

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department of Computer Science
1.4 Field of study	Computer Science
1.5 Study cycle	Master
1.6 Study programme / Qualification	Data Science in Industry and Society

2. Information regarding the discipline

2.1 Name of the discipline	Forecasting and Predictive Modelling						
2.2 Course coordinator	Lect. Dr. Zsuzsanna Onę-Marian						
2.3 Seminar coordinator	Lect. Dr. Zsuzsanna Onę-Marian						
2.4. Year of study	2	2.5 Semester	3	2.6. Type of evaluation	C	2.7 Type of discipline	Compulsory
2.8 Code of the discipline	MME8187						

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

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	1+1
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					40
Additional documentation (in libraries, on electronic platforms, field documentation)					42
Preparation for seminars/labs, homework, papers, portfolios and essays					50
Tutorship					4
Evaluations					8
Other activities:					-
3.7 Total individual study hours	144				
3.8 Total hours per semester	200				
3.9 Number of ECTS credits	8				

4. Prerequisites (if necessary)

4.1. curriculum	Algorithmics, data structures, statistics
4.2. competencies	Ability to use data analytics computer software

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> Students will attend the course with their mobile phones silenced. Room with a good video projector is needed
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> Students will attend the seminar with their mobile phones silenced.

6. Specific competencies acquired

Professional competencies	<ul style="list-style-type: none"> Understanding the concepts, methods and models used in forecasting and predictive data modelling. Understanding the principles, design, and implementation of various forecasting methods. Learning to conduct incipient original research in forecasting and predictive data modelling.
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Transversal competencies	<ul style="list-style-type: none"> • The ability to apply forecasting methods in solving real world problems. • Responsible execution of lab assignments, research and practical reports. • Application of efficient and rigorous working rules. • Manifest responsible attitudes toward the scientific and didactic fields. • Respecting the professional and ethical principles.
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7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	<ul style="list-style-type: none"> • To introduce the student in forecasting and predictive modelling
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> • To present the field of forecasting and predictive modelling as a novel research and application domain. • To induce the necessity of forecasting and predictive modelling methods by studying relevant practical applications • To offer the student the instruments that will allow to develop different forecasting applications.

8. Content

8.1 Course	Teaching methods	Remarks		
1: Administration and organization	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 			
2: Introduction to forecasting				
3: SAS, R and other software packages				
4: Time series graphics and decomposition				
5-6: Exponential smoothing				
7-8: Forecasting with ARIMA models				
9-10: Multiple regression and forecasting				
11: Advanced methods				
12-13: ML based methods				
14: Written exam				
Bibliography				
R.J. Hyndman, G. Athanasopoulos Forecasting: Principles and Practice, OTexts, 3rd edition, 2018.				
P.J. Brockwell, R.A. Davis, Introduction to Time Series and Forecasting, Springer Verlag, 2nd edition, 2002.				
D.C. Montgomery, C.L. Jennings, M. Kulahci, Introduction to Time Series Analysis and Forecasting, Wiley, 2nd edition, 2015.				
M. Huber, D. Modlin, C. Wells. Forecasting Using Model Studio in SAS Viya, 2020				
V. Zoonekynd, Statistics with R, 2007				
8.2 Seminar / laboratory	Teaching methods	Remarks		
1. Administration	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation 			
2-3. Work to prepare the reports / Optional exercises				
4-5. Delivery of the theoretical report				
6-7. Delivery of the experimental report				
Bibliography				
R.J. Hyndman, G. Athanasopoulos Forecasting: Principles and Practice, OTexts, 3rd edition, 2018.				
P.J. Brockwell, R.A. Davis, Introduction to Time Series and Forecasting, Springer Verlag, 2nd edition, 2002.				
D.C. Montgomery, C.L. Jennings, M. Kulahci, Introduction to Time Series Analysis and Forecasting, Wiley, 2nd edition, 2015.				
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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 the discipline is consistent with the similar disciplines from other Romanian universities and universities from abroad, as well as with the requirements that potential employers would have in the forecasting and predictive modelling field.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	The correctness and completeness of the accumulated knowledge.	Written exam (in week 14, during the last lecture)	40%
	A state-of-the-art research report on a relevant topic, based on recent research papers, should be prepared and presented	Evaluation of the research report (a written paper of about 10 pages and an oral presentation)	25%
10.5 Seminar/lab activities	An experimental research report containing the application of the methods and techniques discussed during the lecture on some data sets, should be prepared and presented	Evaluation of the research report (a written paper and an oral presentation)	35%

10.6 Minimum performance standards

Students have to prove that they acquired an acceptable level of knowledge and understanding of the forecasting and predictive modelling domain, that they are capable of stating this knowledge in a coherent form, that they have the ability to establish certain connections and to use the knowledge in solving different problems.

Class attendance is neither formally required nor observed.

Successful passing of the exam is conditioned by:

- The final grade that has to be at least 5
- The written exam grade has to be at least 5
- Presenting at least one report

Penalty points are awarded for delays in submission of proposed topic choices and submission of final reports.

One report can be submitted and presented in the retake session only in case when the two report grades are so low, that passing final grade cannot be achieved, not even with a perfect written exam, otherwise reports may be submitted and presented only during the semester.

Date
30.04.2024

Signature of course coordinator
Lect. dr. Oneţ-Marian Zsuzsanna

Signature of seminar coordinator
Lect. dr. Oneţ-Marian Zsuzsanna

Date of approval

Signature of the head of department
Assoc. prof. Sterca Adrian