<table>
<tr><td>COURSE NAME</td><td colspan="7">Probability I</td></tr>
<tr><td>Code</td><td>PMM228</td><td>Year of study</td><td colspan="5">1st and 2nd year of graduate study</td></tr>
<tr><td>Course teacher</td><td>Snježana Braić</td><td>Credits (ECTS)</td><td colspan="5">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td></td></tr>
<tr><td>30</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory and elective course</td><td>Percentage of application of e-learning</td><td colspan="5">30%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Course objective is stating and proving main results from classical probability theory using measure theory.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Course enrolment requirement: Completed course Introduction to probability and statistic. Course taken: Measure and integral
Entry competences required: Basic knowledge of measure theory and Lebesgue integration.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">At the end of this course, students should be able to:
- Understand and apply probability theory concepts and methods
- Use multidimensional distributions and analyze their properties
- Solve problems regarding sums and sequences of random variables using characteristic functions
- Differentiate between different types of convergence of random variables
- Recognize conditions for applying laws of large numbers and central limit theorems</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">- Random variables. (2)
- Cumulative distribution function of random variables. Classification of random variables. (2)
- Cumulative distribution function of random vectors. Classification of random vectors. (2)
- Probability on infinite dimensional spaces. (2)
- Mathematical expectation as Lebesgue integral. Properties of mathematical expectation. Radon-Nikodym theorem (without proof). Transformation of mathematical expectation. Variance. Important inequalities. L^p spaces. (2)
- Types of convergence of random variables. (2)
- Integration on product spaces. (2)
- Independent random variables – different characterizations. Functions of random variables and random vectors. Applications in statistics. (4)
- Weak law of large numbers (2)
- Strong law of large numbers. (2)
- Characteristic functions (2-4)
- Central limit theorem (2-4)</td></tr>
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Format of instruction	Lectures and exercises section
Student responsibilities	Students are obliged to regularly attend lectures and exercises.
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Attending lectures and exercises (2) Written final exam/mid-term exams (2) Oral exam (2)
Grading and evaluating student work in class and at the final exam	There are 2 mid-term exams during a semester. Passing both mid-term exams enables students to take an oral exam. Successfully passing the oral exam leads to successful completion of the course. Final grade is derived as the arithmetic mean of scores in mid-term exams (or a written exam) and the oral exam. In the case of failure in mid-term exams or the oral exam students must undergo a written exam before approaching oral exam again.
Required literature (available in the library and via other media)	N. Sarapa, *Teorija vjerojatnosti*, Školska knjiga, Zagreb, 2002.
Optional literature (at the time of submission of study programme proposal)	1. R. B. Ash, *Real Analysis and Probability*, Academic Press, New York, 1972. 2. M. M. Rao, *Probability Theory with Applications*, Academic Press, New York, 1984. 3. R. Durret, *Probability: Theory and Examples*, Wadsworth & Brooks, 1991
Quality assurance methods that ensure the acquisition of exit competences	Detailed statistics of student results, gathering feedback from students through official questionnaires and lecturer’s self-evaluation.
Other (as the proposer wishes to add)	