

STUDY COURSE DESCRIPTION FORM		
Name of the course Advanced on-line diagnostics of the power transformer		Code
Name of the doctoral school Poznan University of Technology Doctoral School		Year /Semester
Specialty/Discipline Environmental engineering, mining and energy		Type (obligatory, elective): elective
No. of hours Lectures: 4 Classes: - Laboratories: - Seminars: -		No. of credits 1
Cycle of study: Third-cycle studies (Polish Qualifications Framework level eight)	Form of study: Full-time	Assessment: (written exam, presentation, etc.) written test
Responsible for the course/lecturer: dr hab. inż. Krzysztof Walczak e-mail: krzysztof.walczak@put.poznan.pl phone : +48 61 665 2797 Faculty of Environmental Engineering and Energy Poznan Uversity of Technology Piotrowo street 3A, 60-965 Poznan, Poland		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge: PhD student should have basic knowledge in the field of electricity generation and transmission as well as high voltage technology	
2	Skills: PhD student can individually identify, formulate and solve engineering problems using innovative tools	
3	Social competencies: PhD student recognizes the importance of continuous learning and individual work, is open to exploring new areas of knowledge	
Objectives of the course: Acquaintance with modern on-line diagnostics techniques and assessment of the state of insulation of high-voltage devices on the example of power transformer. Acquisition of processing skills and proper interpretation of measurement data to assess the condition of high voltage equipment.		
Educational results (Study outcomes)		
Knowledge:		
P8S_WG	PhD student knows the key trends for the development of electrical power equipment diagnostics.	SzD_W02
P8S_WK	PHD student understands the relationships that exist between the economic sphere and the commercialization of scientific research results	SzD_W07
Skills:		
P8S_UW	PhD student is able to use knowledge from various fields of science to create expert systems that allow comprehensive assessment of the state of technical devices.	SzD_U01

P8S_UW	PhD student is able to critically analyze and evaluate the results of measurements and analyzes in order to make rational decisions regarding the operation of electrical power equipment.	SzD_U02	
Social competencies:			
P8S_KK	PhD student is ready to critically assess the achievements in the field of modern methods of assessing the state of power engineering devices	SzD_K01	
P8S_KO	PhD student is ready to initiate actions aimed at making the public aware of the importance of modern methods of online diagnostics for energy security.	SzD_K05	
Compulsory literature:			
<ol style="list-style-type: none"> 1. E. Kuffel , W.S. Zaengl, J. Kuffel , High Voltage Engineering. Fundamentals, Second edition, Butterworth-Heinemann, 2000 2. James H. Harlow , Electric Power Transformer Engineering, 3rd Edition, CRC Press, 2012 3. Issouf Fofana (Ed.), Power Transformer Diagnostics, Monitoring and Design Features, MDPI, December 2018 4. Ahmed Abu-Siada Ed), Power Transformer Condition Monitoring and Diagnosis, IET, 2018 			
Additional literature:			
<ol style="list-style-type: none"> 1. W. Sikorski (Ed), Acoustic emission. Research and applications, INTECH, 2013 2. W.H. Tang , By (author) Q.H. Wu, Condition Monitoring and Assessment of Power Transformers Using Computational Intelligence, Springer London Ltd , 2011, 			
COURSE DESCRIPTION			
	General issues	Specific issues	No. of hours
1	Dissolved Gas in Oil Analysis	<ul style="list-style-type: none"> • The fundamental description of the DGA method • Procedures of method use • Methods of results interpretation • On-line application using DGA method 	2
2	Partial discharges measurement	<ul style="list-style-type: none"> • Partial discharges measurement rules • On-line, on-site methods used for PD measurement • Interpretation of the PD measurement results • On-line application using different methods of PD measurement 	2
Assessment methods of educational results			
Knowledge assessment based on a written test.			
STUDENT'S WORKLOAD			
Activity		Hours	
Participation in lectures, classes, seminars and laboratories		4	
Contact hours with lecturers		4	
Self-study		2	

Exam	1
TOTAL	11
TOTAL NUMBER OF ECTS POINTS FOR THE COURSE	1