

DISCIPLINE DESCRIPTION

1. About the program

1.1 Higher education institution	"BABEȘ-BOLYAI" UNIVERSITY OF CLUJ-NAPOCA
1.2 Faculty	FACULTY OF ENVIRONMENTAL SCIENCE AND ENGINEERING
1.3 Department	ENVIRONMENTAL ANALYSIS AND ENGINEERING
1.4 Field of study	ENVIRONMENTAL ENGINEERING
1.5 Study cycle	BACHELOR
1.6 Study Program / Qualification	IM-EN

2. Data about the discipline

2.1 Subject name	APPLIED INFORMATICS						
2.2 Holder of course activities	CS III PhD. Deaconu Lucia-Timea						
2.3 Holder of seminar activities	CS III PhD. Deaconu Lucia-Timea						
2.4 Year of study	I	2.5 Semester	I	2.6. Type of evaluation	C	2.7 Disciplinary regime	DC.Obl

3. Total estimated time (hours per semester of teaching activities)

3.1 Number of hours per week	4	Of which: 3.2 course	2	3.3 seminar	2
3.4 Total curriculum hours	56	Of which: 3.5 course	28	3.6 seminar	28
Time fund distribution:					hours
Study from the textbook, course materials, bibliography and notes					20
Additional documentation in the library, on specialized electronic platforms and in the field					16
Preparation of seminars/workshops, homework, reports, portfolios and essays					0
Tutorials					4
Reviews					2
Other activities:					-
3.7 Total individual study hours	42				
3.8 Total hours per semester	98				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 of curriculum	•
4.2 of skills	•

5. Conditions (where applicable)

5.1 The course	• classroom equipped with video projector
5.2 Seminar	• seminar room with computer for each student

6. Specific skills to be acquired

Professional skills	- the course is adapted to international methodologies, providing students with the opportunity to acquire basic knowledge for analysing and interpreting experimental scientific data - the structure of the course/laboratory provides for the development of computer operating skills using specific software for writing, analysing, processing data (Microsoft Word, Excel) and presenting the results (Microsoft Power Point) - acquisition of both theoretical and practical knowledge for the elaboration of scientific work (articles, bachelor's/dissertation thesis, environmental projects) - understanding of scientific work in the field from the perspective of data processing (elements of descriptive statistics) and their representation - display a positive and responsible attitude towards science
transversal competences	- ability to represent, evaluate and interpret experimental data - research skills - application of descriptive statistics concepts, data representation and interpretation

7. Objectives of the subject (from the grid of competences)

7.1 Overall aim of the subject	to know, understand and deepen computer science concepts with specific reference to data representation and processing
7.2 Specific objectives	- developing knowledge and skills in computer operation, using specific programs for data processing and representation - developing the ability to analyse experimental data from scientific work - developing skills in using scientific databases with environmental applications

8. Contents

8.1 Course	Teaching methods	Remarks
C1. Applied Informatics - objectives and organization	Participative lecture, dialog	
C2. Mastering Basic Excel Operations and Functions for Data Management and Analysis; Basic spreadsheet operations, cell references, and functions; Excel interface, basic formulas, and functions (SUM, AVERAGE, etc.)	Participative lecture, dialog, exposition, demonstration	
C3. Advanced Excel Techniques: Complex Functions, Data Analysis, and Visualization Tools; Complex functions, pivot tables, and data visualization tools; Advanced Excel functions (VLOOKUP, INDEX-MATCH, etc.). Introduction to Pivot Tables, creating charts and graphs for data visualization	Participative lecture, dialog, exposition, demonstration	
C4. Understanding Types of Data, Descriptive Statistics, and Measures of Central Tendency: Analysing Environmental Data Using Mean, Median, and Mode	Participative lecture, dialog	
C5. Exploring Measures of Dispersion (range, variance, standard deviation), Skewness, and Kurtosis: Understanding	Participative lecture, dialog, exposition, demonstration	

Data Spread, Asymmetry, and Distribution Shape in Environmental Datasets		
C6. Statistical Distributions: Normal, Log-Normal, and Other Distributions in Environmental Data	Participative lecture, dialog, exposition, demonstration	
C7. Using Excel for Data Analysis: Applying Statistical Parameters like mean, median, standard deviation and Interpreting Results	Participative lecture, dialog, exposition	
C8. Time Series Analysis in Excel: Trendlines, Moving Averages, and Forecasting for Environmental Data	Participative lecture, dialog, exposition	
C9. Excel for Statistical Modelling: Performing Regression, Correlation, and Hypothesis Testing; Calculate confidence intervals for population parameters; Perform and interpret multiple linear regression in Excel.	Dialogue, presentation	
C10. Advanced Microsoft Word: Basic functions: text formatting, paragraph styles, working with headers, footers, and page numbers. Managing Long Documents with Styles, Templates, and References	Participative lecture, dialog, exposition	
C11. Advanced PowerPoint: Using Interactive Features for Effective Data Presentation	Dialogue, presentation	
C12. Final Project: Analyzing Data, Writing Reports, and Presenting Results with Word, Excel, and PowerPoint	Participative lecture, dialog	
C13. Review for written assessment		
C14. Colloquium	Evaluation	
Bibliography Deaconu L. : Applied informatics - course support (electronic format - CD) Tanvir Mustafy, Md. Tauhid Ur Rahman: Statistics and Data Analysis for Engineers and Scientists, 2023, Springer, ISBN: 9789819946600 David Bourg, Excel Scientific and Engineering Cookbook, 2006, ISBN 0596008791 Sam Green, Excel for Data Analysis: Master Data Cleaning, Analysis, and Visualization Techniques to Make Informed Decisions with Microsoft Excel, 2024, ISBN-13: 979-8346672586 Menke, William, Menke, Joshua. Environmental Data Analysis with MatLab. 2011, Elsevier Science, ISBN: 9780123918864, 0123918863		
8.2 Seminar	Teaching methods	Remarks
L1. Initial test of knowledge in using Word processors, Excel spreadsheets and Power point	Dialogue, computer exercise	
L2. Getting Started with Excel: Basic Functions and Data Management Techniques; create a spreadsheet, input data, and perform basic calculations using formulas	Dialog, computer exercise	
L3. Advanced Excel Skills for Environmental Data Visualization and Insights; Create and manipulate Pivot Tables to summarize large datasets; Use Excel's charting tools to present data visually (bar charts, line charts, etc.).	Dialogue, computer exercise	
L4. Analyzing Environmental Data: Practical Exercises in Data Types and Central Tendency; Calculate the mean, median, and mode using sample environmental data and interpret the results.	Dialog, computer exercise	
L5. Hands-On Analysis of Data Spread and Distribution Shapes in Environmental Studies; Use real-world environmental data to calculate and interpret range, variance, standard deviation	Dialog, computer exercise	

L6. Identifying and Applying Statistical Distributions in Environmental Datasets; Analyze environmental datasets to check for normal and log-normal distributions using histograms and Q-Q plots; Apply data transformations (e.g., log-transformation) and interpret results	Dialog, computer exercise	
L7. Practical Applications of Statistical Analysis in Excel: From Parameters to Insights; Analyze sample datasets, calculate statistical parameters (mean, median, standard deviation). Create visualizations of data distributions.	Dialogue, computer exercise	
L8. Exploring Trends in Environmental Data: Time Series Analysis in Excel; Work with time-based data to create trendlines and moving averages	Dialogue, computer exercise	
L9. Excel for Environmental Statistics: Regression, Correlation, and Hypothesis Testing; Conduct simple linear regression analysis using Excel. Calculate correlation coefficients and perform hypothesis testing using Excel tools.	Dialogue, computer exercise	
L10. Creating and Managing Technical Documents: Advanced Formatting and References in Word; Create a basic document with text, headings, lists, and images; format paragraphs, insert tables, and manage document layout; section breaks, footnotes, and insert a table of contents	Dialogue, computer exercise	
L11. Designing Interactive Presentations: Advanced PowerPoint Features and Data Integration; Create a short presentation, using a variety of design elements and transitions; Advanced features in PowerPoint, including animations, multimedia, and interactive elements; Creating custom slide layouts and incorporating charts, graphs, and Excel data.	Dialogue, computer exercise	
L12. Reviewing Course Concepts: A Seminar for Final Assessment Preparation	Dialogue, computer exercise	
L13. Integrating Word, Excel, and PowerPoint: Preparing for the Final Report	Dialogue, computer exercise	
L14. Verification of the knowledge acquired in L1 - L13	Evaluation	
Bibliography Deaconu L. - Applied informatics - seminar documentation (electronic format - CD) Bryan F.J. Manly , Statistics for Environmental Science and Management, Second Edition, Taylor & Francis Group, LLC, 2009, ISBN-13:978-1-4200-6147-5 John B. Little , Modeling and Data Analysis. An Introduction with Environmental Applications, American Mathematical Society, 2019, ISBN: 9781470448691, 1470448696 Richard Harris, Claire Jarvis , Statistics for Geography and Environmental Science, Taylor & Francis, 2014, ISBN: 9781317904397, 1317904397		

9. Corroboration of subject contents with the expectations of representatives of the epistemic community, professional associations and representative employers in the field related to the program

The content is consistent with the curricula of similar centers in the country and abroad. The structure was determined after studying the content of the curricula **of the Faculty of Physics (Babeş-Bolyai University), the Faculty of Economics and Business Management (Babeş-Bolyai University), and the Master's program in Bioinformatics and Biostatistics (Iuliu Hațieganu University of Medicine and Pharmacy)**. Also, the global trend towards **e-learning platforms such as Coursera, Udemy, Lynda**, etc. has allowed an update of the content, including as video clips containing hints on how to solve the exercises.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Assessment methods	10.3 Weighting in the final mark
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10.4 Course	Knowledge of the concepts presented in the course	Written assessment	3,0 points
10.5 Seminar	Checking your ability to solve the exercises using the programs covered	Computer assessment	6.0 points*
10.6 Minimum performance standard			
• Making graphs and simple calculations using spreadsheets • Understanding the basics of how to represent quantitative/qualitative data			

* 1,0 point will be added to the final mark.

Date of completion

Signature of course holder

Signature of seminar holder

04.12.2024




Date of departmental approval

Signature of the head of department

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