

COURSE SHEET

Computational Intelligence year 2022-2023

1. About the program

1.1	University	Universitatea din Pitești
1.2	Faculty	Sciences, Physical Education and Computer Science
1.3	Department	Mathematics-Computer Science
1.4	Field of study	Informatics
1.5	Cycle of studies	Master
1.6	Study Program / Qualification	Advanced techniques for information processing/ Advanced techniques for information processing

2. Discipline data

2. Discipline data											
2.1	Name of the discipline					Computational Intelligence					
2.2	The holder of the course activities										
2.3	Holder of laboratory activities										
2.4	Year of study	2	2.5	Semester	1	2.6	Type of assessment	E	2.7	Discipline regimen	O

3. Estimated total time

3.1	Number of hours per week	4	3.2	of which course	2	3.3	laboratory	2
3.4	Total hours of the curriculum	56	3.5	of which course	28	3.6	laboratory	28
Distribution of the time fund								hours
Study by textbook, course support, bibliography and notes								56
Additional documentation in the library, on specialized electronic platforms and in the field								38
Preparation of seminars/ laboratories, themes, papers, portfolios, essays								40
Tutoring								6
Examination								4
Other activities.....								-
3.7	Total hours of self-study	144						
3.8	Total hours per semester	200						
3.9	Number of credits	8						

4. Preconditions (where applicable)

4.1	Curriculum	Artificial Intelligence, Data Mining Techniques, Probabilities and Mathematical Statistics
4.2	Skills	Competences acquired in the courses Artificial Intelligence, Data Mining Techniques, Probabilities and Mathematical Statistics, Java and C # Programming

5. Conditions (where applicable)

5.1	Conduct of the course	Room with video projector
5.2	Conducting the seminar/laboratory	Room with video projector and computer equipment

6. Acquired specific skills

Professional skills	<ul style="list-style-type: none"> • Programming in high level languages. • Development and maintenance of computer applications. • Use of IT tools in an interdisciplinary context. • Using the theoretical bases of computer science and formal models. • Design and management of databases.
Transversal competences	<ul style="list-style-type: none"> - Applying the rules of organized and efficient work, of responsible attitudes towards the didactic-scientific field, for the creative capitalization of one's own potential, respecting the principles and norms of professional ethics. - Efficient development of activities organized in an inter-disciplinary group and development of empathic capacities for inter-personal communication, relationships and collaboration with various groups - The use of efficient methods and techniques for learning, informing, researching and developing the capacities to capitalize on knowledge, to adapt to the requirements of a dynamic society and to communicate in Romanian and in a language of international circulation.

7. The objectives of the discipline

7.1 The general objective of the discipline	► Presentation of important chapters in the field of computational intelligence; knowledge modeling through rough sets, fuzzy sets and numbers, evolutionary algorithms and game theory.
7.2 Specific objectives	At the end of the course, the student will be able to: <ul style="list-style-type: none"> - use the notions of fuzzy logic; - to use genetic algorithms in solving general problems. - to use algorithms and notions from game theory in solving some problems

8. Contents

8.1. Course	Nr.	Teaching	Observations
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		hours	methods	Resources used
1	Computational intelligence. Introductory notions.	2	lecture problematization debate individual themes group work Explanation Description and exemplification Demonstration Heuristic Conversation Exercise	computer projector
2	Methods of representing knowledge using rough sets	4		
3	Methods of representing knowledge using fuzzy sets	4		
4	Fuzzy numbers. Specific operations.	4		
5	Fuzzy logic systems	4		
6	Genetic algorithms and evolutionary strategies. Basic notions. The selection. The mutation. Crossing. Evolution.	6		
7	Game theory. Strategies.	4		
Bibliography				
1. Rutkowski, L. Computational Intelligence. Methods and Techniques, Springer, 2008				
2. Koller, D., Friedman D., Probabilistic Graphical Models.Principles and Techniques, MIT Press, 2009				
3. Ashlock, D., Evolutionary Computation for Modeling and Optimization, Springer, 2005				
4. Kasabov, N., Evolving Connectionist Systems, Springer, 2007				
5. Negoita, M., Neagu, D., Palade, V., Computational Intelligence for Modeling and Optimization, Springer, 2005				
6. Tenne, Y., Goh, C-K, Computational Intelligence in Optimization, Springer, 2010				
7. Engelbrecht, P., Computational Intelligence.An Introduction, Wiley, 2002				
8. Doru Popescu Anastasiu, Andrei Eugeniu Ioniță, Combinatorică si teoria grafurilor, Editura Rhabon, Tg. Jiu, 2005				
9. Doru Anastasiu Popescu, Bazele Programării, Java după C++, Editura L&S Soft, 2019, ISBN: 978-973-88037-9-4 , 2019				
10. Doru Anastasiu Popescu, Nicolae Bold, Daniel Nijloveanu, <i>A Method Based on Genetic Algorithms for Generating Assessment Tests Used for Learning</i> , pp.53-60, ISSN 2395-8618, 2016				
11. Doru Anastasiu Popescu, Dan Radulescu, <i>Monitoring of Irrigation systems Using Genetic Algorithms</i> , 6th International Conference on Modeling, Simulation, and Applied Optimization, May 27-29, Istanbul, Turkey, pp. 1-4, 2015				
12. Doru Anastasiu Popescu, Nicolae Bold, Ovidiu Domsa, <i>Generating assessment tests with restrictions using genetic algorithms</i> , 12th IEEE International Conference on Control & Automation, June 1-3, 2016, Kathmandu, Nepal				
13. Doru Anastasiu Popescu, Daniel Nijloveanu, Nicolae Bold, <i>Generator of Tests for Learning Check in Case of Courses that Use Learning Blocks</i> , International Conference in Methodologies and intelligent Systems for Techhnology Enhanced LearningMIS4TEL 2018: Methodologies and Intelligent Systems for Technology Enhanced Learning, 8th International Conference pp 239-244, Springer proceedings, 2018 https://doi.org/10.1007/978-3-319-98872-6_28 Print ISBN9 78-3-319-98871-9, Online ISBN978-3-319-98872-6, 2018				
14. Doru Anastasiu Popescu, Gabriel Ciprian Stanciu and Daniel Nijloveanu, <i>Application of Genetic Algorithm in the Generation of Exam Tests</i> , 9-th International Workshop on Soft Computing Applications (SOFA) 27-29 nov-2020				
8.2. Applications – Seminar / Laboratory		Nr. hours	Teaching methods	Observations Resources used
1	Problems grouping information into crowds. Java / C # implementation.	4	Explanation Description and exemplification Case study Exercise Problematization Individual themes Group work Debate	computer projector
2	Operations with fuzzy sets. Applications	4		
3	Operations with fuzzy numbers. Applications	4		
4	Genetic algorithms. Java / C # implementation	4		
5	Problems using genetic algorithms. Java / C # implementation	4		
6	Find problems. Java / C # implementation	4		
7	Game theory. Strategies. Java / C # implementation	4		
Bibliography				
1. Rutkowski, L. Computational Intelligence. Methods and Techniques, Springer, 2008				
2. Koller, D., Friedman D., Probabilistic Graphical Models.Principles and Techniques, MIT Press, 2009				
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10. Doru Anastasiu Popescu, Nicolae Bold, Daniel Nijloveanu, *A Method Based on Genetic Algorithms for Generating Assessment Tests Used for Learning*, pp.53-60, ISSN 2395-8618, 2016
11. Doru Anastasiu Popescu, Dan Radulescu, *Monitoring of Irrigation systems Using Genetic Algorithms*, 6th International Conference on Modeling, Simulation, and Applied Optimization, May 27-29, Istanbul, Turkey, pp. 1-4, 2015
12. Doru Anastasiu Popescu, Nicolae Bold, Ovidiu Domsa, *Generating assessment tests with restrictions using genetic algorithms*, 12th IEEE International Conference on Control & Automation, June 1-3, 2016, Kathmandu, Nepal
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14. Doru Anastasiu Popescu, Gabriel Ciprian Stanciu and Daniel Nijloveanu, *Application of Genetic Algorithm in the Generation of Exam Tests*, 9-th International Workshop on Soft Computing Applications (SOFA) 27-29 nov-2020

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

The competencies acquired within the discipline allow the graduates to use efficiently the notions of Computational Intelligence in solving the requirements related to the practice and research in the field of informatics.

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Percent of final grade
10.4 Course	Problem solving skills	Practical test (algorithms and problems)	30%
10.5 Seminar/ Laboratory	Solving the proposed problems Presentation and explanation of implementation	Laboratory activity Project	30% 40%
10.6 Minimum performance standard	Grades of at least 5 at the laboratory activity and at the final evaluation (solving 50% of the requirements); final grade minimum 5.		

Date of completion
23.09.2022

Course holder
Conf. univ. dr. Doru Anastasiu Popescu



Laboratory holder
Conf. univ. dr. Doru Anastasiu Popescu



Date of approval in the Department
23.09.2022

Director Department (provider)
Conf.univ.dr. Doru CONSTANTIN



Director Department (*beneficiary*)
Conf.univ.dr. Doru CONSTANTIN

