

SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2026 TO 2029

ACADEMIC YEAR 2028/2029

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	Econometrics
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Exact and Technical Sciences
Name of the unit running the course	Institute of Mathematics
Field of study	Mathematics
Qualification level	First-cycle studies
Profile	General academic
Study mode	Full-time
Year and semester of studies	Year 3, semester 5
Course type	Specialisation course
Language of instruction	English
Coordinator	Sebastian Wójcik, PhD
Course instructor	Sebastian Wójcik, PhD

* - as agreed at the faculty

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Laboratories	Seminars	Practical classes	Internships	others	ECTS credits
5	30		30					5

1.2. Course delivery methods

- conducted in a traditional way
 involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

Laboratory classes – pass with a grade, lectures – pass without a grade.

2. PREREQUISITES

Knowledge and competencies in descriptive statistics, mathematical analysis, and statistical hypothesis testing.

3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS

3.1. Course/Module objectives

O1	To familiarize students with parameter estimation of linear models and linear transformation.
O2	To familiarize students with variable selection techniques.
O3	To familiarize students with quality assessment of linear model.

3.2. COURSE/MODULE LEARNING OUTCOMES (TO BE COMPLETED BY THE COORDINATOR)

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	The student has knowledge in statistics, matrix algebra and econometrics. They can build regression models and forecasting models.	K_Wo8, K_Wo7
LO_02	The student can use IT tools for data acquisition, and for building and testing econometric models.	K_U16, K_U22
LO_03	The student, through their knowledge of modelling and scripting skills, is ready to fulfil social obligations arising from work related to data analysis and processing, and to undertake actions in solving problems typical for data-related professions.	K_Ko4, K_Ko5, K_Ko7

3.3. Course content (to be completed by the coordinator)

A. Lectures

Content outline
1. The concept of an econometric model.
2. OLS assumptions (classical linear regression model, properties of the OLS estimator, variance estimator of the random component).

3. Feature selection for the model (Hellwig method, graph method, stepwise regression).
4. Quality assessment of linear models (goodness-of-fit measures, hypothesis testing and interval estimation, parameter stability testing).
5. Multicollinearity.
6. Autocorrelation of the random component, GLS method.
7. Heteroscedasticity of the random component.
8. Estimation methods for autocorrelation and heteroscedasticity.
9. Information criteria and maximum likelihood method.
10. Forecasting based on econometric models.

B. Classes, laboratories, seminars, practical classes

Content outline
Introduction to the course program and the grading/passing criteria.
Introduction to statistical libraries in Python or R.
Elimination of quasi-constant variables.
Feature selection for a linear model using selected methods.
The problem of selecting the analytical form of the model.
Estimation of parameters of linear models with OLS.
Quality assessment of linear models (testing model fit, overall significance of the model, significance of structural parameters, and verification of the error term).
Estimation of parameters for non-linear models.

3.4. Methods of Instruction

Laboratory classes: computer-based work, practical project
 Lectures: lecture with multimedia presentation.

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

Learning outcome	Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes)	Learning format (lectures, classes,...)
LO-01	observation during classes, project, test	lectures, laboratory
LO-02	observation during classes, project	laboratory
LO-03	observation during classes, project, test	lectures, laboratory

4.2 Course assessment criteria

Lecture credit is based on a test.

The condition for passing the lecture is obtaining at least 50% of the points on the test.

Laboratory (practical class) credit is based on a project and class participation.

The condition for passing the laboratories is obtaining at least 50% of the points from the project. The final grade is then determined according to the following scale:

below 50% – fail,

[50–60%) – satisfactory,

[60–70%) – satisfactory plus,

[70–80%) – good,

[80–90%) – good plus,

[90–100%] – very good.

5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Course hours	60
Other contact hours involving the teacher (consultation hours, examinations)	2

Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	65
Total number of hours	127
Total number of ECTS credits	5

* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Number of hours	<i>Not applicable</i>
Internship regulations and procedures	<i>Not applicable</i>

7. Instructional materials

<p>Compulsory literature: Modern econometrics : an introduction / R. L. Thomas. - Harlow UK [etc.] : Addison-Wesley, 1997. Economic statistics and econometrics / Thad W. Mirer. - 3. ed. - Upper Saddle River : Prentice Hall, 2002. Introduction to Econometrics with R / Christoph Hanck, Martin Arnold, Alexander Gerber, and Martin Schmelzer (online https://www.econometrics-with-r.org/)</p>
<p>Complementary literature: Statistical methods of econometrics / E. Malinvaud ; transl. by A. Silvey. - Ed. 3 rev. - Amsterdam : North-Holland Publishing Company, 1980.</p>

Approved by the Head of the Department or an authorised person