

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Exploitation of technical systems		Code 1010321361010322644
Field of study Electrical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 3 / 6
Elective path/specialty Electrical and Computer Systems in	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: Dr inż. Maria Zielińska email: maria.zielinska@put.poznan.pl tel. 616652539 Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the field of theoretical electrical engineering, electric machines, metrology, electrical power engineering, computerization in designing.
2	Skills	Skill in effective knowledge acquiring in the domain related to the chosen line of studies and cooperation within a team (laboratory group).
3	Social competencies	Consciousness of the need for widening own competences.
Assumptions and objectives of the course: Recognition of theoretical and practical problems related to operation of technical objects. Acquisition of the skill in using legal deeds allowing for admittance of the technical system for operation. Practical skill in choosing basic devices making a part of electrical engineering systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. to describe the structure and operation principle of a technical system, to explain various energy processing processes undergoing in the technical system, to formulate theoretical equation of motion and apply it in engineering (motion of traction vehicle) - [K_W04+, K_W13++] 2. to indicate calculation methods helpful in choosing the driving machine suitable for various loads and operating conditions of the technical system - [K_W11+]		
Skills: 1. to apply the knowledge in the scope of operation of technical objects, to use calculation methods necessary for proper selection of the elements of the technical system, analysis and assessment of its operation - [K_U22++] 2. to work individually and in teams, to make use of catalogue cards with a view to proper choosing the parts of the technical system - [K_U17++]		
Social competencies: 1. ability in independent thinking and creative activity in order to improve engineer effectiveness - [K_K01+]		
Assessment methods of study outcomes		

<p>Lecture: ? assessment of the knowledge and skill presented at written credit of overall - problem type, ? permanent assessment during each lesson based on student?s activity.</p> <p>Laboratory exercises: ? checking and promoting the knowledge of the problems necessary for carrying out the exercises in the sphere of definite laboratory tasks, ? assessment of the knowledge and skill related to fulfilling the exercise, assessment of the exercise report.</p> <p>Additional points may be achieved for activity during the classes, particularly for: ? proposal of discussion of additional solution of the problem, ? ability for cooperation in teams.</p>

Course description

Basic operational notions. Operational models and systems. Standard and legal deeds, dispositions, and catalogue cards. Statics and dynamics of selected electrical technical systems. Power engineering of technical systems. Choice of the power of driving machine. Designing fundamentals of the electrical technical systems. The drive of selected mechanical devices. Principles of calculation and simulation of selected drive systems of mechanical equipment.

2017 Update: Implementantion of selected simulation exercises.Comparative analysis of applied methods used for the above simulation exercises.

Applied methods of education:

lectures - lecture with multimedia presentation (including: drawings, photographs, animations, sound, films) supplemented by examples shown on the board; Student activity is taken into account during the course of the assessment.

laboratories - laboratories supplemented with multimedia presentations (including drawings, photographs, animations, sound, films); Use of tools to enable students to complete home tasks (eg open source software).

Basic bibliography:

1. D. Majchrzak, Analiza wpływu wybranych uszkodzeń na pracę napędu z silnikiem PMSM i przekształtnikiem matrycowym. Poznan University of Technology, Academic Journals, No. 91, Poznań 2017
2. M. Hebda, Elementy teorii eksploatacji systemów technicznych, MCNEMT, Radom, 1990
3. Z. Stein, Eksploatacja maszyn elektrycznych, WUPP, Poznań, 1991
4. Z. Gogolewski, Z. Kuczewski Napęd elektryczny WNT Warszawa 1972
5. K. Zawirski, Sterowanie silnikiem synchronicznym o magnesach trwałych, WPP 2005

Additional bibliography:

1. J. Konieczny, Sterowanie eksploatacją urządzeń, PWN, Warszawa, 1975
2. Praca zbiorowa pod kierunkiem Z. Grunwalda: ?Napęd elektryczny? WNT Warszawa 1987
3. Drozdowski P. ? Wprowadzenie do napędów elektrycznych? Politechnika Krakowska; skrypt dla studentów wyższych uczelni technicznych Kraków 1998

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	30
2. participation in laboratory lessons	15
3. participation in consultations for lectures	3
4. crediting the classes	2
5. preparation to laboratory lessons	10
6. drawing up the reports	12
7. preparation to crediting the classes	10
8. participation in consultations for laboratory lessons	2

Student's workload

Source of workload	hours	ECTS
Total workload	84	3
Contact hours	52	2

Practical activities	39	1
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