Study program: Mechanical engineering

Type and level of studies: Doctoral studies

Course unit: Uncertainty Based Reasoning Systems

Teacher in charge: prof. dr. Mirko Djapic

Language of instruction: English

ECTS: 5

Prerequisites:

Semester: Spring

Course unit objective:
To introduce students with the mathematical tools (beliefs functions) and the way of their selection in the process of modeling and reasoning on the basis of uncertainty in the fields of engineering and management

Learning outcomes of the course unit
Students should acquire knowledge and skills that will enable them to select and apply of appropriate models, the beliefs functions by which they will modeling the uncertainty of the problems in the field of engineering and management

Course unit contents
Theoretical classes
The concept, definition and division of uncertainty in engineering, Modeling aleatory and epistemic uncertainty, Dempster-Shafer's theory of belief functions, Entropy of the belief functions, Graphical models (frames) for presentation uncertainty knowledge, Processing uncertainty knowledge and reasoning on the basis of uncertainty - Expert Systems for the processing of uncertain knowledge, Valuation systems, Evidential networks, Bayesian belief networks, Application examples of the evidential networks in engineering and management.
Practical classes
A student project consists of modeling uncertainty in the selected problem by the evidence networks

Literature

1. G. Shafer (1976): A Mathematical Theory of Evidence, Princeton University Press.
2. P. Shenoy (1992): Valuation-Based Systems: A framework for managing uncertainty in expert systems, John Wiley & Sons, New York, 1992.
3. B.M. Ayyub, G.J. Klir (2006): Uncertainty Modeling and Analysis in Engineering and the Sciences, Champman & Hall/CRC Taylor &Ftancis Group, Boca Raton, FL.

Number of active teaching hours				**Other classes**
Lectures: 3	Practice: 3	Other forms of classes:	Independent work: 1	

Teaching methods
Teaching is carried out through lectures which will be presented basic methods and tools for modeling epistemic uncertainty as well as the latest research results in this area. The exercises consist of presentation software tools for modeling uncertainty and independent preparation and defense of the project by the students.

Examination methods (maximum 100 points)

Exam prerequisites	**No. of points:**	**Final exam**	**No. of points:**
Student's activity during lectures		oral examination	
practical classes/tests		written examination	50
Seminars/homework	50	.....	
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