



COURSE SPECIFICATION

Course code	M#1-S1-ME-107
Course title in Polish	Chemia Techniczna
Course title in English	Technical Chemistry
Valid from (academic year)	2019/2020

GENERAL INFORMATION

Programme of study	MECHANICAL ENGINEERING
Level of qualification	first-cycle
Type of education	academic
Mode of study	full-time
Specialism	all
Department responsible	Department of Mechanics
Course leader	Prof. dr hab. inż. Dariusz Ozimina
Approved by	

COURSE OVERVIEW

Course type	basic
Course status	compulsory
Language of instruction	English
Semester of delivery	semester 1
Pre-requisites	None
Examination required (YES/NO)	NO
ECTS value	2

Mode of instruction	lecture	class	laboratory	project	seminar
No. of hours per semester	15	15			

LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Has a structured knowledge of mathematics necessary to efficiently use numerical methods necessary to solve engineering problems.	MiBM1_W01
	W02	Has knowledge of physics, including mechanics in particular, the knowledge necessary to understand basic physical phenomena.	MiBM1_W02
	W03	Has elementary knowledge of chemistry, including technical chemistry, with particular emphasis on its application in mechanics and machine construction.	MiBM1_W03
Skills	U01	He is able to use knowledge in the field of basic sciences, such as mathematics, physics, chemistry and related to them to solve engineering tasks in various areas of mechanics and construction.	MiBM1_U11
	U02	Can use analytical, numerical and simulation methods to formulate and solve engineering tasks in the field of mechanics and machine construction, can properly interpret and use the results of the experiment.	MiBM1_U12
	U03	The student is able to choose the appropriate engineering materials to ensure the correct operation of machines.	MiBM1_U14
Competence	K01	Understands the need and knows the possibilities of continuous improvement (2nd and 3rd degree studies, post-graduate studies, courses), aimed at improving professional, personal and social competences.	MiBM1_K01
	K02	Is aware of the importance and understands the relationship between engineering and non-technical activities in terms of the effects of environmental impact and responsibility for decisions made.	MiBM1_K02
	K03	Can think and act in an entrepreneurial way, understanding the needs of society and the laws governing the natural environment.	MiBM1_K05

COURSE CONTENT

Type of instruction*	Topics covered
lecture	1. Structure of the atom and the periodic table of chemical elements: an outline of the knowledge of the structure of the atom, quantum numbers, the notation of the electronic structure of the atom, the position of the element in the periodic table, structure of the periodic table of elements.
	2. Interatomic bonds: ionic, atomic, covalent, coordination, metallic, intermolecular bonds.
	3. States of matter. Physicochemical properties of gases, liquids and solids used in technology. Phenomena at the interface - surface tension, surfactants.
	4. Solutions and phenomena occurring in aqueous solutions: electrolytic dissociation, the exponent of hydrogen ions pH, hydration, hydrolysis, Chemical reactions, types of chemical reactions. Scheme of chemical reactions, the energy effect of the reaction, the phase state of reactants and reaction products. Chemical kinetics: rate of chemical reactions, catalysis and catalysts.
	5. Corrosion of metal materials. Types of corrosion: chemical and electro-chemical corrosion; atmospheric corrosion, earth corrosion (in soil), corrosion in water and aqueous solutions (sea); uniform and uneven corrosion.

	6. Corrosion cells. Limiting the effects of corrosion - methods of protection against corrosion basic surface engineering - creating surface layers with anti-corrosion and anti-wear properties.
	7. Chemistry of non-metallic materials.
	8. Ceramics, glasses, basic organic compounds and functional groups, macromolecular compounds, classic and alternative fuels, lubricants, process fluids and consumables.
class	1. Stoichiometric calculations.
	2. Solutions: percentage and molar concentration, mixing, dilution of solutions.
	3. Ionic equilibria in water solutions of electrolytes: electrolytic dissociation, degree of dissociation, ion product of water, exponent of hydrogen ions - pH, hydrolysis and water hardness.
	4. Galvanic cells: electrode potential (half-cells), voltage series of metals, calculation of electromotive force of galvanic cells (EMF).
	5. Electrolysis: laws and reactions of electrolysis.

*) Please delete rows in the table above that are not applicable.

ASSESSMENT METHODS

Outcome code	Methods of assessment <i>(Mark with an X where applicable)</i>					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			x
W02			X			x
W03			X			
U01			X			
U02			X			x
U03			X			x
K01			X			x
K02			X			x
K03			X			x

ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	non-examination assessment	The pass mark is a minimum of 50% for the final in-class test.
class	non-examination assessment	The pass mark is a minimum of 50% for the in-class test and tasks at the blackboard.

*) Please delete rows in the table above that are not applicable.

OVERALL STUDENT WORKLOAD

ECTS weighting							
	Activity type	Student workload					Unit
		L	C	Lab	P	S	
1.	Scheduled contact hours	15	15				h
2.	Other contact hours (office hours, examination)	2	2				h
3.	Total number of contact hours	34					h
4.	Number of ECTS credits for contact hours	1,4					ECTS

5.	Number of independent study hours	16	h
6.	Number of ECTS credits for independent study hours	0,6	ECTS
7.	Number of practical hours	25	h
8.	Number of ECTS credits for practical hours	1	ECTS
9.	Total study time	50	h
10.	ECTS credits for the course <i>1 ECTS credit = 25-30 hours of study time</i>	2	ECTS

READING LIST

1. Ashby M.F., Jones D.R.H., Materiały Inżynierskie, WNT Warszawa 1996
2. Bielański A.: Podstawy Chemii Nieorganicznej. PWN Warszawa 2002
3. Cotton F. A., Wilkinson G., Gaus P. L.: Chemia Nieorganiczna, Podstawy. WNT, 1995
4. Kozłowski Z.; Chemia Ogólna. Warszawa, Wydawnictwa Szkolne Pedagogiczne 1989
5. Ozimina E., Ozimina D.: Materiały do ćwiczeń tablicowych z chemii technicznej, Wyd. PŚk nr 156/2005
6. Patrick G. L.: Chemia Organiczna. PWN Warszawa 2002
7. Sułko K., Ozimina D.: Laboratorium z Chemii Technicznej. Skrypt PŚk, nr 294/1997 i kolejne wydania
8. Wells A. F.: Strukturalna chemia nieorganiczna. WNT, 1993