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	**Doctoral School in Mathematics and Computer Science**
1.4 Field of study	**Computer Science**
1.5 Study cycle	**Doctoral studies**
1.6 Study programme	**TRAINING PROGRAM BASED ON ADVANCED ACADEMIC STUDIES**

2. Information regarding the discipline

2.1 Name of the discipline			**Special chapters of Data Analysis**				
2.2 Course coordinator			**Prof. dr. Horia F. Pop**				
2.3 Seminar coordinator			**Prof. dr. Horia F. Pop**				
2.4. Year of study	**1**	2.5 Semester	**1**	2.6. Type of evaluation	**C**	2.7 Type of discipline	**Optional**

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 sem
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					50
Additional documentation (in libraries, on electronic platforms, field documentation)					64
Preparation for seminars/labs, homework, papers, portfolios and essays					60
Tutorship					25
Evaluations					15
Other activities:					

3.7 Total individual study hours	214
3.8 Total hours per semester	250
3.9 Number of ECTS credits	10

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	Students will attend the course with their mobile phones shut down
5.2. for the seminar /lab activities	Students will attend the seminar with their mobile phones shut down Laboratory with computers; high level programming language environment

6. Specific competencies acquired

Professional competencies	● Understanding the concepts, methods and models used in intelligent data analysis. ● Understanding the principles, design and implementation of various data analysis methods ● Learning to conduct incipient original research in intelligent data analysis

Transversal competencies	● The ability to apply intelligent data analysis 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.

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

7.1 General objective of the discipline	To open the student to special topics of data analysis
7.2 Specific objective of the discipline	To present the field of intelligent data analysis as a novel research and application domain. To induce the necessity of intelligent data analysis methods by studying relevant practical applications To offer the student the instruments to allow develop different data analysis applications.

8. Content

8.1 Course	**Teaching methods**	**Remarks**
● Week 1: Administration and organization	Interactive exposure, Explanation, Conversation	
● Week 2: Introduction ● Reference: [Han, ch. 1], [Mitchell, ch. 1]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 3: Introduction to Fuzzy sets ● Reference: [Klir, ch. 2, 3]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 4: Fuzzy logic, fuzzy reasoning ● Reference: [Klir, ch. 8, 10]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 5: Fuzzy control systems ● Reference: [Klir, ch. 12]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 6: Rough sets ● Reference: [Pawlak] [Ye, ch. 1], [5, ch. 3]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 7, 8: Fuzzy Clustering ● Reference: [Han, ch. 7], [Ye, ch. 10]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 9, 10: Multivariate analysis ● Reference: [Ye, ch. 7, 8, 16, 17]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
● Week 11, 12: Applications of data analysis ● Reference: [Ye, ch. 21, 24, 27], [Han, ch. 10, 11]	Interactive exposure, Explanation, Conversation, Didactical demonstration	
8.2 Seminar	**Teaching methods**	**Remarks**
Administration. Survey of the sources of information available on Internet and Intranet. Chosing the paper topics and scheduling the presentations.	Interactive exposure, Explanation, Conversation	
Discussions on the theoretical and experimental reports	Interactive exposure, Explanation, Conversation	

Bibliography

J. Han, M. Kamber, Data Mining: Concepts and Techniques, Academic Press, 2001
G.J. Klir, B. Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall, 1995
T. Mitchell, Machine Learning, McGraw Hill, 1996
Z. Pawlak, Rough Sets, Polish Academy of Sciences, Gliwice, 2004
N. Ye, The Handbook of Data Mining, Lawrence Elbaum Associates Publishers, 2003

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 intelligent data analysis field.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	A theoretical research report on a data analysis method or topic, based on some recent research papers should be prepared and presented	Evaluation of the research report (a written paper of about 10 pages and an oral presentation)	33%
10.5 Seminar	An experimental research report on a data analysis method or topic, based on some recent research papers should be prepared and presented	Evaluation of the research report (a written paper of about 10 pages and an oral presentation)	33%
	A personal software project fully implemented, without using existing libraries of data analysis.	Evaluation of the project (software implementation, documentation and demonstration)	33%
10.6 Minimum performance standards			
Each student has to prove that (s)he acquired an acceptable level of knowledge and understanding of the Intelligent Data Analysis domain, that (s)he is capable of stating these knowledge in a coherent form, that (s)he has the ability to establish certain connections and to use the knowledge in solving different problems. Penalty points are awarded for delays in submission of proposed topic choices and submission of final reports. Successful passing of the exam is conditioned by the final grade that has to be at least 5.			

Date	Signature of course coordinator	Signature of seminar coordinator
30.06.2021	Prof. dr. Horia F. Pop	Prof. dr. Horia F. Pop

Date of approval	Signature of the head of doctoral school
07.07.2021	Prof. dr. Gabriela Czibula