High Voltage Engineering Polish obligatory Cycle of study: Form of study (full-time,part-time) Form of study (full-time,part-time) Second-cycle studies full-time No. of credits full-time Lecture: 15 Classes: - 15 Classes: - Laboratory: 15 Project/seminars: - 2 Status of the course in the study program (Basic, major, other) (university-wide, from another field) (brak) Education areas and fields of science and art technical sciences 2 100% Technical sciences 2 100% 2 100% Responsible for subject / lecturer: Prof. dr hab. inż. Lech Nowak Dr hab. inż. Wiesław Łyskawiński email: wiesław Łyskawiński email: lecthrowo 3A, 60-965 Poznań Uydział Elektryczny Uk Piotrowo 3A, 60-965 Poznań U. Piotrowo 3A, 60-965 Poznań ul. Piotrowo 3A, 60-965 Poznań Uk Piotrowo 3A, 60-965 Poznań 1 Knowledge Basic knowledge in the area of theory, characteristics and the method of electrical machine control. 2 Skills Matrix calculus on the basic level. Ability of the effective self-education in the field associated with chosen subject.			STUDY MODULE D	ESCRIPTION FORM		
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3. Student is able to assess the possibility of using new technological achievements for the design and productions of the electrical devices and systems, containing innovative solutions - [K_U19 ++] Social competencies:						
•	3. Stud	lent is able to assess	the possibility of using new techno	ological achievements for the de		
1. The student understands the need of formulating both handing over to the society information and opinions of						
achievements in the area of electrical engineering and other aspects of activity of an electrical engineer - [K_K02 ++]	1. The	student understands	the need of formulating both hand	ing over to the society information	on and opinions of	

Assessment methods of study outcomes

Lecture:

- constant judging on every classes (awarding a bonus to the activity and qualities of the perception),

- evaluation of the knowledge and abilities on a written problem character examination.

Laboratory:

- the test and awarding a bonus to the essential knowledge of problems for the accomplishment stated in given area of laboratory tasks,

- constant judging, on every classes - awarding a bonus to the increase in the ability of using with found principles and methods,

- the evaluation of the knowledge and the abilities associated with the accomplishment of the exercise task, the evaluation of the report from the performed exercise.

Getting additional points for the activity during classes, particularly for:

- proposing discussing additional aspects of the issue,

- ability of the cooperation in the team performing the task in the laboratory;

- remarks about improving teaching materials.

- quality of the elaborated reports.

Course description

Circuit models of induction machine, voltage equation in natural coordinate frame. Two-axis model of induction machine, transformation of impedance matrix. Equilibrium equations for drive with induction motors: steady state and transients. Scalar and field-vector control of induction motor drives Magnetic circuits. Equations of synchronous machines. Converter fed motor. Drives with stepping motors. Brushes DC motors and universal motors. Drives with brushless DC motors. Structures of control systems for electric drives.

Applied methods of education:

Lectures:

- lecture with multimedia presentation supplemented with examples given on the board,

- interactive lecture with questions to students,

- student activity is taken into account during the course of the assessment process.

Laboratory:

- detailed review of the reports by the teacher, discussion,
- demonstrations and presentations,

- teamwork.

Basic bibliography:

1. Wykłady z elektromechanicznych przemian Energii, Sobczyk T., Węgiel T., Wydawnictwo Politechniki Krakowskiej, Kraków 2014

2. Zasady elektromechanicznego przetwarzania energii (tłum. z angielskiego), Meisel J., Wydawnictwo Naukowo Techniczne, Warszawa, 1970.

3. Napęd elektryczny i jego sterowanie, Sidorowicz J., Oficyna Wydawnicza Politechniki Warszawskiej , Warszawa, 1994.

4. Electrical drivers and electromechanical systems, Crowder R., Elsevier, 2006.

5. Dynamics and Control of Electrical Drivers, Wach P., Springer Verlag, Berlin-Heidelberg, 2011.

6. Permanent magnet and Electromechanical Devices, Furlani E.P., Academic Press, 2001.

7. Wprowadzenie do napędów elektrycznych, Drozdowski P., Skrypt Politechniki Krakowskiej, Kraków, 1998.

Additional bibliography:

1. Sterowanie silnikiem synchronicznym o magnesach trwałych, K. Zawirski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005.

2. Bezczujnikowe układy napędowe z silnikami indukcyjnymi, Orłowska-Kowalska T., Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2003.

3. Automatyka napędu elektrycznego, Deskur J., Kaczmarek T., Zawirski K., Wydawnictwo Politechniki Poznańskiej, Poznań 2012.

Result of average student's workload

Activity

Time (working hours)

1. Participation in the lecture		15			
2. Participation in the laboratory exercises		15			
3. Participation in the consultation	7				
4. Participation in the examination		2			
5. Preparing for the examination		10			
6. Preparing for the laboratory exercises and carrying reports out	11				
Student's workload					
Source of workload	hours	ECTS			
Total workload	60	2			
Contact hours	39	1			
Practical activities	28	1			