

Study programme: PhD studies – Mathematics			
Course name: Extreme Value Theory			
Lecturer: Pavle Mladenović			
Status: Optional for the module Statistics, actuarial and financial mathematics			
ECTS: 9			
Attendance prerequisites: Stochastic processes, Stationary random processes			
<p>Course aims: Learning objective is: getting acquainted with general and special results in the field of classical extreme value theory, that is concerned principally with the distributional properties of the maximum and other upper extremes of n i.i.d. random variables, as n becomes large, and also in the field of extreme value theory for stationary processes, in discrete as well as continuous time.</p>			
<p>Course outcome: Student has obtained skills, competence and knowledge in the field of extreme value theory. Student has also become acquainted with the possibilities of applying probability methods based on this theory. Student is trained to achieve independence in scientific research in this area.</p>			
<p>Course content: Regularly varying functions. Integral properties of regularly varying functions and Karamata theorem. Monotone functions and generalized inverse. Π-varying and Γ-varying functions. Extreme values of the sequences of independent random variables. Gumbel, Fréchet and Weibull distribution. Max-stable distributions. The extremal types theorem. The maximum domain of attraction of the Fréchet distribution. The maximum domain of attraction of the Weibull distribution. The maximum domain of attraction of the Gumbel distribution. Probability distributions that do not belong to max-domain of attraction of any of the extreme value distributions. Extreme values of stationary random sequences. Weak dependence conditions. The extremal types theorem for stationary sequences. Estimating parameters of Gumbel distribution. Estimating the extreme value index. Hill's estimator and Pickands' estimator and their properties. Quantile estimation.</p>			
<p>Literature: Павле Младеновић: <i>Екстремне вредности случајних низова</i>, Математички факултет, Београд 2002. Paul Embrechts, Claudia Klüppelberg, Thomas Mikosch: <i>Modelling Extremal Events for Insurance and Finance</i>, Springer-Verlag Berlin-Heidelberg 2012.</p>			
Number of hours: 10	Lectures: 4	Study research project: 6	
Teaching and learning methods: Group or individual tutorials.			
Assessment (maximal 100 points)			
Course assignments	Number of points	Final exam	Number of points
Homework	20	Written exam	-
Exercises / Tutorials	-	Oral exam	60
Colloquia	-	Written-oral exam	-
Tests	-		
Essay / Project	20		