Module designation	*Introduction to Measure Theory and Integral*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Prof. Dr. Hartono, M.S*
Language	*Bahasa Indonesia*
Relation to curriculum	*Elective course*
Teaching methods	*150 minutes lectures and 180 minutes structured activities per week.*
Workload (incl. contact hours, self-study hours)	*Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.*
Credit points	*3*
Required and recommended prerequisites for joining the module	*MAT6321-Real Analysis*
Module objectives/intended learning outcomes	*Students know that/know how to/are able to* *CO1: Explain the limitations of Riemann integrals through examples of functions that cannot be integrated using Riemann integrals.* *CO2: State and apply the concept of σ-algebra to subsets of real numbers.* *CO3: Develop the concept of measure of a set in a measure space.* *CO4: Determine and analyze the properties of measurable functions.* *CO5: Define and construct the Lebesgue integral through characteristic functions and simple functions.* *CO6: Explain and prove the fundamental properties of the Lebesgue integral.* *CO7: Apply the Lebesgue integral to solve integral-related problems and compare it with the Riemann integral.*
Content	*This course begins with a discussion of the Riemann integral of a real-valued function and provides an example of a function that is not Riemann integrable as motivation for discussing the Lebesgue integral. Next, it discusses a space consisting of subsets of real numbers called sigma algebras. From the concept of sigma-algebra, the concept of the measure of a set is developed, and subsequently the concept of a measurable function is developed. Based on the concept of a characteristic function, the concept or definition of the Lebesgue integral is developed. The properties of the Lebesgue integral are used to solve problems related to integrals.*

<table>
<tr><td>Examination forms</td><td>CO1: Attitude assessment is carried out at each meeting by observation and / or self-assessment techniques using the assumption that basically every student has a good attitude.</td></tr>
<tr><td>Study and examination requirements</td><td>The student is given a value of very good or not good attitude if they show it significantly compared to other students in general. The result of attitude assessment is not a component of the final grades, but as one of the requirements to pass the course. Students will pass from this course if at least have a good attitude.

The final mark will be weight as follow:
<table>
<tr><th>No</th><th>CO</th><th>Assessment Object</th><th>Assessment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>CO 1</td><td>a. Presentation
b. Discussion</td><td>Observation</td><td>5%
10%</td></tr>
<tr><td>2</td><td>CO 2, CO 3, CO 4</td><td>a. Individual assignment
b. Group assignment
c. Quiz
d. Midterm
e. Final test</td><td>Written</td><td>10%
10%
20%
20%
25%</td></tr>
<tr><td colspan="4">Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Reading list</td><td>Royden, H. L., & Fitzpatrick, P. M. (2010). Real Analysis (4th ed.). Pearson.
Folland, G. B. (1999). Real Analysis: Modern Techniques and Their Applications (2nd ed.). Wiley.
Bartle, R. G. (1995). The Elements of Integration and Lebesgue Measure. Wiley.</td></tr>
</table>