

M036	FIN-obligatory- Semester 1 MR,IPM- elective-Year 1	<b>Introduction to Measure Theory</b>	L+P+S 2+2+0	ECTS 5
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**Course objective.** Students should be introduced to fundamental ideas and methods of measure theory, which represent the basis for many other courses.

**Course prerequisites.** Undergraduate study programme in mathematics.

**Syllabus.**

1. Introduction. Countable sets and basic topological facts.
2. Measures.  $\sigma$ -algebras. Measure on  $\sigma$ -algebra. Outer measure. Measurable sets. Carathéodory's theorem. Dynkin classes and  $\pi$ -systems. Lebesgue outer measure. Lebesgue measure. Cantor's set. The Lebesgue-Stieltjes measure. Complete measures. Borel measure. Product measures.

**Expected learning outcomes:**

After completing the course, students are expected to:

- know and understand basic concepts of abstract measure theory;
- be familiar with some examples of measures with special emphasis on Lebesgue measure;
- know and be able to prove basic theorems in measure theory;
- acquire the necessary knowledge for the application of measure theory of measure in other courses.

**Teaching methods and student assessment.** Lectures and exercises are obligatory. The final examination consists of both a written and an oral part that can be taken after completion of all lectures and exercises. During the semester students can take 2-3 mid-term exams that replace the written examination.

**Can the course be taught in English:** Yes.

**Basic literature:**

1. D. Jukić, Mjera i integral, Odjel za matematiku, Osijek, 2012.
2. D. Jukić, Reviewed teaching materials are available on the course website.

**Recommended literature:**

1. D. L. Cohn, Measure theory, Birkhäuser, 1980.
2. S. Mardešić, *Matematička analiza 2: Integral i mjera*, Školska knjiga, 1977.
3. W. Rudin, Principles of Mathematical Analysis, Mc Graw-Hill, Book Company, 1964.
4. R. L. Schilling, *Measures, integrals and martingales*, Cambridge University Press, New York, 2005.
5. H. J. Wilcox, D. L. Myers, An Introduction to Lebesgue Integration and Fourier Series, Dover, New York, 1994.