

## SYLLABUS

### 1. Information regarding the programme

1.1 Higher education institution	<b>Babeş-Bolyai University</b>
1.2 Faculty	<b>Faculty of Mathematics and Computer Science</b>
1.3 Department	<b>Department of Mathematics</b>
1.4 Field of study	<b>Mathematics</b>
1.5 Study cycle	<b>Master</b>
1.6 Study programme / Qualification	<b>Advanced Mathematics</b>

### 2. Information regarding the discipline

2.1 Name of the discipline	<b>Applied Statistics</b>						
2.2 Course coordinator	Assoc. Prof. PhD Habil. Hannelore Lisei						
2.3 Seminar coordinator	Assoc. Prof. PhD Habil. Hannelore Lisei						
2.4. Year of study	2	2.5 Semester	4	2.6. Type of evaluation	E	2.7 Type of discipline	Optional
2.8. Code of the discipline	MME3161						

### 3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar/laboratory	1
3.4 Total hours in the curriculum	36	Of which: 3.5 course	24	3.6 seminar/laboratory	12
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					60
Additional documentation (in libraries, on electronic platforms, field documentation)					50
Preparation for seminars/labs, homework, papers, portfolios, and essays					40
Tutorship					19
Evaluations					20
Other activities: .....					0
3.7 Total individual study hours	189				
3.8 Total hours per semester	225				
3.9 Number of ECTS credits	9				

### 4. Prerequisites (if necessary)

4.1. curriculum	<ul style="list-style-type: none"> <li>Mathematical Analysis, Probability Theory, Statistics</li> </ul>
4.2. competencies	<ul style="list-style-type: none"> <li>Logical thinking</li> </ul>

### 5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> <li>Classroom with blackboard/video projector</li> </ul>
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5.2. for the seminar /lab activities	<ul style="list-style-type: none"> <li>Classroom with blackboard/video projector</li> </ul>
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## 6. Specific competencies acquired

<b>Professional competencies</b>	<p>Identifying the models and adequate methods for solving problems</p> <p>Ability to understand and manipulate advanced concepts, results, and theories in the fields of mathematics.</p>
<b>Transversal competencies</b>	<p>Ability to use acquired and complementary knowledge to prepare a PhD in Mathematics, Applied Mathematics, or other scientific fields that use mathematical methods.</p>

## 7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	The course aims to deepen the notions of Statistics, followed by their applicative side and their practical interpretation.
7.2 Specific objective of the discipline	<p>Predictive models and their performance</p> <p>Methods of statistical testing</p> <p>Application of Monte Carlo methods</p> <p>Regression models</p>

## 8. Content

8.1 Course	Teaching methods	Remarks
C1. Review - basic notions of Probability Theory	Lecture, description, explanation	
C2. Review - basic notions of Statistics	Exposure, description, explanation, examples	
C3. Methods in Inferential Statistics	Exposure, description, explanation, examples	
C4. Sampling distributions	Exposure, description, explanation	
C5. Inference for distributions	Exposure, description, explanation, examples	
C6. Nonparametric techniques I	Exposure, description, explanation, proof	
C7. Nonparametric techniques II	Exposure, description, explanation, proof, examples	
C8. Correlation Analysis	Exposure, description, explanation, proof	
C9. Regression models I	Exposure, description, explanation	
C10. Regression models II	Exposure, description, explanation	
C11. Statistical performance	Exposure, description,	

	explanation	
C12. Statistical evaluation - overview	Exposure, description, explanation	
Bibliography		
DasGupta, A., Asymptotic Theory of Statistics and Probability, New York, Springer Science+Business Media, LLC, 2008.		
Dekking F.M., A modern introduction to probability and statistics: understanding why and how, London, Springer, 2005.		
Lisei, H., Probability Theory, Casa Cărții de Știință, Cluj-Napoca, 2004.		
Lisei, H., Grecksch, W., Iancu, M., Probability: Theory, Examples, Problems, Simulations. World Scientific Publishing, Singapore, 2020.		
Morariu, C. O., Probabilități și statistică aplicată, Editura Universității "Transilvania", Brașov, 2010.		
Shao, J., Mathematical statistics, New York, Springer, 2003.		
8.2 Seminar / laboratory	Teaching methods	Remarks
S1. Solving problems from Probability Theory and Statistics	Presentation, discussion	The seminar is structured as 2 hours classes every second week
S2. Mathematical methods for generating random data	Presentation, individual work	
S3. Solving problems using Inferential Statistics	Presentation, individual work	
S4. Regression models	Discussion, group-based work, modelling	
S5. Bootstrap methods	Discussion, group-based work, modelling	
S6. Project presentations	Discussion, group-based work, modelling, simulation	
Bibliography		
DasGupta, A., Asymptotic Theory of Statistics and Probability, New York, Springer Science+Business Media, LLC, 2008		
Dekking F. M., A modern introduction to probability and statistics: understanding why and how, London, Springer, 2005.		
Lisei, H., Probability Theory, Casa Cărții de Știință, Cluj-Napoca, 2004.		
Lisei, H., Grecksch, W., Iancu, M., Probability: Theory, Examples, Problems, Simulations. World Scientific Publishing, Singapore, 2020.		
Moore, D. S., The basic practice of statistics, New York, W. H. Freeman, 2007.		
Morariu, C. O., Probabilități și statistică aplicată, Editura Universității "Transilvania", Brașov, 2010.		

**9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations, and representative employers within the field of the program**

The content of this discipline is in accordance with the curricula of the most important universities in Romania and abroad, where advanced mathematics and its applications play an essential role.

### 10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Knowledge of the main concepts presented in the course	Final exam	65%
10.5 Seminar/lab activities	To be able to solve specific problems using statistical inference	Continuous observation during the semester, active participation at the seminars, project presentation	35%
10.6 Minimum performance standards			
At least grade 5 (on a scale of 1 to 10) at the written exam. The student should be able to perform specific reasoning, to use statistical inference and its predictive methods.			

Date

Signature of course coordinator

Signature of seminar coordinator

04.04.2024 Assoc. Prof. PhD Habil. Hannelore Lisei

Assoc. Prof. PhD Habil. Hannelore Lisei

Date of approval

Signature of the head of department

Prof. PhD Andrei Mărcuș