Study program: Information Technology, Engineering Management

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

Course title: Mathematical Modelling

Name of lecturer/lecturers: Damljanović Ž. Nada

Language of instruction: English

ETCS: 15

Prerequisites: -

Semester: Summer

Course unit objective

Introduction to ideas and concepts of mathematical modelling of real phenomena and processes, types of mathematical models, construction and implementation of mathematical models, simulation and computation for engineering and environmental processes, manufacturing, and industrial systems.

Learning outcomes of Course unit

At the end of the course, students would master the ideas, concepts and results of the theory of mathematical modelling. In particular, depending on the process to be modelled, students would be able to choose the appropriate mathematical model: to properly formulate variable, to analyse the mutual influence of parameters in the model, to optimise the number of operations in the model, to perform simulation experiments and to analyse and forecasting real processes.

Course unit contents

Theoretical classes

Methodology of mathematical modelling and model types. Examples from science and technology. Mathematical methods for physics and engineering, computer science and management. Applications to modelling of various types of engineering, industrial, service, organizational and computer systems depending on the elective area of the candidate's study.

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] K. F. Riley, M. P. Hobson, S. J. Bence, Mathematical Methods for Physics and Engineering, 2004.

[2] A. Marcja, C. Toffalori, A guide to Classical and Modern Model Theory, Kluwer Academic Publishers, 2003.

[3] D. Marker, Model Theory: An Introduction, Springer, 2002.

[4] J. R. Chasnov, Introduction to Differential Equations, The Hong Kong University of Science and Technology, 2019, https://www.math.ust.hk/~machas/differential-equations.pdf

[5] S. Lynch, Dynamical Systems with Applications using Mathematica, Birkhauser, Boston, 2007.

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