Study program: Information Technology

Type and level of studies: Doctoral studies (third level of studies)

Course title: Fuzzy Sets and Systems

Name of lecturer/lecturers: Damljanović Ž. Nada

Language of instruction: English

ETCS: 15

Prerequisites: -

Semester: Winter

Course unit objective

Introduction to ideas, concepts and results of the theory of fuzzy sets and systems with the algebraic basis of fuzzy logic, as well as the practical applications of fuzzy sets.

Learning outcomes of Course unit

At the end of the course, students would master the basic ideas, concepts and results of the theory of fuzzy sets and systems, and they would be able to apply practically their knowledge in individual scientific researches in within the same or within some other scientific fields.

Course unit contents

Theoretical classes

Fuzzy sets, notion of a fuzzy set, set and algebraic operations of fuzzy sets, fuzzy relations, composition of fuzzy relations, fuzzy orders, fuzzy equivalences and fuzzy equalities, fuzzy partitions, fuzzy functions, extensionality, fuzzy matrices, fuzzy closures, algebraic foundations of fuzzy logic, Residuated lattices, Heyting algebras, BL-algebras, MV-algebras, Gödel algebras, triangular norms on the unit interval, a Lukasiewicz, product and Gödel norm, applications of fuzzy sets, modelling of vagueness, fuzzy logic and approximate reasoning, fuzzy control, fuzzy data analysis, fuzzy clustering, fuzzy decision making, fuzzy languages and fuzzy automata, fuzzy algebraic structures, fuzzy relational systems.

Practical classes

Solving concrete problems based on exposed theoretical concepts and principles. The course include individual research study, active monitoring of scientific resources and their systematization, analysis, solving specific problems and preparation of scientific papers for publication.

Literature

[1] R. Belohlavek and V. Vychodil, Fuzzy Equational Logic, Springer, Berlin/Heidelberg, 2005.

[2] B. Bede, Mathematics of Fuzzy Sets and Fuzzy Logic, Springer, Berlin/Heidelberg, 2013.

[3] D. Dubois, H. Prade, Fuzzy Sets and Systems, Theory and Applications, Academic Press, 1980.

[4] 3. G. Gerla, Fuzzy Logic: Mathematical Tools for Approximate Reasoning, Kluwer, Dodrecht, 2001.

[5] J. N. Mordeson and D. S. Malik, Fuzzy Automata and Languages: Theory and Apllications, Chapman & Hall/ CRC, Boca Raton, London, 2002.

Number of active teaching hours				Other classes
Lectures: 3	Practice: 5	Other forms of classes:	Independent work: 2	

Teaching methods

Solving concrete problems which involve exposed theoretical concepts and principles. Part of the teaching takes place through self-study research, which includes active monitoring of scientific sources and their systematization, analyzing, solving specific problems, and preparing papers for publication.

Examination methods (maximum 100 points)

Exam prerequisites:	**No. of points:**	**Final exam:**	**No. of points:**
Student's activity during lectures	6	oral examination	25
Practical classes/tests	30	written examination	35
Seminars/homework	4	……	
Project			
Other			

Grading system

Grade	**No. of points**	**Description**
10	91-100	Excellent
9	81-90	Exceptionally good
8	71-80	Very good
7	61-70	Good
6	51-60	Passing
5	Less than 50	Failing