



JAGIELLONIAN
UNIVERSITY
IN KRAKÓW

Techniques and Methods II

Educational subject description sheet

Basic information

Field of study Joint Bachelor in Sustainability		Education cycle 2025/26	
Speciality Geography & Economics		Subject code UJ.WPAJBSGECES.880.16521.25	
Organizational unit Faculty of Law and Administration		Lecture languages english	
Study level first cycle (joint degree programme)		Subject related to scientific research Yes	
Study form full-time degree programme		Disciplines Economics and finance	
Education profile General academic		ISCED classification 0311 Economics	
Mandatory obligatory		USOS code	
Subject coordinator	Piotr Szwedo		
Lecturer	Julieta Peveri, Marc-Arthur Diaye, Romain Courault		
Period Semester 4	Examination exam	Number of ECTS points 5.0	
	Activities and hours Discussion class: 45		

Goals

C1	Students learn how to master the different tools in both disciplines and apply methodology adapted to sustainability issues
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Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	the theory and methodology of disciplines included in the selected specialisation track to sustainability-related problems, taking into consideration practical limitations such as the protection of intellectual property.	JBS_K1_W07	written exam
W2	examples of sustainability-related dilemmas and can present theories and hypotheses.	JBS_K1_W03	written exam
Skills - Student can:			
U1	apply adequate methods and tools, including selected IT tools, to solve problems related to data collection, analysis, and management in the context of sustainability. The student can use R and Python to produce and analyze data.	JBS_K1_U03	written exam
Social competences - Student is ready for:			
K1	to critically assess and verbalize own competencies and skills related to techniques and methods used in sustainability assessments, with a special focus on statistics, econometrics, hydrological assessment and measuring of the carbon footprint.	JBS_K1_K04	written exam
K2	to defend the importance of scientific methods presented during the course as a basis for decision-making, with a special focus on geospatial assessments.	JBS_K1_K05	written exam
K3	to formulate an opinion and possible solutions based on the data analysis	JBS_K1_K03, JBS_K1_K05	written exam

Calculation of ECTS points

Activity form	Activity hours*
Discussion class	45
problem analysis	45
preparation for the exam	30
preparation for classes	15
Student workload	Hours 135
	ECTS 5.0

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes
1.	<p>Section 1: Statistics for Economics and Introduction to Econometrics 3.2.16</p> <ul style="list-style-type: none"> • Introduction and analysis of quantitative data. Characterization (mean, median, standard deviation, quantile, concentration indices) • Characterization (continue) and graphical Representation of continuous and discrete variables • Elementary and synthetic indices (Laspeyres Index, Paasche Index) • Conditional distributions • Time series 	W1, U1, K1, K2
2.	<p>Section 2: Mathematics for Economists II 3.2.17</p> <ul style="list-style-type: none"> • Matrix and Linear mapping <ul style="list-style-type: none"> ◦ Introduction ◦ System of linear equations ◦ Diagonalization, eigenvalues and mapping ◦ Trigonalization and mapping ◦ Generalized inverse and pseudo-inverse of a matrix ◦ Practices using Python • Optimization <ul style="list-style-type: none"> ◦ Optimization without constraints ◦ Optimization with constraints ◦ A crash introduction to dynamic discrete-time optimization • Link with General Linear Model <ul style="list-style-type: none"> ◦ Solve the General Linear Model using optimization ◦ Solve the General Linear Model using linear projectors ◦ Practices using Python 	W1, U1, K1, K2

No.	Course content	Subject's learning outcomes
3.	Section 3: Temporal and geospatial data analysis for hydrological assessment and carbon footprint 3.2.18 <ul style="list-style-type: none"> • Introduction to temporal and spatial data analysis • Hydrological time series analysis using R • Hydrological data analysis using Python • Geodata analysis for watershed assessment • Hydrological modelling with R • Carbon footprint assessment • Spatial analysis of carbon emissions 	W1, W2, U1, K1, K2, K3

Course advanced

Teaching methods :

text analysis, brainstorming, conversation lecture, practicals

Activities	Examination methods	Credit conditions
Discussion class	written exam	Active participation (non-graded), written exam based on open questions (graded).

Entry requirements

None

Literature

Obligatory

1. Core Econ Team (2024), The Economy 2.0 : Microeconomics, url : <https://www.core-econ.org/project/the-economy-2-0-microeconomics/>
2. Core Econ Team (2024), The Economy 2.0 : Macroeconomics, url : <https://www.core-econ.org/new-edition-of-the-economy/>
3. Core Econ Team (2024), Experiencing Economics, url : <https://www.core-econ.org/project/experiencing-economics/>
4. Core Econ Team (2024), Doing Economics, url : <https://www.core-econ.org/project/doing-economics/>
5. Core Econ Team (2024), The Economy 1.0, url : <https://www.core-econ.org/project/core-the-economy/>
6. Core Econ Team (2024), Economy, Society, and Public Policy, url : <https://www.core-econ.org/project/core-espp/>

Effects

Code	Content
JBS_K1_K03	The graduate can consider different visions of the future and develop own evidence-based opinions in reference to the balance of values linked to economic development, social welfare, and environmental protection.
JBS_K1_K04	The graduate can critically assess and verbalize own competencies and skills related to different aspects of sustainability as well as their need for development.
JBS_K1_K05	The graduate can defend the importance of scientific data and methods as a basis for decision-making.
JBS_K1_U03	The graduate can apply adequate methods and tools, including selected IT tools, to solve problems related to data collection, analysis, and management in the context of sustainability.
JBS_K1_W03	The graduate can give examples of sustainability-related dilemmas and hypothesize on the optimal course of action.
JBS_K1_W07	The graduate can apply the theory and methodology of disciplines included in the selected specialisation track to sustainability-related problems, taking into consideration practical limitations such as protection of intellectual property.