

Course unit title: Structure and properties of engineering materials Struktura i właściwości materiałów inżynierskich			
Field of study: Materials (Glass, paper, plastic and wood)			Course unit code:
Type of course unit: obligatory	Level of study: study-I level	Form of study: stationary studies	Year: I-III Semester: I-VI
Teaching methods: Lecture, Seminar, Laboratory, Project Tutorials		Number of hours/week: 2, 1, 1, 0, 0	Number of ECTS credits: ECTS 6

Course guide

I COURSE CARD

COURSE PURPOSES

- C1. This course introduces students in the materials structures and properties in engineering materials
C2. Students will gain an understanding of structures of materials and utility properties materials

INITIAL REQUIREMENT FOR THE KNOWLEDGE, ABILITIES AND OTHER COMPETENCES

1. Knowledge of the subjects: mathematics, chemistry, and physics
2. Ability to work independently and in a group.
3. Ability to use literature and internet resources.

THE EFFECTS OF EDUCATION

- EK 1 – Student knows the structures of the materials engineering
EK 2 – Student has a working knowledge of structure and properties of materials.
EK 3 – Student knows the essential phases of materials.
EK 4 - Provides practical experience in laboratory methods and reporting.

COURSE CONTENT

Teaching method – LECTURE	
W1,2 - Classification and characteristics of new materials. Crystallography	4h
W 3,4 – Materials science and engineering is concerned with the relationship between the properties and structure of materials.	4h
W 5,6 – Iron-cementite equilibrium diagram. Steel and cast iron structure and properties	4h
W 7 – Heat Treatment of Steel	2h

W 8,9 – Structure and properties of aluminium, copper, titanium and magnesium alloys	4h
W 10,11 – Structure and properties of ceramic materials	4h
W 12 – Structure and properties of polymer materials.	2h
W 13,14 – Structure and properties of composite materials	4h
W 15 – Structure and properties of the materials in modern technologies	2h
Teaching method – Laboratory	
L 1,2 – Steel and cast iron structure and properties	2h
L 3,4 – Heat Treatment of Steel	2h
L 5-8 – Structure and properties of aluminium, copper, titanium and magnesium alloys	4h
L 9,10 – Structure and properties of ceramic materials	2h
L 11 – Structure and properties of polymer materials	1h
L12,13 - Structure and properties of composite materials	2h
L14,15 - Structure and properties of the materials in modern technologies	2h
Teaching method – SEMINAR	
S 1-5 – Microstructure, properties and possibility of materials application.	5h
S 6-10 – Metal alloys for applications in the energy and aeronautics	5h
S 11-15 Mechanical Properties of Engineering Materials	5h

TEACHNING TOOLS

1. – Lecture with the use of audiovisual media
2. – Tutorials –discussion in group supported by a teacher
3. – Laboratory – student examines the structure and properties of the materials

WAYS OF ASSESSMENT (F – FORMING, P – SUMMARY)

F1. – assessment of preparing to tutorials
F2. – assessment of the skills to use the knowledge during tutorials
F3. – assessment of the preparation of topic to practical research during laboratory
F4. – assessment of the student’s active involvement during the course
P1. – assessment of knowledge gained during tutorials
P2. – assessment of the practical skills in materials investigations

STUDENT WORKLOAD

Form of activity	Average number of hours to complete the activity
Contact hours with the teacher	30W 15T 15 lab 60 h
Getting Acquainted with the indicated literature	30 h

Preparing to tutorials		20 h
Preparing to laboratory		40 h
Preparing to pass the course		10 h
Total number of hours	Σ	160 h
TOTAL NUMBER OF ECTS CREDITS FOR THE COURSE		6 ECTS

BASIC AND SUPPLEMENTARY LITERATURE

1. R.W. Cahn, P. Haasen, E.J. Kramer: Materials Science and Technology, VCH, New York, 8,2005..
2. J.R. Davies: „Metallurgy, Processing and Properties of Superalloys”, Heat Resistant Materials, ASM Specialty Handbook, 1997.
3. Biomaterials Science, An Introduction to Materials in Medicine, Edited by B.D. Ratner, A.S. Hoffman, F.J. Schoen, and J.E.L Emons, Academic Press, second edition, 2004 •
4. Handbook of Materials for Medical Devices, Edited by J. R. Davis, ASM international, 2003

LEADING TEACHER (NAME,SURNAME, ADRES E-MAIL)

1. dr hab. inż. Agata Dudek, prof. PCz dudek@wip.pcz.pl
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MATRIX OD REALIZATION OF EFFECTS OF EDUCATION

The effects of education	The reference of the effect to the effects defined for the entire program	Course purposes	Course content	Teaching tools	Ways of assessment
EK1	K_W06, K_W08, K_W10, K_W11	C1, C2	W 1-15, L1-15, T1-15	1-3	F1-F4 P1-P2
EK2	K_W16, K_W18, K_U19	C1,C2	W 1-15, L1-15, T1-15	1-3	P1-P2 F1-F4
EK3	K_U22, K_U23, K_U25	C1, C2	W 1-15, L1-15, T1-15	1-3	F1-F4 P1-P2
EK4	K_W19, K_U03, K_U04, K_U10, K_U18	C1, C2	L1-15	3	P2 F3

II.ASSESSMENT FORM – DETAILS

	For grade 2	For grade 3	For grade 4	For grade 5
EK 1 Student knows the structures of the materials engineering	Student does not know the structures of the materials engineering	Student knows some the structures of the materials engineering	Student knows the structures of the materials engineering	Student knows in detail the structures of the materials engineering
EK 2 Student has a working knowledge of properties of materials	Student does not have a working knowledge of properties of materials	Students will have a basic working knowledge of properties of materials	Students will have a working knowledge of properties of materials	Students will have excellent working knowledge of properties of materials
EK 3 Student knows the essential phases of materials	Student does not know the essential phases of materials	Student knows the basic knows the essential phases of materials	Student knows the essential phases of materials	Student knows the excellent knows the essential phases of materials
EK 4 Student provides practical experience in laboratory methods and reporting	Student is not able to provide practical experience in laboratory methods and reporting	Student provides some practical experience in laboratory methods and reporting	Student provides practical experience in laboratory methods and reporting	Student provides in detail practical experience in laboratory methods and reporting

III. OTHER USEFUL INFORMATION ABOUT THE COURSE (web site WIPiTM PCZ)

1. Information where presentation of classes, instruction, subjects of laboratory can be found, etc.
2. Information about the location of the classes,
3. Information about the date of the course (day of the week/time).
4. Information about the consultation (time + place).