STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Dielectrics engineering		**1010311271010310398**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
High Voltage Engineering	**polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **1**	Classes: **-**	Laboratory: **-**	Project/seminars: **-**	**2**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Insulation systems fundamentals, physicochemical structure of materials.
2	**Skills**	Students can make the calculation of the electric field distribution for basic insulation systems.
3	**Social competencies**	Understands the importance of teamwork.

Assumptions and objectives of the course:

Getting to know dielectric materials and phenomena occurring in them, getting to know the dielectric properties of materials, and modern research methods to assess the condition of the insulation.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Students have orderly and theoretically founded knowledge about dielectric properties. They have knowledge of the electrical breakdown of gases, liquids and solids. They have a well-established knowledge about the phenomenon of conduction in dielectrics and dielectric polarization. - [K_W23+++]

Skills:

1. The student can choose the right method and use the measuring equipment to determine the basic measurable quantities describing dielectrics materials. - [K_U20+++]

2. Students can choose a proper dielectric material to build insulation systems of transformers, cables, motors and generators. - [K_U03+++]

Social competencies:

1. The student understands the aspects and consequences of the use of dielectric materials, including the impact on the environment, and the related responsibility for decisions. - [K_K01++]

Assessment methods of study outcomes

assessment of knowledge and skills in written and oral exams.

Course description

The structure of dielectric materials (crystalline arrangements, polymorphism, monocrystal, crystal defects, polycrystalline structure, amorphous structure)

Breakdown mechanisms and environmental exposure (breakdown mechanism in gases, contaminated liquids and solid dielectrics), classification of insulating materials by heat resistance factor, impact of weather conditions on the properties of insulating materials. Polarization phenomena. Frequency spectra and equivalent circuits of dielectrics.

Basic bibliography:

1. Mościcka-Grzesiak H., ?Inżynieria wysokich napięć w elektroenergetyce?, Wydawnictwo Politechniki Poznańskiej, tom I - 1996, tom II - 1999
2. Kolbiński K., Słowikowski J. ?Materiałoznawstwo elektrotechniczne?, WNT 1978
3. Chełkowski A., ?Fizyka dielektryków?, Wyd. Naukowe PWN, Warszawa 1993
4. Celiński Z., ?Materiałoznawstwo Elektrotechniczne?, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005

Additional bibliography:

1. Gorur G. Raju, ?Dielectrics in Electric Fields?, Marcel Dekker, Inc. New York, 2003

Result of average student's workload

Activity	Time (working hours)
1. participation in class lectures.	15
2. current preparation for the class lectures.	10
3. preparation for final test.	20
4. consultation.	5

Student's workload

Source of workload	hours	ECTS
Total workload	50	2
Contact hours	20	1
Practical activities	0	0