

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>High voltage insulating systems</b>		Code <b>1010311271010311710</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>High Voltage Engineering</b>	Subject offered in: <b>polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: - Classes: - Laboratory: <b>2</b> Project/seminars: <b>1</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Zbigniew Nadolny, prof. nadzw. email: zbigniew.nadolny@put.poznan.pl tel. 61-665-2298 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	He/she has knowledge in frame of electrical engineering material science and knows fundamental principles related to electrical circuits theory. He/she has fundamental knowledge about high voltage engineering. He/she has knowledge in frame of overvoltage protection of buildings and lines.
2	<b>Skills</b>	He/she can build simple electrical system. He/she can make measurements of physical properties related to insulation systems. He/she can make measurements of high voltage using various methods.
3	<b>Social competencies</b>	He/she can work and cooperate in group. He/she knows influence of high voltage insulation systems on natural environment.
<b>Assumptions and objectives of the course:</b> To know fundamental problems related to high voltage insulation systems, used in electric power devices such as insulators, transformers, capacitors, cables and GIS substations.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. He/she has fundamental knowledge related to properties and applications of materials used in high voltage insulation systems. - [K_W23++] 2. He/she has knowledge about physical phenomena occurring in high voltage insulation systems. - [K_W26++]		
<b>Skills:</b> 1. He/she can design simple electric power system using proper methods. - [K_U03++] 2. He/she can make specification of simple high voltage insulation system. - [K_U16++]		
<b>Social competencies:</b> 1. He/she know the role of own work, and work in team. - [K_K03++]		
<b>Assessment methods of study outcomes</b>		

<p>Project</p> <p>? assessment of knowledge and skills show during project,</p> <p>? assessment of project</p> <p>laboratories:</p> <p>? test related to laboratory,</p> <p>? continuous assessment on each laboratory,</p> <p>? assessment of laboratory reports.</p>		
<b>Course description</b>		
<p>Laboratories consists of problems related to high voltage insulation systems, used in electric power systems, such as insulators, transformers, cables, capacitors, GIS substations. Laboratories are related to following problems: the influence of contaminants on electric strength of insulators; voltage breakdown of spare gap; the influence of barriers on electric strength; test of high voltage cable; estimation of work voltage of insulators on the basis of voltage breakdown; capacitors test; analysis of electric field distribution on model of cable.</p> <p>In frame of project, students design chosen high voltage insulation system (insulator, transformer, capacitor, cable).</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Insulation systems of electric power devices, praca zbiorowa, Wydawnictwa Naukowo-Techniczne, Warszawa 1978.</li> <li>2. Knotce S., High voltage substations, Wydawnictwa Naukowo-Techniczne, Warszawa 1976.</li> <li>3. Jezierski E., Transformers. Podstawy teoretyczne, Wydawnictwa Naukowo-Techniczne, Warszawa 1965.</li> <li>4. Szczepaniak Cz., AC capacitors, Wydawnictwa Naukowo-Techniczne, Warszawa 1976.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Rakowska A., DC cable lines, Wydawnictwo Politechniki Poznańskiej, Poznań 2011.</li> </ol>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in laboratory.	30	
2. Participation in projects.	15	
3. Consultations.	20	
4. Preparation to the laboratory.	10	
5. Preparation of laboratory reports.	10	
6. Preparation of the project.	20	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	105	4
Contact hours	65	2
Practical activities	85	4