

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Design and diagnostic of distributive devices</b>		Code <b>1010312331010304898</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>2 / 3</b>
Elective path/specialty <b>Distribution Devices and Electrical</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>15</b>		No. of credits <b>5</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Jerzy Janiszewski email: jerzy.janiszewski@put.poznan.pl tel. 61 665 20 28 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of construction and operation of the electrical devices and systems as well as the measuring equipment and its application.
2	<b>Skills</b>	Ability to acquire information from the literature in the field and other sources and to analyze it in evaluative way. Ability to deal with the analytical, simulation and experimental tools.
3	<b>Social competencies</b>	Understanding of the need for creative activity
<b>Assumptions and objectives of the course:</b> Getting familiar with design of the distribution devices construction elements and with diagnostic methods for parameters of devices operating under normal and disturbed conditions.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Student has ordered knowledge in the scope of designing and diagnose typical construction elements of the distribution equipment. - [K_W05++, K_W11+]		
<b>Skills:</b> 1. Student can apply the mathematical models to design and analyze the electric device elements? operating conditions. - [K_U06++] 2. Student is able to carry out the diagnostic measurements and to verify the tested object?s quality. - [K_U09+]		
<b>Social competencies:</b> 1. Student is able to think and act in the professional way. - [K_K01 +] 2. Student has understanding of need for the interdisciplinary specialists? cooperation and has understanding of the need for device condition tests to provide its safe work. - [K_K01+]		
<b>Assessment methods of study outcomes</b>		

Lecture: Assessment of the knowledge and skills during the problem-solving type examination, oral or written, on-line assessment at each class ( bonus for activity and perception quality).

Lab class: test and bonus for the knowledge necessary to accomplish the problems posed within the indicated lab-task area, assessment of the knowledge and skills related to the lab task accomplishment, assessment of the lab-task accomplishment's report.

Design work: assessment of the final design ( or part-design), on-line assessment and bonus for activity at each class.

Reaching extra points for activity in discussions, especially for:

- effectiveness of implementation of the knowledge acquired when solving a given problem, ability to cooperate in the team accomplishing in practice a specific task either in lab or within the team-accomplished design, remarks related to the educational materials? enhancement, care and esthetic form of the prepared designs and reports.

### Course description

1. Operating conditions of the Electric power devices, finding the devices? thermal capacity under normal and disturbed operating conditions, and designing of the current path of switches and distribution devices.
- 2 Thermal and electro-dynamic calculations of the current paths of switches and electric power switchgears. Design of the current-limiting reactors, switch contact pairs and distribution devices? electrical connections; modeling and investigation of phenomena in the contact pairs.
3. Electrical devices? diagnostic tests, legal requirements related to the diagnostic tests of electrical devices and equipment; modern alternative diagnostic methods for electric power devices.
4. Diagnostic instruments and their accuracy, acquisition and reporting of the test results..
5. Diagnostic test of chosen distribution equipment , vverhead line construction elements, conductors, cable and low voltage installations.

### Basic bibliography:

1. Markiewicz H.: Urządzenia elektroenergetyczne, WNT, Warszawa, 2001.
2. Maksymiuk J.: Aparaty elektryczne, PWN, Warszawa, 1995.
3. Maksymiuk J., Pochanke Z.: Obliczenia i badania diagnostyczne aparatury rozdzielczej, wyd.1, WNT, 2001.
4. Au A., Maksymiuk J., Pochanke Z.: Podstawy obliczeń aparatów elektroenergetycznych, WNT, 1995.
5. Kupras K.: Pomiar w elektroenergetyce ?wytyczne, wyd. SEP, 2007
6. Przepisy Budowy Urządzeń Elektroenergetycznych, Wydawnictwa Przemysłowe WEMA, Warszawa, 1997.
7. Konopacki Z., Gryżewski Zd.: Prace kontrolno-pomiarowe przy urządzeniach elektroenergetycznych o napięciu znamionowym do 1 kV, COSTW SEP, Warszawa,1999.

### Additional bibliography:

1. Wiśniewski S., Wiśniewski T.S.: Wymiana ciepła. WNT, Warszawa, 1997
2. Periodyki: Elektroinstalator, Elektroinfo
3. Poradnik inżyniera elektryka, WNT, 1997
4. Publikacje internetowe
5. Normy przedmiotowe

### Result of average student's workload

Activity	Time (working hours)
1. Lecture	15
2. Labs	15
3. Design work	15
4. General consultations, Design-related consultation	23
5. Preparation to pass the course	15
6. lab report elaboration	10
7. Accomplishment of design or part-design	15

### Student's workload

Source of workload	hours	ECTS
Total workload	125	5
Contact hours	68	3
Practical activities	70	3