UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

Faculty of Technical Sciences

Course title: Modelling and optimization of technical systems

ECTS credit allocation (and other scores): 1.5

Semester: spring

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 30

Course coordinator/ Department and e-mail: Konrad Nowak, Department of Machines and Materials Technology, konrad.nowak@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: Use of engineering computation software (COMSOL) to model selected technical systems and complete a design project. Application of a computational environment (EXCEL, MATLAB) to the optimization of selected technical systems.

LECTURES: Concepts of systems and processes. Time-independent and time-dependent systems; stochastic and deterministic systems. Methods for modelling of technical systems. Lumped-parameter and distributed-parameter models. Introduction to static optimization methods: linear, quadratic, and nonlinear, both unconstrained and constrained. Use of engineering computation software for the modelling, optimization, and design of thermal processes.

Learning purpose: Prepare students to modelling and optimization of typical technical systems.

On completion of the study programme the graduate will gain:

Knowledge: Knowledge about methods of modelling and optimization of constructions or processes.

Skills: Ability to use computer simulation to model selected processes and optimize them.

Social Competencies: Ability to be ready for optimization of typical technical systems.

Basic literature: Naim Kheir, *Systems Modeling and Computer Simulation*, CRC Press, 2018; Michael C Fu, *Handbook of Simulation Optimization*, Springer International Publishing, 2018. Wen J. T., Intelligent Building Control Systems, Springer New York, 2014; MATLAB Help;

Supplementary literature: Adrian Bejan, George Tsatsaronis, Michael Moran, *Thermal design and optimization*, Wiley, 1996; Yogesh Jaluria, *Design and Optimization of Thermal Systems* (Third Edition), CRC Press, 2019;

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 32

Student's independent work: 5.5