

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Operating and diagnostics in power engineering		Code 1010311461010316132
Field of study Power Engineering	Profile of study (general academic, practical) general academic	Year /Semester 3 / 6
Elective path/specialty Ecological Source of Electrical Energy	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: 60 Classes: - Laboratory: 30 Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 5 100% 5 100%
Responsible for subject / lecturer: dr inż. Krzysztof Sroka email: krzysztof.sroka@put.poznan.pl tel. 61 665 22 75 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		Responsible for subject / lecturer: dr hab. inż. Zbigniew Nadolny email: zbigniew.nadolny@put.poznan.pl tel. 61 665 22 97 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	He/she has fundamental information in frame of technology and power machines used in commercial power engineering, liquid mechanics, and metrology. He/she has knowledge in frame of material science, fundamental of electric engineering, and structure of high voltage insulating systems.
2	Skills	He/she understands principles of work of machine parts and knows structure of basic electric power devices - steam boiler, steam and gas turbine, heat regenerator, compresor, fan. He/she is able to choose proper materials to high voltage insulating systems.
3	Social competencies	He/she has consciousness of necessary of extension their competencies, and to be ready to cooperate in frame of team.
Assumptions and objectives of the course: Achievement of knowledge of application of correct principles of loading of power devices and machines. Recognition of tasks concerning to detailed structure, loading and diagnostics of high voltage insulating systems of power devices.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He/she has fundamental knowledge in frame of utility power devices in various state of loading. - [K_W12+++K_W14+K_W24+] 2. He/she has general knowledge about methods of optimalisation of work of power sources in electric power system. - [K_W18++K_W23+] 3. He/she has knowledge in frame of detailed structure, loading and diagnostics insulating systems of power devices. - [K_W19+]		
Skills:		
1. He/she is able to formula correct principles of loading of basic power devices. - [K_U18+] 2. He/she is able to utility principles of correct work of power sources in electric power system. - [K_U20+] 3. He/she recognise state of loading of power instalation. - [K_U19+]		
Social competencies:		
1. He/she has consciousness of influence of power machine technology on natural environment. - [K_K02+]		
Assessment methods of study outcomes		

<p>Lecture:</p> <ul style="list-style-type: none"> - grade of knowledge and skills indicated on exams with problem character, - continous grading knowledge and skills on each lecture by disscussion regarding actual problems related to proper methods of loading. <p>Laboraty:</p> <ul style="list-style-type: none"> - tests verifying needed knowledge to realisation indicated problems in some field of laboratory tasks, - grade of knowledge and skills related to realisation of laboratory tasks, grade of report, - collection of extra points of collaboration in frame of team realising laboratory tasks. 		
Course description		
<p>Fundamental loading definition. Loading principles of devices. Utility of power block in various states. Work of producing devices in transition states, caused by failure or planned transition states. Changes of load, Work of power plant in electric power system - economic distribution of load. Dyspozytory of power plants. Problems of reliability. Repairs. Collection and analysis of load data. Diagnostics of basic kinds of failures. Recognition of possibilities, limitations of diagnostics methods used in high voltage insulating systems of power devices.</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. R.Janiczek ? Eksploatacja elektrowni parowych, WNT W-wa 1990 2. Florkowska B., Diagnostyka wysokonapięciowych układów izolacyjnych urządzeń elektroenergetycznych, Wydawnictwa AGH, Kraków, 2009 3. Glinka T., Maszyny elektryczne i transformatory. Podstawy teoretyczne, eksploatacja i diagnostyka, Komel 2015 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Gładys H., Matla R.: Praca elektrowni w systemie elektroenergetycznym. WNT. W-wa 1995 2. Pawlik M., Strzelczyk F.: Elektrownie, WNT W-wa 2012, 2017 3. Gacek Z., Kształtowanie wysokonapięciowych układów izolacyjnych stosowanych w elektroenergetyce, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002 4. Florkowska B. i inni, Mechanizmy, pomiary i analiza wylądowań niepełnych w diagnostyce układów izolacyjnych wysokiego napięcia, Uczelniane Wydawnictwo Naukowe ? Dydaktyczne AGH, Kraków, 2001 		
Result of average student's workload		
Activity	Time (working hours)	
1. participations on lectures	60	
2. participations in laboratory	30	
3. preparation to laboratory tasks	28	
4. preparation of laboratory reports	28	
5. particiaption in consultations related to laboratory	5	
6. preparation to test	20	
7. participation during test	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	174	5
Contact hours	98	4
Practical activities	91	2