

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Design and diagnostic of distributive devices</b>		Code <b>1010315341010304898</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 4</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>part-time</b>	
No. of hours Lecture: <b>9</b> Classes: <b>-</b> Laboratory: <b>9</b> Project/seminars: <b>9</b>		No. of credits <b>3</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> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<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	9
2. Labs	9
3. Design work	9
4. General consultations, Design-related consultation	12
5. Preparation to pass the course	10
6. lab report elaboration	8
7. Accomplishment of design or part-design	20

**Student's workload**

Source of workload	hours	ECTS
Total workload	77	3
Contact hours	44	1
Practical activities	40	2