STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Physics of Dielectric		**1010402211010430037**

Field of study	Profile of study (general academic, practical)	Year /Semester
TECHNICAL PHYSICS	**(brak)**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

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

No. of hours				No. of credits
Lecture: **2**	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%**
Technical sciences	**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	knowledge of electricity and condensed matter physics in terms of learning outcomes / content program implemented at the first level of education at the Technical Physics field of study
2	**Skills**	ability to solve basic problems of electricity on the basis of their knowledge, the ability to obtain information from the indicated sources
3	**Social competencies**	understanding of the need to expand their competences

Assumptions and objectives of the course:

Acquainting students with the theory, basic properties and applications of dielectrics.

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

Knowledge:

1. Can apply physical models to describe and analyze processes in dielectrics, and also know restrictions on the use of these models. - [K_W01, K_W02]

2. Has extensive knowledge of the dielectric characterization and their potential applications, knows the current state of knowledge of the dielectric materials, knows dielectric test methods, including the method of dielectric spectroscopy. - [K_W04, K_W10, K_W13]

Skills:

1. Can choose dielectric materials for their applications in modern electronics and optoelectronics. - [K_U13]

Social competencies:

1. Sees opportunities and ways to continuously update and complement the knowledge of modern technology using dielectric materials - [K_K04]

Assessment methods of study outcomes

Effect of education	Type of evaluation	Evaluation criteria	
W01, W02, W04, W10, W13	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%
U013	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%
K04	written/oral exam	3	
		4	
		5	

Course description

1. Dielectrics in constant electric field.
2. Molecular description of dielectric polarization.
3. Local fields.
4. The phenomena of molecular orientation in dielectrics.
5. Dielectric relaxation and its use.
6. Nonlinear effects in dielectrics.
7. Ferroelectrics, piezoelectrics, pyroelektrics and their application.
8. Preparation, properties and applications of electrets.

Basic bibliography:

1. A. Chełkowski, Fizyka dielektryków, PWN, Warszawa, 1993
2. B. Hilczer, J. Małecki, Elektrety i piezopolimery, PWN, Warszawa, 1992
3. C.J.S. Boettcher, Theory of electric polarization, vol. 1 and 2, Elsevier, Amsterdam, 1978

Additional bibliography:

1. A.R. von Hippel, Dielektryki i fale, PWN, Warszawa, 1963

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in consultations related to the implementation of the training	2
3. Preparing for exam	30
4. Presence at exam	2

Student's workload

Source of workload	hours	ECTS
Total workload	64	2
Contact hours	34	1
Practical activities	30	1