DOCTORAL (PHD) STUDIES
COURSE DESCRIPTION

Course title	Field of science	Faculty	Institute
Limit Theorems in Probability Theory	Mathematics (N 001)	Faculty of Mathematics and Informatics	Institute of Mathematics, Institute of Applied Mathematics
Study method	Number of credits	Study method	Number of credits
Lectures	0	Consultations	1
Individual work	4	Seminars	0

Course summary

1. Distributions and characteristic functions. Distribution and distribution function of random variable. Characteristic function of random variable. Calculation of characteristic functions. Properties of characteristic functions. The characteristic function method to investigate the weak convergence of the random variable sequence. Clasical Bernoulli, Moivre-Laplace and Poisson limits theorems for Bernoulli scheme.

2. Infinitelly divisible distributions. The concept of infinitelly divisible distributions. Examples of infinitelly divisible distributions. Characteristic function of the infinitelly divisible distribution. The canonical expression of the characteristic function. Levy's spectral function. Characteristic function of infinitelly divisible distribution with finite variance.

3. Infinitesimal random variables. The sequences array of infinitesimal random variables. Properties of such array. The class of limit distributions for sums of infinitesimal random variables. Conditions for the convergence of such sums to particular possible distribution. Conditions for convergence to Normal and Poisson distributions.

4. Limit theorems for normed sums. Class of distributions **L.** The characteristic functions of distributions from class **L.** The canonical expression of characteristic function for distribution from class **L**. Class of limiting distributions for normed sums of independent random variables. Convergence to the Normal law of normed sums of independent random variables..

5. Stable distributions. Class of stable distributions. Levy's spectral function of stable distribution. The canonical expression of the characteristic function for stable distribution. Attraction domain of a stable distribution. Attraction domain of the Normal law.

Main literature

1. I. A. Ibragimov, Yu. V. Linnik. *Independent and stationary sequences of random variables* Groningen : Wolters-Noordhoff., 1971.
2. V.V. Petrov. *Limit theorems of probability theory,* Oxford university press, 1995.
3. M. Loeve. *Probability theory.* Springer Verlag, 1978.

Consulting teacher	Scientific degree	Pedagogical name	Main publications in the field of science of the last 5 year period
Vydas Čekanavičius	Habil. dr.	Prof.	1. S. Neelesh Upadhye, **V Čekanavičius**, P. Vellaisamy, On Stein operators for discrete approximations. *Bernoulli*, 2017, 23, 2828-2859. 2. **V.Čekanavičius**, P. Vellaisamy, Approximating by convolution of the normal and compound Poisson laws via Stein's method. *Lithuanian Mathematical Journal*, 2018, 58, 127-140. 3. P. Vellaisamy, **V. Čekanavičius,** Infinitely divisible approximations for sums of m-dependent random variables. *Journal of Theoretical Probability*, 2018, 31, 2432-2445. 4. **V.Čekanavičius**, P. Vellaisamy, On large deviations for sums of discrete m-dependent random variables. *Stochastics*, 2019, 91, 1092-1108.

			5. G. Liaudanskaitė, **V. Čekanavičius**, Approximations for sums of three-valued 1-dependent symmetric random variables. *Nonlinear Analysis – Modelling and Control*, 2020, 25, 675-691.
Eugenijus Manstavičius	Habil. dr.	Prof.	1. **E. Manstavičius**, Sharp bounds for the variance of linear statistics on random permutations. *Random Structures and Algorithms,* 2020, 57, 1303-1313. 2. **E. Manstavičius**, V. Stepas, Moments of additive statistics with respect to the Ewens sampling formula. *Publicationes Mathematicae – Debrecen*, 2019, 95, 259-277. 3. **E. Manstavičius**, R. Petuchovas, Local probabilities and total variation distance for random permutations. *Ramanujan Journal,* 2017, 43, 679-696. 4. **E. Manstavičius,** V. Stepas, Variance of additive functions defined on random assemblies. *Lithuanian Mathematical Journal,* 2017, 57, 222-235.
Jonas Šiaulys	Dr. (HP)	Prof.	1. E. Bernackaitė, **J. Šiaulys**, The finite-time ruin probability for an inhomogeneous renewal risk model. *Journal of Industrial and Management Optimization*, 2017, 13, 207-222. 2. S. Danilenko, **J. Šiaulys**, G. Stepanauskas, Closure properties of O-exponential distributions. *Statistics and Probability Letters*, 2018, **140**, 63-70. 3. O. Ragulina, **J. Šiaulys**, Randomly stoped minima and maxima with exponential-type distributions. *Nonlinear Analysis: Modelling and Control,* 2019, 24, 297-313. 4. R. Leipus, **J. Šiaulys**, On a closure property of convolution equivalent class of distributions. *Journal of Mathematical Analysis and Applications*, 2020, **490**, 124226. 5. M. Dirma, S. Paukštys, **J. Šiaulys**, Tails of the moments for sums with dominatedly varying random summands. *Mathematics*, 2021, 9, 824.

Approved by the Board of Faculty of Mathematics and Informatics 10/12/2021. Resolution No. (1.5 E) 110000-TPN-42
Board Chairman – assoc. prof. dr. Kristina Lapin