COURSE UNIT DESCRIPTION

Course unit title	Course unit code
Probability Theory and Mathematical Statistics II	TTMS2214

Lecturer(s)	Department where the course unit is delivered
Coordinator: Vytautas Stepas **Other lecturers:**	Faculty of Mathematics and Informatics Institute of Mathematics Naugarduko St. 24 LT-03225 Vilnius Lithuania

Cycle	Level of course unit	Type of the course unit
1st (BA)	2 out of 2, SK	Compulsory
Mode of delivery	**Semester or period when the course unit is delivered**	**Language of instruction**
Face-to-face	Third year of study Autumn semester	Lithuanian, english

Prerequisites and corequisites	
Prerequisites: Mathematical Analysis I-III, Probability Theory and Mathematical Statistics I	**Corequisites (if any):** Measure and Integral Theory

Number of ECTS credits allocated	Student's workload	Contact hours	Individual work
5	130	48	82

Purpose of the course unit: programme competences to be developed

The aim of the course is to develop the skills of mathematical description and analysis of sequences of random variables and random processes, of monitoring results, of communications in subject-related situations.

Learning outcomes of the course unit: students will be able to	Teaching and learning methods	Assessment methods
The student abstract thinking ability will be developed. The students will learn to employ mathematical reasoning, that is, to proceed from assumptions to conclusions following the patterns of logical inference.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Understand the central limit theorem and its application areas.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Describe phenomenon by systems of random variables, understand the main types of random processes.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Define basic concepts of mathematical statistics and to use them.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Formulate and prove main propositions of mathematical statistics on statistical estimates and hypothesis testing.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Formulate statistical problems in mathematical language.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Solve the problems of mathematical statistics (obtain the parameter estimates for unknown distributions, test the statistical hypothesis)	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written) Exam (written).
Provide the conclusions of statistical analysis of monitoring results, use and justify them.	Interactive Lecture. Practice. Individual reading.	Tests (written). Colloquium (written)

		Exam (written).

Course content: breakdown of the topics	Contact hours						Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Practice classes	Laboratory work	Contact hours	Individual work	Assignments
1. Bernoulli process.	1			2		**3**	5	Individual reading Problem solving
2. Poisson process.	2			4		**6**	11	Individual reading Problem solving
3. Markov process.	4			8		**12**	19	Individual reading Problem solving
4. Law of large numbers.	2			4		**6**	11	Individual reading Problem solving
5. Central limit theorem.	2			4		**6**	10	Individual reading Problem solving
6. Bayesian statistical inference.	3			6		**9**	15	Individual reading Problem solving
7. Classical statistical inference.	2			4		**6**	11	Individual reading Problem solving
Total	**16**			**32**		**48**	**82**	

Assessment strategy	Weight %	Deadline	Assessment criteria
Tests (written)	30	During semester	Assessment: 3 – excellent knowledge and abilities; 2,5 – strong knowledge and abilities; 1,5 – mediocre knowledge and abilities; 0,5 – minimal knowledge and abilities; < 0,5 – minimal requirements are not satisfied.
Work in lecture-room	10	During semester	Assessment: 1 – excellent work in lecture-room; 0,5 – mediocre work in lecture-room; < 0,5 – unsatisfactory work in lecture-room.
Colloquium (written)	20	November	Assessment: 2 – excellent knowledge and abilities; 1,5 – strong knowledge and abilities; 1 – mediocre knowledge and abilities; 0,5 – minimal knowledge and abilities; < 0,5 – minimal requirements are not satisfied.
Exam (written)	40	January	Assessment: 4 – excellent knowledge and abilities; 3 – strong knowledge and abilities; 2 – mediocre knowledge and abilities; 1 – minimal knowledge and abilities; < 1 – minimal requirements are not satisfied.

Author	Publishing year	Title	Number or volume	Publisher or URL
Required reading				
J. Tsitsiklis	2010	Probabilistic Systems Analysis and Applied		https://ocw.mit.edu/courses/electrical-engineering-

		Probability		and-computer-science/6-041-probabilistic-systems-analysis-and-applied-probability-fall-2010/index.htm
Recommended reading				
V. Čekanavičius, G. Murauskas	2000	Statistika ir jos taikymai	Part1	Vilnius, TEV
V. Čekanavičius, G. Murauskas	2002	Statistika ir jos taikymai	Part 2	Vilnius, TEV
V. Bagdonavičius, J. Kruopis	2007	Matematinė statistika	Part 1	Vilnius, TEV
J. Kubilius	1996	Tikimybių teorija ir matematinė statistika		Vilniaus universiteto leidykla
D. Bertsekas, J. Tsitsiklis	2008	Introduction to probability, 2nd ed.		Nashua (NH, USA), Athena Scientific