STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Technical Computer Science	**1010252431011000217**

Field of study	Profile of study (general academic, practical)	Year /Semester
MECHARTONICS	**(brak)**	**2 / 3**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **1** Classes: **-** Laboratory: **1** Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics, computer science, operating systems, programming languages, machines and electric drives.
2	**Skills**	Computer skills, Windows operating system, programming in C++ language, formulating and solving mathematical models of electrical actuators.
3	**Social competencies**	Awareness of necessity for broadening knowledge and skills. Ability to comply with rules during lectures and laboratory classes, ability to communicate with others during classes.

Assumptions and objectives of the course:

The acquisition of the ability to use a computer to solve technical problems and ability to elaborate simple models of phenomena for analysis, synthesis and to control selected electromagnetic actuators of mechatronics systems; making use of commercial software for analysis and synthesis of actuators.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Basic knowledge about the use of computer to solve engineering problems. - [K_W10]
2. Knowledge of non-linear circumferential and field mathematical models of electromagnetic actuators and basic methods of solving them. - [K_W01, 09]
3. Knowledge of creating algorithms and computer programmes to solve discrete models of selected electromagnetic actuators. - [K_W09]
4. Knowledge of programming techniques and ways formulation of simulation models in selected commercial programming environments for analysis and simulation of coupled electromagnetic and mechanical phenomena in electromagnetic and electromechanical actuators. - [K_W09, 13]

Skills:

1. Ability to formulate and solve phenomena models in electromagnetic actuators. - [K_U01,07]
2. Ability to elaborate simple discrete models for simulation of phenomena in electromagnetic transducers. - [K_U07,15]
3. Ability to use the commercial software to the analysis and synthesis of simple electromagnetic transducers. - [K_U13,14,15]

Social competencies:

1. Understanding the requirement of learning by whole life; ability to inspire and organize learning process of other people. - [K_K01]
2. Ability to cooperate and work in team/group taking various roles. - [K_K03]
3. Ability to define priorities leading to task completion. - [K_K04]

Assessment methods of study outcomes

Lecture:

- credit on the basis of a test consisting of both open and test questions. Scale of estimate: 51-60% - dst(C), 61-70% - dst+(C+), 71-80% - db(B), 81-90% - db+ (B+), 91-100% - bdb(A).

Laboratory:

- awarding a bonus of practical knowledge gained during previous laboratory classes;
- practical verification of ability to elaborate simple models by using commercial software;
- evaluation of knowledge and skills connected with realization of individual and team programming projects.

Receiving additional points for class activity, especially for:

- ability to cooperate with others in the team working practically on particular tasks in laboratory,
- making use of elements and techniques surpassing lecture and laboratory material,
- esthetical care of completed projects.

Course description

Mathematical models of electromagnetic actuators of rotary linear motion. Methods of solving models equations. Discrete models. Algorithms and computer programmes of analysis of steady state, transient and controlling systems of electromagnetic actuators. Solving of simulation models of electric drive systems in Matlab-Simulink environment. Field analysis of the operating states of the electrical actuators in the Magnet environment

Basic bibliography:

1. Baron B., Metody numeryczne w C++Builder, Helion 2004
2. Burden R., Faires J.D., Numerical Analysis, PWS Publishers, Prindle, Weber&Schmidt, 1970.
3. Mrozek B., Mrozek Z., MATLAB i Simulink, Wydawnictwo Helion, Gliwice, 2004.
4. Lal K., Rak T., Orkisz K., RTLinux - system czasu rzeczywistego Wydawnictwo Helion, Gliwice, 2003

Additional bibliography:

1. Hammond P., Sykulski J. K., Engineering Electromagnetism, Physical Processes and Computation, Oxford University Press,1994.

Result of average student's workload

Activity	Time (working hours)
1. Lecture	15
2. Laboratory	15
3. Consultations	8
4. Preparation to practice	10
5. Preparation to test	10
6. Test	2

Student's workload

Source of workload	hours	ECTS
Total workload	60	3
Contact hours	40	1
Practical activities	25	1