



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physicochemistry of liquides

### Course

Field of study

Year/Semester

Transport

4/7

Area of study (specialization)

Profile of study

Engineering of Pipeline Transport

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

part-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

9

18

0

Tutorials

Projects/seminars

0

0

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

dr Edyta Janeba-Bartoszewicz

email: edyta.janeba-

bartoszewicz@put.poznan.pl

phone 616652497

Institute of Machines and Motor Vehicles

Piotrowo 3 street, 60-965 Poznan

Responsible for the course/lecturer:

prof. PP dr hab. inż. Jarosław Bartoszewicz

email: jaroslaw.bartoszewicz@put.poznan.pl

Faculty of Environmental Engineering and Energy

phone : 61 6652215

Piotrowo 3 street, 60-965 Poznan

### Prerequisites

The student knows the basics of physics and chemistry and the basics of thermodynamics and fluid mechanics. The student speaks terminology in mechanics, thermodynamics, physics and chemistry. Corrects description of observed phenomena, analysis of received results and drawing conclusions. The student works in an interdisciplinary team. Ability to lead the team and expand team knowledge.

### Course objective

Demonstration of dependencies describing physical and chemical properties of gases.



### Course-related learning outcomes

#### Knowledge

The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems

The student has knowledge of ethical codes regarding transport engineering, is aware of the dangers related to environmental protection and understands the specificity of mission-critical systems

#### Skills

The student is able to obtain information from various sources, including literature and databases (both in Polish and in English), integrate it properly, interpret it and critically evaluate it, draw conclusions, and comprehensively justify his/her opinion.

The student can properly use information and communication techniques, applicable at various stages of the implementation of transport projects

#### Social competences

The student understands that in technology, knowledge and skills very quickly become obsolete

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam. Obtaining credit from a minimum of 51% of the points possible to get. There is a possibility of an oral question to raise the grade.

Laboratories - positive evaluation of reports on exercises performed

### Programme content

Characteristics of the liquid state. Phase equilibria in multicomponent systems. Osmotic phenomena in two-component systems. Liquid viscosity, pressure and temperature dependence. Osmosis, dialysis. Donnan diaphragm equilibrium. Diffusion. Kinetics and mechanism of phase transitions.

### Teaching methods

Informative lecture (conventional) (information transfer in a systematic way)

### Bibliography

#### Basic

1. H. Buchowski, W. Ufnalski: Fyzykochemia gazów i cieczy, Wydawnictwa Naukowo -Techniczne, Warszawa 2012
2. H. Buchowski, W.Ufnalski: Roztwory, Wydawnictwa Naukowo -Techniczne, Warszawa 1995
3. J. Szargut: Termodynamika techniczna, PWN 1991

#### Additional

1. K. Pigoń, Z. Ruziewicz: Chemia fizyczna, PWN 2012



### Breakdown of average student's workload

	Hours	ECTS
Total workload	72	4,0
Classes requiring direct contact with the teacher	27	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	45	2,0

<sup>1</sup> delete or add other activities as appropriate