Applied Statistics and Econometrics

General data

Course code:	M23KOA01E
ECTS credits:	6
Type of the course:	General core course (A)
Semester:	Spring, Semester 1
Course restrictions:	*Statistics knowledge at the BSc level is useful*
Course leader (with availabilities):	*Gábor RAPPAI, Dr.* *Professor* *B112 room* *rappai.gabor@ktk.pte.hu*
Further lecturer(s) (with availabilities):	*Diána FŰRÉSZ, Dr.* *Assistant professor* *B112 room* *furesz.diana@ktk.pte.hu*

1. Description and aims

The course gives an overview of major methods regarding empirical work in economics, mostly concentrating on econometric techniques. The methods will be applied to various economic problems, demonstrating their practical applications. Students get hands-on experiences analyzing various economic problems with a variety of approaches. We use gretl software for practical work. The module aims to deepen the statistical methodology studied at the BSc level and present its special applications in economics and business.

2. Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, students should be able to:

CILO1. know the basic principles of constructive modeling based on empirical data and the selection procedures used for optimal and economical modeling (PILO4);
CILO2. know the continuous and limited endogenous variable econometric models that can be used to solve the problems of business life and the procedures that enable the examination of the common effect of multiple variables (PILO4);

CILO3. know the correct method for exploring stochastic- and causal relationships and the limitations of causality (PILO4, PILO5);

CILO4. collect multivariate primary and secondary data files, clean data with appropriate procedures, and describe and plot them correctly and ethically (PILO4, PILO7);

CILO5. choose an appropriate statistical-econometric procedure for examining a given hypothesis and knows the conditions and limitations of the methods (PILO4, PILO5);

CILO6. use statistical software that facilitates the application of multivariate regression analysis and applies new methods based on public data (PILO4);

CILO7. perform analytical tasks ethically, furthermore knows and wish to avoid bias caused by incorrect data transformation (PILO7);

CILO8. argue supported by professional arguments and represent their opinion responsibly. Taking into account the consequences of the decisions based on it, and at the same time, regardless of the client's intentions (PILO8).

3. Content, schedule

1. Economic Questions & Data; Review of Probability
2. Review of Probability; Review of Statistics
3. Linear Regression with One Regressor
4. Regression with a Single Regressor: Hypothesis Tests and Confidence Intervals
5. Linear Regression with Multiple Regressors
6. Nonlinear Regression Functions
7. Midterm exam
8. Regression with Panel Data
9. Regression with Binary Dependent Variable
10. Introduction to Time Series Regression and Forecasting
11. Estimation of Dynamic Causal Effect
12. Additional Topics in Time Series Regression
13. Assessing Study based on regression

4. Learning and teaching strategy, methodology

Principal teaching methodologies: lecture, in-class discussion, and take-home quizzes for extra points.

This module consists of a combination of lectures and practical exercises. Two classes (2 times 75 minutes) per week in which theory is explained (CILO 1, 2, 3, 5) and applications are demonstrated. The seminars extend the student's knowledge of econometric software (primarily gretl) to solve business-related problems and construct models based on the book's material (CILO 4, 5, 6). A home assignment (CILO 4) is given ten times for the students to practice in the form of quizzes. Students are expected to practice on their own based on the core learning materials during the course. Students can earn ten (10) bonus points (10x1%) with quizzes released week-by-week during the semester. (One point per quiz can be achieved if all the answers are correct, but it will only be considered if the student reaches 51 % from both the midterm and final exams.)

5. Assessment

Formative assessment elements:

Oral feedback on in-class activities, discussion of the solution of practical exercises solved during the classes.

Summative assessment elements:

Individual Assessment	100%	**Group Assessment**	-

Name of the element	**Weight**	**Type**	**Details**	**Retake opportunity**	**Req.***	**Related CILOs**
Midterm	40%	Individual written exam	A written exam based on chapters	one retake opportunity	yes	1, 2, 3, 4, 5, 6

			1-8, containing 3-5 questions.			
Final exam	60%	Individual written exam	A written exam based on chapters 1-8 and 10, 11, 15-17, containing 5-6 questions.	one retake opportunity	yes	1, 2, 3, 4, 5, 6
Take-home quizzes	max.+10%	individual, written, quiz	online weekly quizzes (10x1%)	no	no	1, 2, 3, 5, 6

** Req.: Completion of the element is required to pass the course, irrespective of the performance in other elements.*

6. Learning materials

- Essential

Stock and Watson (2020): Introduction to Econometrics, 4th edition

- Recommended

Kőrösi, Mátyás and Székely (1992): Practical Econometrics, Avebury

Adkins, L. C. (2018): Using gretl for Principles of econometrics.
https://www.learneconometrics.com/gretl/poe5/using_gretl_for_POE5.pdf

Wooldridge, J.M. (2012): Introductory Econometrics – A Modern Approach.
https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf

7. Further information

International aspects embedded with the course
The global edition of the essential learning material contains many international problems. Guest lectures from international faculty if possible.
Ethics, Responsibility & Sustainability (ERS) aspects embedded with the course
Almost all chapters of the essential learning material and all lectures mention ethical considerations and use of statistics.
Connections to the world of practice of the course
In case studies of the essential learning material, the lecturer shares her consulting and research experiences.