Module Description of Measure Theory and Probability

Module Name	:	Measure Theory and Probability
Module Level	:	Bachelor
Code, if applicable	:	23H01131503
Subtitle, if applicable	:	-
Courses, if applicable	:	Measure Theory and Probability
Semester(s) in which the module is taught	:	5 (Fifth Semester)
Module coordinator(s)	:	Dr. Muh. Nur, S.Si., M.Si.
Lecturer(s)	:	Prof. Dr. Eng. Mawardi, S.Si., M.Si., Dr.Muh. Nur, 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 exams for Calculus I, Calculus II, and Statistical Methods
Module objectives/intended learning outcomes		After completion of this module, the student will be able to: CLO 1. understanding of set notation and operations on sets, set algebra, and sigma algebra; CLO 2. demonstrate an understanding of the properties, measure spaces, probability spaces, and outer measure; CLO 3. demonstrate an understanding of measurable functions, distribution functions, and the Lebesgue integral. The following is the mapping of the ILO and the CLO of this course:

	ILO 3	ILO 4	ILO 7
CLO 1	X	X	
CLO 2		X	X
CLO 3	X	X	X

<table>
<tr><td>Content</td><td>:</td><td>This course is a continuation of mathematical analysis and statistics, focusing on the development of measure theory and probability. Measure theory and probability play an important role in the advancement of integral theory, probability and statistical theory, Fourier analysis, functional analysis, topology, geometry, quantum physics, and other related fields. The course provides students with the foundation needed to understand these concepts and their applications in both pure and 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 theory:, Written Exam (40%), and Report (60%).

The Written Exam assesses comprehension and synthesis of all materials discussed during the semester. Reports measure analytical and writing skills. 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>
<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>M. Brokate and G. Kersting, Measure and Integral, Springer, 2015.
J. Jacod and P. Protter, Probability Essentials, 2nd ed., Springer, 2004.
Ekasasmita, W.; Bahri, M.; Bachtiar, N.; Rahim, A.; Nur, M. One-Dimensional Quaternion Fourier Transform with Application to Probability Theory. Symmetry 2023, 15, 815. https://doi.org/10.3390/sym15040815</td></tr>
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		4. Marek Capinski and Ekkehard Kopp, Measure, Integral and Probability, Springer-Verlag, 2004. 5. Billingsley, P. (1995). Probability and measure (3rd ed.). Wiley.
Last revision date	:	July 28th, 2025