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Responsible for subject / lecturer: Responsible for subject / lecturer: Prof. dr hab. in2. Lech Nowak email: lech.nowak@put.poznan.pl Dr in2. Kazimierz Radziuk email: kazimierz.radziuk@put.poznan.pl tel. 61 665 2380 tel. 61 665 2636 Wydziai Elektryczny Wydziai Elektryczny ul. Piotrowo 3A, 60-965 Poznań ul. Piotrowo 3A, 60-965 Poznań Prerequisites in terms of knowledge, skills and social competencies: 1 Knowledge 2 Skills 3 Student is able to obtain information from literature, databases and other sources; has abilities of the self-education for improving qualifications and the update of professional competence. 3 Social competencies Competencies Student is aware of a need to expand his competence and readiness to understands other aspects of engineering activity, including its influence on the environment. Assumptions and objectives of the course: Study outcomes and reference to the educational results for a field of study Knowledge: 1. The student has a knowledge tidied up in the structure, the application and control of the automation and robotics systems (K_W19++) 2. Studt Studen times typical engineering technologies, knows and understands principles of the selection of serve- and measuring-testing devices [K_W20++] Moreting Study outcomes and reference	technical sciences				6 100%		
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email: lech.nowak@put.poznan.pl email: kazimierz.radziuk@put.poznan.pl tel. 61 665 2380 tel. 61 665 2380 Wydział Elektryczny Wydział Elektryczny ul. Piotrowo 3A, 60-965 Poznań ul. Piotrowo 3A, 60-965 Poznań Prerequisites in terms of knowledge, skills and social competencies: 1 Knowledge 2 Skills 3 Student should have knowledge in chosen branches of physics including the electricity and the magnetism and the knowledge of the theory of electric circuits. 2 Skills Student is able to obtain information from literature, databases and other sources; has abilities of the self-education for improving qualifications and the update of professional competence. 3 Social competencies Student is aware of a need to expand his competence and readiness to undertake the cooperation in the team; has an awareness of the importance and understands other aspects of magnetic circuits analysis. Getting knowledge of operation, characteristics and methods of analysis of: transformers, induction motors, synchronous motors, brushed d.c. motors, electronically commutated motors as well as the other electromechanical converters. Student kas a knowledge tidied up in the structure, the application and control of the automation and robotics systems [K_W19++] 2. Student kas a knowledge tidied up in the structure, the application and control of the automation and robotics systems [K_W20++] 2. Student is able to use models of simple electrome	Pro	f. dr hab. inż. Lech No	wak	Dr inż. Kazimierz Radziuk			
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			Assessment metho	ds of study outcomes			

Lecture:

- ? constant progress monitoring during all classes (awarding a bonus to the actively participating students),
- ? evaluation of student?s knowledge and skills on a written examination in a form of test.

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

- ? proposing answers to the questions and tasks presented during the lectures,
- suggestions on how to improve the teaching materials.

Course description

Magnetic circuits. Transformers: construction, operation modes, equivalent circuit. Rotating machine principles: distributed windings, rotating magnetic field and rotating electromotive force. Induction motors: construction, principle of operation, equivalent diagram scheme;, basic characteristics, angular velocity control. Single-phase induction motors. Synchronous machines: construction, principle of operation, phasor diagrams. Permanent magnet motors.. Starting up the synchronous motors. Synchronous motors optimal control. Reluctance motors. The stepper motors The brushed direct current motors: construction, principles of operation, the armature reaction, commutation. The torque-speed characteristic and speed control. The brushed a.c. motors, universal motors. Brushless direct current motors. Special electromechanical converters.

Basic bibliography:

1. A. M. Plamitzer, Maszyny Elektryczne, wyd. VII, WNT Warszawa, 1982.

2. W. Karwacki, Maszyny Elektryczne, Wyd. Pol. Wrocławskiej, Wrocław, 1993.

3. M. S. Sarna, Electric Machines, Steady-State Theory and Dynamic Performance, West Publishing Company, wyd. 2, 1994 i wyd. Następne

- 4. Z. Bajorek, Maszyny Elektryczne, WNT Warszawa, 1977.
- 5. T. Glinka, Maszyny Elektryczne wzbudzane magnesami trwałymi, Wyd. Politechniki Śląskiej, Gliwice 2002.
- 6. R Sochocki, Mikromaszyny Elektryczne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszaw 1996

7. R. Miksiewicz, Maszyny Elektryczne, Wyd. Politechniki Śląskiej, Gliwice 2000.

Additional bibliography:

- 1. W. Latek, Teoria Maszyn Elektrycznych, wyd. II, WNT Warszawa, 1987.
- 2. Praca zbiorowa, Poradnik Inżyniera Elektryka, Tom 2, WNT Warszawa 2007.
- 3. T. Wildi, Electrical Machines, Drives, and Power Systems, Prentice Hall, Pearson International Edition, New Jersey 2002.
- 4. Przepiórkowski, Silniki Elektryczne w praktyce Elektronika, Wydwnictwo BTC, Warszawa 2007.

Result of average student's workload

Activity	Time (working hours)	
1. Participation in the lecture	30	
2. Consultation	5	
3. Preparation for examination	20	
4. Participation in the examination	5	
Student's wo	rkload	
Source of workload	hours	ECTS
Total workload	60	3
Contact hours	40	2
Practical activities	0	0