COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Sample Surveys	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: assoc. prof. Rūta Levulienė **Other(s):**	Faculty of Mathematics and Informatics Institute of Applied Mathematics Department of Statistical Analysis

Study cycle	Type of the course unit (module)
Second level	Optional

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face-to-face	Master studies, the second semester	Lithuanian / English

Requirements for students	
Prerequisites: Probability theory, basics of statistics	**Additional requirements (if any):**

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	125	42	83

Purpose of the course unit (module): programme competences to be developed		
• Creatively solve non-standard theoretical and empirical problems; • Design and realize practical surveys; • Estimate the adequacy of the models and adjust the models.		
Learning outcomes of the course unit (module)	**Teaching and learning methods**	**Assessment methods**
Design sample survey	Problem-oriented teaching, analysis of examples, laboratory work, individual reading	Midterm exam, laboratory work, exam
Construct the estimators of the parameters of the surveyed population and estimate the accuracy		
Apply sampling methods and simulated modelling for complex problems of estimation, optimization and model selection		
Associate theoretical models with empirical problems		
Know the main stages of applied survey		

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	**Contact hours**	**Self-study hours**	**Assignments**
1. Main notions of the sampling theory: finite population, probability sample, finite population parameter, estimators of the finite population parameter, measures of the accuracy of the estimator. Planning and examples of the sample surveys.	4		2				**6**	**8**	Work with supplementary reading list; exercises and problem solving.
2. Simple random sample. Estimators of the mean, total and proportion. Variances of the estimators. Sample from the finite and infinite population. Estimation of sampling error, confidence interval, coefficient of variation. Estimation of the parameters in the case of qualitative data. Estimation of the sample size.	6		2				**8**	**10**	Work with supplementary reading list; exercises and problem solving.
3. Sampling with unequal probabilities. Estimators of the mean and total. Variances of the estimators.	2		2				**4**	**15**	Work with supplementary reading list; exercises and problem solving. Laboratory work no. 1.
4. Ratio, regression and calibrated estimators.	6		2				**8**	**14**	Work with supplementary reading list; exercises and problem solving. Laboratory work no. 1.
5. Stratified sampling. Optimal sample size allocation.	4		2				**6**	**12**	Work with supplementary reading list; exercises and problem solving. Laboratory work no. 2.
6. Cluster sampling. Multistage sampling.	4		2				**6**	**14**	Work with supplementary reading list; exercises and problem solving. Laboratory work no. 2.
7. Estimation of variances of complex estimators using Taylor expansion, bootstrap and jack-knife methods.	2		2				**4**	**10**	Work with supplementary reading list; exercises and problem solving. Laboratory work no. 2.
Total	**28**		**14**				**42**	**83**	

Assessment strategy	Weight,%	Deadline	Assessment criteria
Laboratories	30%	During the semester	The problem for the first laboratory is formulated by the lecturer. The problem for the second laboratory the students can choose from the list presented by the lecturer. The laboratory can be done by group consisting of 2 students. The solutions (results) are presented during the seminar and discussed. The printed report is also allowed. The cumulative method and interim points are used. Each laboratory can be evaluated up to 15 interim points. Laboratories are evaluated according to the requirements

			presented in advance. The complexity of the problem, originality, quality of the processing and presentation are taken into account.
Mid-term exam.	30%	In the middle of the semester	The outcome of the first part of the course (Topics 1-4) is evaluated. The simple exercise, more complicated theoretical problem consisting from several parts is to be solved. The colloquium can be evaluated up to 30 (interim) points.
Final exam	40%	Exam session	The outcome of the second part of the course (Topics 5-7) is evaluated. The final exam is evaluated up to 40 interim points. The type of exercises and theoretical problems are similar to that of suggested for the colloquium. The final evaluation is in 10 points scale. The sum of interim points is divided by 10 and rounded.

Author	**Year of publication**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing place and house or web link**
Compulsary reading				
R. Levulienė		Course material		VU VLE
Sarndal C.-E., Swenson B., Wretman J.	1993	Model Assisted Survey Sampling		*Springer-Verlag*
Lohr, Sharon L.	2010	Sampling: Design and analysis		*Boston: Brooks/Cole*
Optional reading				
Efron, Bradley.	1994	The jackknife, the bootstrap and other resampling plans		*Philadelphi, Society for Industrial and Applied Mathematics*
Krapavickaitė D., Plikusas A.	2005	Imčių teorijos pagrindai.		*Technika, Vilnius*