the birth and death processes and renewal processes, which are widely applied in modeling real-world systems. By the end of this course, students are expected to understand the theoretical foundations of stochastic processes, develop skills to model and analyze random systems, and apply these concepts in various fields such as mathematics, computer science, engineering, and economics.</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 (5%), Quizzes (25%), Written Exam (20%), Report (50%).

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. The Written Exam assesses comprehension and synthesis of all materials discussed during the semester. 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>
</table>

<table>
<tr><td></td><td></td><td>
<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>
<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. Karlin, S & Amp; H. M. Taylor, 1994. An Introduction to Stochastic Modeling, 3rd Edition. Academic Press. New York.
2. Allen, S. 2003. Introduction to Stochastic Process with Biology Application.
3. Ross, Sheldon M. 2007. Introduction to Probability Models, 9th Edition. Elsevier Inc. London</td></tr>
<tr><td>Last revision date</td><td>:</td><td>February 5th, 2025</td></tr>
</table>