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.WPAJBSGECS.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 **Activities and hours** Discussion class: 45	**Number of ECTS points** 5.0

Goals

C1	Students learn how to master the different tools in both disciplines and apply methodology adapted to sustainability issues

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	ECTS
	135	5.0

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes
1.	Section 1: Statistics for Economics and Introduction to Econometrics 3.2.16 • Introduction and analysis of quantitative data. Characterization (mean, median, standard deviation, quantile, concentration indices) • Characterization (continuate) 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.	Section 2: Mathematics for Economists II 3.2.17 • Matrix and Linear mapping ◦ Introduction ◦ System of linear equations ◦ Diagonalization, eigenvalues and mapping ◦ Trigonalization and mapping ◦ Generalized inverse and pseudo-inverse of a matrix ◦ Practices using Python • Optimization ◦ Optimization without constraints ◦ Optimization with constraints ◦ A crash introduction to dynamic discrete-time optimization • Link with General Linear Model ◦ 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 • 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.