

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Metal Science and Heat Treatment		Code 1010604131010613052
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 10 Classes: - Laboratory: 6 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 4 100%
Responsible for subject / lecturer: dr hab. inż. Leszek Małdziński, prof. nadzw. email: leszek.maldzinski@put.poznan.pl tel. +4861 665-2238 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Corrosion of steel and alloys. Industrial technologies thermo chemical heat treatment of steel. Structural steels, tool and special properties - structural features, properties, applications, among others, to build cars. Steels and alloys for the construction of nuclear power plant - the reactor operating conditions, the criteria for wear, contemporary steel and alloys for the construction of the reactor. Electrical and thermal properties of steel. Issues of selection of metals, steel and alloys in engineering practice.
2	Skills	Conducting some research in the field of metallurgy and heat treatment of metals and alloys execution and interpretation of the results of metallographic
3	Social competencies	The student is aware of the validity of technical activities, understands the need for the development and training
Assumptions and objectives of the course: knowledge of the theoretical and alloy steel corrosion and its prevention. Knowledge of structural steel, tool and special properties - structural features, properties, applications. Knowledge of steel and alloys used to build cars, nuclear reactors, etc.. Getting to know the issues of selection of metals, steel and alloys in engineering practice		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knowledge of the knowledge of corrosion of steel and alloys and its prevention, industrial heat treatment technology of thermo chemical structural steels, tool, with special properties, structural design, properties and application of, inter alia, in industrial practice - [K1A_W09]		
Skills:		
1. The ability to select steels and alloys for the construction of concrete engineering. The student can obtain information from literature and databases, to interpret and justify opinions - [K1A_U03]		
Social competencies:		
1. Consciousness of responsibility for their own work, willingness to comply with the rules of working in a team and take responsibility for collaborative tasks - [K1A_K04]		
Assessment methods of study outcomes		
Written and oral examination; written and oral exam		
Course description		

Theoretical basis of electrochemical and chemical corrosion of steel alloys . Knowledge of the factors determining the type and the rate of corrosion , corrosion protection methods .

Understanding the key technologies of heat and thermo - chemical industrial scale : annealing normalizing , hardening and tempering steel , nitriding and carburizing . Getting Acquainted with modern industrial devices .

Structural steels , tool and special properties , and examples of applications in industrial practice : continuous welding (piping) , constantly toughening (for crankshafts , camshafts , gears, etc. .

Steels nitriding and carburizing on selected parts of machinery and vehicles

Tool steels for cold , hot and high speed : the construction of structural , thermal processing , properties and applications.

Steels with special properties :

heat-resistant and heat resistant steels and valve : structural features , properties and application , among others, to : elements of internal combustion engines , jet engines wentylatorowo

Steels and alloys for the construction of nuclear power plant - the reactor operating conditions , the criteria for wear , contemporary steel and alloys for the construction of the reactor.

Selected physical properties and utility of metals, steel and metal alloy electrical properties , thermal .

Issues of selection of metals , steel and alloys in engineering practice .

among others to build car engines include gear , engines wentylatorowo - jet , drums , gas turbines.

Basic bibliography:

1. S. Rudnik: Metaloznawstwo. PWN, Warszawa, 1996
2. F. Staub; Metaloznawstwo, 1979
3. W. Luty [i in.]: Poradnik inżyniera. Obróbka cieplna stopów żelaza, 1977
4. L. Dobrzański: Metaloznawstwo z podstawami nauki o materiałach. WNT, Warszawa, 1996
5. S. Prowans: Metaloznawstwo. PWN, Warszawa, 1988
6. K. Przybyłowicz: Metaloznawstwo. WNT, Warszawa, 1996
7. L. A. Dobrzański: Metaloznawstwo i obróbka cieplna,
8. L. A. Dobrzański: Podstawy nauki o materiałach i metaloznawstwo, WNT, Gliwice 2002
9. K. Przybyłowicz, J. Przybyłowicz, ?Materiałoznawstwo w pytaniach i odpowiedziach? , Wydawnictwo Naukowo-Techniczne, 2004

Additional bibliography:

1. Michael Ashby i in.: ?Inżynieria materiałowa? tom I i II, Wydawnictwo Galaktyka, 2006
2. Michael Ashby i in.: ?Materiały inżynierskie? tom I i II, WNT, 1996
3. Poradnik Inżyniera: ?Obróbka cieplna metali?, WNT, 1979
4. Mały poradnik mechanika, tom I i II, WNT1999
5. Wilhem Domke: ?Vademecum materiałoznawstwa?, NT, 1997
6. Feliks Wojtking, Jurij Soncew: Materiały specjalnego przeznaczenia, Wydawnictwo Politechniki Radomskiej, 2001

Result of average student's workload

Activity	Time (working hours)	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	45	2
Practical activities	15	1