Practical Econometrics with R and Python I

SUBJECT DESCRIPTION

Subject Title	Code
Practical Econometrics with R and Python I	

Lecturer (-s)	Division
Coordinating: Andrius Buteikis	Faculty of Mathematics and Informatics Institute of Applied Mathematics Department of Statistic Analysis

Study cycle	Subject type
First	Compulsory

Mode of delivery	Period	Study language
Auditorium	Fourth (Spring) semester	English

Student requirements	
Preliminary requirements: Introductory Statistics	**Parallel requirements (if any):** Microeconomics

Subject volume in credits	Total student workload	Contact hours	Self-study hours
5	140	64	76

Subject objectives: the competences developed during the subject		
Ability to work in a group and assume responsibility for the entrusted task. Ability to model various phenomena by mathematical and statistical means. Ability to use specialized statistical-econometric software.		
Learning outcomes from the subject	**Study methods**	**Assessment methods**
Upon successful completion of the subject studies, the student should have the following:		
Ability to formalize economic laws and theory and express them as relationships between economic variables. Ability to express these connections as regression equations and understand the underlying methods and assumptions required for correct model parameter estimations.	Problem-based teaching, case studies, discussion. Tasks in a computer lab/classroom.	Assessment of the adoption of statistical programs via midterms and final written examination.
Ability to correctly specify the model and adequately test the theoretical assumptions, as well as use these models for quantitative predictions.		
Ability to use computer software.		

Topics	Contact hours					Self-study hours and tasks	
	Lectures	Consultations	Laboratory works	Seminars	**Total contact work**	**Self-study**	Tasks
1. Statistical data types and their models. Regression models, examples. R and Python programming languages.	2		2		4	12	[RLpa; ch. 1 & 2] [RLpr; ch. 1 & 2]
2. Univariate regression: ordinary least squares (OLS) method, OLS estimator properties, regression model, hypothesis testing methods, coefficient of determination, model functional form selection, heteroskedasticity and autocorrelation, nonlinear regression.	11		8		19	15	[RLpa; ch. 3] [RLpr; ch. 3]
3. Midterm I (computer class)			2		2	4	Preparation for the midterm.
4. Multiple regression: OLS formula, multicollinearity, AIC, BIC and similar model adequacy statistics, categorical/indicator variables, model coefficient hypothesis tests, heteroskedasticity and autocorrelation, model specification tests, instrumental variables, simultaneous equations.	11		8		19	15	[RLpa; ch. 4] [RLpr; ch. 4]
5. Midterm II (computer class)			2		2	4	Preparation for the midterm.
6. Discrete response models.	10		4		14	18	[RLpa; 5 skyrius] [RLpr; 5 skyrius]
7. Final exam.	3	1			4	8	Preparation for the exam.
Total	**37**	**1**	**26**	**0**	**64**	**76**	

Grading strategy	Weight, %.	Date	Evaluation Criteria
General assessment system: Depending on the level of students and the nuances of teaching and scheduling, assessment thresholds may change slightly, but generally at least 45 points is required to obtain a positive grade. (max. 100 pts.) and receive at least 5 pts. of the session exam (max. 40 pts.). Retention of examination. Students who have received an unsatisfactory grade may take a written test of the entire course material during the retention period (assessed at 100 pts.). A minimum grade of 45 pts. is needed for passing.			
Midterm I in computer classes	30	Week 7–8	One or two tasks from the lectured course material. The tasks are divided into 8 – 10 total parts. The tasks are worth a maximum of 30 points combined.

Midterm II in computer classes	30	Week 15-17	One or two tasks from the lectured course material. The tasks are divided into 8 – 10 total parts. The tasks are worth a maximum of 30 points combined.
Session examination	40	January	One or two tasks from the whole lectured course material. The tasks are divided into 10 – 12 total parts. The tasks are worth a maximum of 40 points combined.

Author	Date	Title	Periodical publication no. or volume of the publication	Publisher or web link
Required literature				
Buteikis A.	2019	Lecture notes and slides		http://web.vu.lt/mif/a.buteikis/category/practical-econometrics/practical-econometrics-i-ii/
Lapinskas R.	2011	Practical Econometrics I : Regression Models (Lecture Notes)		https://klevas.mif.vu.lt/~rlapinskas/Ekonometrija%20-%20Econometrics_R_gretl%20/Practical%20Econometrics%20with%20R%20and%20gretl.%20I/
Lapinskas R.	2011	Practical Econometrics I : Regression models (Computer Labs)		https://klevas.mif.vu.lt/~rlapinskas/Ekonometrija%20-%20Econometrics_R_gretl%20/Practical%20Econometrics%20with%20R%20and%20gretl.%20I/
Optional literature				
Wooldridge J.M.	2012	Introductory econometrics: a modern approach		Mason, South-Western Cengage Learning
Hill R.C., Griffiths W.E., Judge G.G.	2007	Principles of econometrics		Danvers, Wiley
Stock J.H., Watson M.W.	2007	Introduction to econometrics		Boston, Pearson Addison-Wesley