STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Materials Science		**1011101211011003076**
Field of study	Profile of study (general academic, practical)	Year /Semester
Safety Engineering - Full-time studies - First-	**(brak)**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**full-time**	
No. of hours		No. of credits
Lecture: **30** Classes: **-** Laboratory: **15** Project/seminars: **-**		**3**
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 %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has a basic knowledge of chemistry, physics and mathematics.
2	**Skills**	Student has a basic knowledge of chemistry, physics and mathematics. Student can think logically, associates the image with the description.
3	**Social competencies**	Student understands the need to learn and acquisition knowledge, systematic learning.

Assumptions and objectives of the course:

Understanding the relationship between chemical composition, physical properties and material microstructure in combination with heat treatment, thermo-chemical treatment and plastic forming.

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

Knowledge:

1. Student knows the basic engineering materials groups. - [K_W03, K_W16]
2. Student knows the basic mechanical, physical and chemical properties of material. - [K_W08, K_W11, K_W14]

Skills:

1. Student can evaluate the structure and properties of materials on the basis of phase equilibrium diagrams. - [K_U01, K_U03, K_U05, K_U13]
2. Student can propose appropriate heat treatment of ferrous alloys. - [K_U01, K_U05]

Social competencies:

1. Student is aware of the importance of materials properties in economy. - [K_K02]
2. Students can cooperate in a group. - [K_K03]

Assessment methods of study outcomes

Formative assessment:

a. In the range of laboratory, on the basis of oral responses with each exercise.

b. In the range of lectures, on the basis of two tests during the semester.

Collective assessment:

a. In the range of laboratory, average of grades obtained in the exercise.

b. In the range of lectures - oral exam.

Course description

Lecture:

Classification, types of materials and their use. Important properties of materials. Factors influencing the properties of materials. Methods and techniques of materials properties modification. Classification of metals and alloys. Phase equilibrium diagrams of metal alloys. Types, microstructure and properties of phases in metal alloys. Iron alloy - microstructure, properties and their modifications, destiny. Copper alloys. Aluminum alloys. Titanium alloys. Ceramics - types, microstructure, properties and uses. Plastics - types, microstructure, properties and uses. Composites - types of structure and properties. Heat treatment and thermo-chemical treatment. Importance, types and properties of the surface layers.

Laboratory:

1. Structural steels
2. Structure and properties of steel after heat treatment
3. Tool steels
4. Cast iron and cast steel
5. Copper and copper alloys
6. Aluminum alloys
7. Surface layers
8. Engineering ceramics
9. Composites

Basic bibliography:

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in laboratory excercises	15
3. Preparation for laboratory excercises	7
4. Preparation for the exam	15
5. Conducting the exam	2
6. Discussion of exam results	2
7. Elaboration of laboratory reports	7

Student’s workload

Source of workload	hours	ECTS
Total workload	78	3
Contact hours	49	2
Practical activities	15	1