

Syllabus

1. Programme information

1.1. Institution	THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
1.2. Faculty	Economic Cybernetics, Statistics and Informatics
1.3. Departments	Department of Economic Informatics and Cybernetics
1.4. Field of study	Cybernetics and statistics
1.5. Cycle of studies	Master Studies
1.6. Education type	Full-time
1.7. Study programme	Applied data analytics
1.8. Language of study	English
1.9. Academic year	2025-2026

2. Information on the discipline

2.1. Name	Data Science with Python								
2.2. Code	25.0318IF1.1-0002								
2.3. Year of study	1	2.4. Semester	1	2.5. Type of assessment	Exam	2.6. Status of the discipline	O	2.7. Number of ECTS credits	6
2.8. Leaders	C(C)	prof.univ.dr. DÂRDALĂ N Adriana Elena				adriana.dardala@ie.ase.ro			
	S(S)	prof.univ.dr. DÂRDALĂ N Adriana Elena				adriana.dardala@ie.ase.ro			

3. Estimated Total Time

3.1. Number of weeks	14.00
3.2. Number of hours per week	3.00 of which
	C(C) 1.00
	S(S) 2.00
3.3. Total hours from curriculum	42.00 of which
	C(C) 14.00
	S(S) 28.00
3.4. Total hours of study per semester (ECTS*25)	150.00
3.5. Total hours of individual study	108.00
<i>Distribution of time for individual study</i>	
Study by the textbook, lecture notes, bibliography and student's own notes	40.00
Additional documentation in the library, on specialized online platforms and in the field	15.00
Preparation of seminars, labs, assignments, portfolios and essays	15.00
Tutorials	7.00
Examinations	2.00
Other activities	29.00

4. Prerequisites

4.1. of curriculum	
4.2. of competences	

5. Conditions

for the C(C)	The lectures will be held in rooms with Internet access and multimedia teaching equipment
for the S(S)	The seminars will be conducted in rooms with computers which have appropriate software development tools

6. Acquired specific competences

PREFESSIONAL	CC1	Digital skills – advanced use of software tools and platforms, development of software applications on different platforms.
PREFESSIONAL	CC2	STEM (science, technology, engineering, mathematics) skills – understanding the mathematical foundations of AI, statistical methods of data analysis applied in AI techniques.
PREFESSIONAL	CC3	Personal, social and learning skills – self-management, adaptability to new technologies and continuous learning.
PREFESSIONAL	CP2	Uses of data processing techniques
PREFESSIONAL	CP3	Performs data analysis
PREFESSIONAL	CT3	Lists simple instructions for a computer system to solve problems or perform tasks at a basic level, with appropriate guidance if necessary.

7. Objectives of the discipline

7.1. General objective	Providing software tools for data analysis and processing applied in socio-economical field.
7.2. Specific objectives	<ul style="list-style-type: none"> - Creating procedures for data analysing and visualising, extraction of new knowledge from data. - Use of specialized software packages for data analysis and processing. - Developing software programs for data processing, analysis and visualisation. <p>Expected learning outcomes:</p> <p>Knowledge:</p> <p>C2: Deep understanding of the processes of data collection, processing, analysis and interpretation in economic, social and industrial contexts, as well as the integration of interdisciplinary knowledge (data science, machine learning, advanced visualization).</p> <p>C3: Acquisition of knowledge about accessing data from different sources and handling large volumes of data.</p> <p>Skills:</p> <p>A2: Application of exploratory and predictive data analysis techniques, including time series analysis, spatial econometrics and big data, with the purpose of substantiating strategic decisions in public and private organizations.</p> <p>Responsibility and autonomy:</p> <p>RA2: Taking responsibility for continuous professional development and active involvement in multidisciplinary teams, including through consultancy, applied research or innovation activities in the field of data analysis.</p>

8. Contents

8.1. C(C)		Teaching/Work methods	Recommendations for students
1	Overview of the Python language: general syntax, data types and structures, control structures, collections, functions (C2, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [1], pag. 15-129
2	Handling data files and tabular data: aggregation, applying basic statistical functions, pivot tables (C3, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [1], pag. 130-182
3	Common Python modules and packages for data analysis and processing (C2, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [2], pag. 35-87
4	Using pre-existing machine learning models in Python (C2, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [2], pag. 355-383
5	Libraries for geospatial analysis (C2, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [3], pag. 10-100
6	Data visualisation with Python (C3, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [2], pag. 225-351
7	Web scraping with Python (C3, A2, RA2)	Lecture based on multimedia presentations, demo, and interaction with students. (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [6], ref [4], pag. 16-25

Bibliography

- Jake VanderPlas, Python Data Science Handbook. Essential Tools for Working with Data, O'Reilly Media, 2023, Statele Unite ale Americii
- Bonny P. McClain, Python for Geospatial Data Analysis Theory, Tools, and Practice for Location Intelligence, O'Reilly Media, 2022, Statele Unite ale Americii
- Kyran Dale, Data Visualization on the Web with Python and JavaScript. Scrape, Clean & Transform Your Data, O'Reilly Media, 2023, Statele Unite ale Americii
- Wade Briggs, Data science with Python. Beginner's Guide to Python for Data Science That's Easy to Follow, Notion Press, 2022, Statele Unite ale Americii
- Matthes, Eric, Python crash course : a hands-on, project-based introduction to programming, No Starch Press, 2023, Statele Unite ale Americii

8.2. S(S)		Teaching/Work methods	Recommendations for students
1	Selecting and working with integrated development environment for Python. Conceiving simple programs using the Python language. (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: : ref [5], ref [1], pag. 1-14
2	Creating programs using the Python standard library (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [1], pag. 129-223
3	Using the NumPy library for data analysis. (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [2], pag. 35-100
4	Creating libraries and user code reuse (C2, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [1], pag. 150-154

5	Using the Pandas library for files manipulation (C2, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [1], pag. 183-207
6	Using the Pandas library for data processing (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: : ref [5], ref [1], pag. 183-207
7	Visualizing data with Matplotlib. Using Seaborn for graphical representations (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [2], pag. 101-175, pag. 332-351
8	Using SciKit-Learn library to manage machine learning models (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [2], pag. 367-383
9	Natural language processing using Python libraries(C2, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [6], pag. 4-31
10	Natural language modeling using Python libraries (C3, A2, RA2)	Applications in Python and case studies	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [6], pag. 38-93
11	Geopandas library for geospatial analysis (C2, A2, RA2)	Applications in Python and case studies	Consulting the online.ase.ro platform and bibliographic references: ref [5], ref [3], pag. 10-100
12	Web scraping cu Python (C2, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: : ref [5], ref [4], pag. 16-25
13	Python libraries for implementing neural networks (C3, A2, RA2)	Applications in Python and case studies (2h)	Consulting the online.ase.ro platform and bibliographic references: : ref [5], ref [1], pag. 300-350
14	Project Presentation (C2, C3, A2, RA2)		

Bibliography

- Bonny P. McClain, Python for Geospatial Data Analysis. Theory, Tools, and Practice for Location Intelligence, O'Reilly Media, 2022, Statele Unite ale Americii
- Susan E. McGregor, Practical Python Data Wrangling and Data Quality. Getting Started with Reading, Cleaning, and Analyzing Data, O'Reilly Media, 2020, Statele Unite ale Americii
- Deborah A. Dahl, Natural Language Understanding with Python, Packt Publishing, 2023, Statele Unite ale Americii
- - Adriana Dardala, Material didactic disponibil pe platforma Blended Learnig , ASE, 2025, România
- Matthes, Eric, Python crash course : a hands-on, project-based introduction to programming, No Starch Press, 2023, Statele Unite ale Americii
- Ryan Mitchel, Web Scraping with Python, O'Reilly Media, 2024, Statele Unite ale Americii

9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, of the professional associations and representative employers in the field associated with the programme

The proposed course and seminar topics are consistent with national and international literature, as well as employers' requirements both in terms of theoretical knowledge and software packages used.

10. Assessment

Type of activity	Assessment criteria	Assessment methods	Percentage in the final grade
10.1. C(C)	Active participation at course and seminars and involvement in discussing issues	Assessing theoretical and practical skills using quizzes, homework, project.	10.00
10.2. S(S)	Project evaluation	Project presentation	40.00
10.3. Final assessment	Assessing theoretical and practical skills	Written computer-based assessment	50.00
10.4. Modality of grading	Whole notes 1-10		
10.5. Minimum standard of performance	Project presentation during the seminar. To pass the subject the student must achieve at least grade 5.		

Date of listing,
04/28/2026

Signature of the discipline leaders,

Date of approval in the
department

Signature of the Department Director,