COURSE UNIT DESCRIPTION

Course Unit Title	Code
QUANTITATIVE RESEARCH METHODS	

Lecturer(s)	Department(s)
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Study cycle	Type of the course unit
First	Compulsory

Mode of delivery	Course unit delivery period	Language (s) of instruction
Face-to-face	2 (spring) semester	English

Requirements for students	
Pre-requisites: -	**Co-requisites (if any): -**

Number of credits allocated	Total student's workload	Contact hours	Self-study hours
10	250	64	186

Purpose of the course unit: programme competences to be developed

The course aims to develop student's knowledge of and skills in quantitative, social-scientific research, to form abilities to use collected data to test his/her hypotheses and answer his/her research questions by using R, as well as to evaluate the research that has been conducted by others and the mass of quantitative information in the world around.

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
Students will be able to independently formulate and implement a basic quantitative research project (formulate a scientifically valid research question based on the topics in their study program, select an appropriate quantitative research methodology and correctly apply them to lay out reasoned conclusions).	Problem-oriented lectures, seminars (practical exercises related to various facets of conducting statistical analysis in R), individual studies and an individual research project.	Mini-research project using R, examination
Students will be able to define and explain the main principles behind statistical research, scientific research and qualitative data.	Problem-oriented lectures, seminar discussions, individual studies (individual search of information, critical literature studies and the analysis of theoretical and practical problems).	Active and high-quality participation in seminars, examination
Students will be able to critically assess research published by social scientists, as well as other publicly available information from the quantitative analysis standpoint.	Problem-oriented lectures, seminars (practical exercises related to various facets of conducting statistical analysis in R), individual studies.	
Students will be able to apply their knowledge to practical assignments related to addressing the global challenges that require usage of statistical analysis by working with R.	Seminars (practical exercises related to various facets of conducting statistical analysis in R), individual studies and an individual research project.	
Students will be able to critically evaluate their own progress and to enhance acquired knowledge and abilities independently.	Problem-oriented lectures, seminars (practical exercises related to various facets of conducting statistical analysis in R), individual studies.	Active and high-quality participation in seminars

Content: breakdown of the topics	Contact hours							Self-study: hours and assignments	
	Lectures	Consultations	Seminars	Practical sessions	Laboratory activities	Internship/work	Contact hours	Self-study hours	Assignments
1. The principles of scientific research. Introduction to R: • Introduction to R interface (how it works, arithmetic of R); • How to enter and import data into R, and how to prepare it for use in statistical analyses.	2		2				4	6	Reading and analysis of The Essentials of Political Analysis, Introduction (p. xviii-xxii). Practical exercises related in order to familiarize yourself with the R interface and learn to enter data for future use.
2. Measurement. Data collection and survey techniques. • Data collection methods for quantitative research; • Data types and structures (e.g., scalars, vectors, matrices, data frames, and lists).	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 1 (p. 1-20), Chapter 2 (p. 24-29). Practical exercise related to exploring data types with R.
3. Introduction to descriptive statistics: • Frequency distribution, measures of central tendency, and measures of variability; • Variable assignment in R	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 2 (p. 29-44). Practical exercise related to variable assignment in R.
4. What is a hypothesis. Relationship between the independent and dependent variable: • Correlations; • Frequency and contingency tables; • Crosstabs.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 3 (p. 48-70). Practical exercise related to creating and using frequency and contingency tables in R.
5. Causality. Experiments and quantitative research methods.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 4 (p. 78-86). Presenting your own research idea, class discussion.
6. Robust correlation analyses: false positive and power validation.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 4 (p. 86-97), Chapter 5 (p. 102-118). Practical exercise: working with R, comparisons and control.
7. Prognosis. Correlation and introduction to linear regression.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 8 (p. 183-191). Practical exercise: linear regression.
8. Basics of descriptive statistics. Random variables and probability distributions.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 6 (p. 123-141). Practical exercise: using R for your own research.

9. The question of uncertaintly and erros of measurement in statistics. Statistical significance.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 6 (p. 141-155). Practical exercise: using R for calculating measurement errors.
10. Comparing populations in statistics. T-test.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 7 (p. 156-165). Practical exercise: Comparing two means in R.
11. Statistical hypothesis tests. Chi-square and others.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 7 (p. 165-178). Practical exercise: performing statistical tests in R.
12. Uncertainty in regression. Multivariate statistical analysis.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 8 (p. 188-209). Practical exercise: using multivariate linear regression.
13. Introduction into basic logistic regression.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 9 (p. 215-231). Practical exercise: using logistic regression in R.
14. Ordinal logistic regression and multinomial logistic regression.	2		2				4	8	Reading and analysis of The Essentials of Political Analysis, Chapter 9 (p. 231-239). Practical exercise: using R for your own research.
15. Cluster analysis in R – tips for good analysis and vizualization	2		2				4	8	Reading and analysis of An introduction to statistical learning: with applications in R (p. 385-401)
16. The possibilities and potential of statistical methods, critique and alternatives.	2		2				4	8	Reading and analysis of Ragin C.C. (2006) The Limitations of Net-Effects Thinking. In: Rihoux B., Grimm H. (eds) Innovative Comparative Methods for Policy Analysis. Springer, Boston, MA Practical exercise: using R for your own research.
Mini-research project using R								35	Preparation and execution of the mini research project using R.
Preparation for the final exam								25	Preparation for the final exam.
Total	**32**		**32**				**64**	**186**	

Assessment strategy	Weight, percentage	Assessment period	Assessment criteria
Active and quality participation in seminars	30%	During semester	Students will be expected to demonstrate both the knowledge related to the principles of statistical analysis gained during the course, as well as their abilities to apply it in a given situation while doing a number of practical exercises in R.
Mini-research project using R	40%	During semester	Students will have to prepare and implement a mini-research project using R. The assessment will consist of their ability to: - Formulate an appropriate research question;

			- Formulate hypotheses; - Select measurable variables; - Entering data and performing statistical analysis in R; - Arriving at plausible conclusions, and ability to critically assess the limitations of the research project; - Present results in written in adhesive way.
Examination	30%	At the end of the semester	Written examination consists of 20 multiple-choice questions including fictitious cases to be answered (all questions are of the same score). The assessment of multiple-choice questions will be aimed at the student's capability to assess his/her higher order cognition, i.e. synthesis, creative thinking and problem solving, based on the knowledge of the subject and abilities acquired during the course. No material (notes, handbooks, etc.) is allowed.

Author	Year of publication	Title	Issue of periodical or volume of publication	Publishing place and house or web link
Compulsory reading				
Philip H. Pollock III, Barry C. Edwards	2016	The Essentials of Political Analysis		Thousand Oaks, California: SAGE publications
James G. et al.	2013	An introduction to statistical learning: with applications in R		Springer
Recommended reading				
Garrett Grolemund	2014	Hands-On Programming with R: Write Your Own Functions and Simulations		O'Reilly Media
J. D. Long, Paul Teetor	2019	R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics 2nd Edition		O'Reilly Media
Richard Cotton	2013	Learning R: A Step-by-Step Function Guide to Data Analysis 1st Edition		O'Reilly Media