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	**Applied Computational Intelligence**

2. Information regarding the discipline

2.1 Name of the discipline	**Advanced Methods in 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	**E**	2.7 Type of discipline	**Compulsory**

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	42	Of which: 3.5 course	28	3.6 seminar/laboratory	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					35
Additional documentation (in libraries, on electronic platforms, field documentation)					45
Preparation for seminars/labs, homework, papers, portfolios and essays					47
Tutorship					15
Evaluations					16
Other activities:					-

3.7 Total individual study hours	158
3.8 Total hours per semester	200
3.9 Number of ECTS credits	8

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 • Room with computers as needed; 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 introduce the student in advanced methods 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 some relevant practical applications • To offer the student the instruments that will allow him/her to develop different data analysis applications.

8. Content

8.1 Course	Teaching methods	Remarks
• Week 1: Introduction • Reference: [Han, ch. 1], [Mitchell, ch. 1]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 2: Introduction to Fuzzy sets • Reference: [Klir, ch. 2, 3]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 3: Fuzzy logic, fuzzy reasoning • Reference: [Klir, ch. 8, 10]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 4: Fuzzy control systems • Reference: [Klir, ch. 12]	• Interactive exposure • Explanation • Conversation • Didactical	

	demonstration	
• Week 5: Introduction to Rough sets • Reference: [Pawlak]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 6: Applications of Rough sets • Reference: [Ye, ch. 1], [5, ch. 3]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 7: Mining (Fuzzy) Association rules • Reference: [Ye, ch. 2]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 8, 9: (Fuzzy) Clustering • Reference: [Han, ch. 7], [Ye, ch. 10]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 10: Classification • Reference: [Han, ch. 6], [Mitchell, ch. 6], [Ye, ch. 1, 3]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 11: Linear and non-linear regression • Reference: [Ye, ch. 7]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 12: Principal components, Factor analysis • Reference: [Ye, ch. 8]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 13: Feature extraction, Performance analysis • Reference: [Ye, ch. 16, 17]	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• Week 14: Applications of data analysis • Reference: [Ye, ch. 21, 24, 27], [Han, ch. 10, 11]	• Interactive exposure • Conversation • Didactical demonstration	
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		
8.2 Seminar / laboratory	Teaching methods	Remarks

1. Administration. Survey of the sources of information available on Internet and Intranet. Chosing the paper topics and scheduling the presentations.	• Interactive exposure • Explanation • Conversation	
2. Delivery of theoretical report	• Interactive exposure • Explanation • Conversation	
3. Delivery of theoretical report	• Interactive exposure • Explanation • Conversation	
4. Delivery of experimental report	• Interactive exposure • Explanation • Conversation	
5. Delivery of experimental report	• Interactive exposure • Explanation • Conversation	
6. Delivery of software project	• Interactive exposure • Explanation • Conversation	
7. Delivery of software project	• 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	• The correctness and completeness of the accumulated knowledge.	Written exam (in the regular session)	30%
	• 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)	20%
10.5 Seminar/lab activities	• Class activity	Grade awarded pro rata	10%

	• 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)	20%
	• A personal software project fully implemented, without using existing development environments.	Evaluation of the project (software implementation, documentation and demonstration)	20%

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; the written exam grade has to be at least 5.

Date	Signature of course coordinator	Signature of seminar coordinator
30.04.2013	Prof. dr. Horia F. Pop	Prof. dr. Horia F. Pop
Date of approval		Signature of the head of department
		Prof. dr. Bazil Pârv