

**Name:** Physicochemistry of interfaces (C-PS.II1-PhysCH)

**Name in Polish:**

**Name in English:** Physicochemistry of interfaces

**Information on course:**

**Course offered by department:** Faculty of Chemistry

**Course for department:** Faculty of Chemistry

**Default type of course examination report:**

Examination

**Language:**

English

**Course homepage:**

<http://www.katedrachf.umcs.lublin.pl>

**Description:**

The module covers the knowledge in the area of phenomena occurring at different interfaces, their understanding and importance in everyday life and industrial processes, and possibility of practical applications of got knowledge.

Lecture:

Characteristics of interfacial phenomena and their importance.

Intermolecular interactions and their role in the interfacial phenomena.

Physicochemical characterization of liquid and solid surfaces.

Adsorption on surface of liquid solutions.

Films of amphiphilic substances on solid and liquid surfaces.

Adsorption on solid/gas Interface.

Adsorption on solid/solution Interface.

Colloidal systems and their stability.

Laboratory:

Surface tension and the methods for its determination, parachor, the Traube's rule.

Adsorption: at liquid/gas interface - the Gibbs adsorption isotherm; at solid/liquid interface - Freundlich adsorption isotherm, Langmuir adsorption isotherm, isoplane

Surface tension of liquids and solutions: verification of Traube's rule, Szyszkowski equation, parachor, determination of critical micellization concentration.

Colloids. Electrical phenomena at the interfaces: isoelectric point (iep) and point of zero charge (pzc). Preparation and properties of liposomes.

**Bibliography:**

1. A. W. Adamson, Physical Chemistry of Surfaces, 5th edition, Interscience Publication, New York, 1990.
2. J. Ościk, Adsorption, Polish Scientific Publisher, Warszawa 1982.
3. P.W. Atkins, Physical Chemistry, Fourth Edition, Oxford University Press, 1992.
4. C.J. van Oss, Acid-base interfacial interactions in aqueous media, Colloids and Surfaces A: 78, 1-49 (1993).

**Learning outcomes:**

**KNOWLEDGE**

W1. Has got extended knowledge about interfacial phenomena occurring on various interfaces, including specialized knowledge and conceptions dealing with the adsorption process; K\_W10

W2. Knows intermolecular interactions taking place at interfaces: liquid-gas (liquid), solid-gas(liquid) and thermodynamic functions describing interfacial properties; K\_W11.

W3. Knows fundamental concepts describing physicochemistry of colloidal systems; K\_W12.

W4. Has got knowledge about surfactants structure, properties of amphiphile substance layers, at interfacial areas and their applications; K\_W13.

W5. Knows rules of job safety and sanitation on the level allowing for individual planning and conduction of experiments occurring on different interfaces; K\_W17.

**SKILLS**

U1. He/she is capable to define and describe interfacial processes and apply thermodynamic functions to interpret phenomena occurring at the border of different phases; K\_U07.

U2. Knows how to classify colloidal systems, knows methods of their preparation, and is able to present their characteristics and properties; K\_U08.

U3. Can present and analyze parameters characterizing surfactants at interface and in bulk solution; K\_U09.

U4. Has got skill to interpret the obtained results within the frame of classes, evaluate errors, put forward conclusions and prepare reports describing the achieved results; K\_U24.

**ATTITUDES**

- K1. He/she is conscious about need to his/her own progress and need of continuous improvement, understand need to study by him/herself and can do it individually and in a group; K\_K01.
- K2. Is able to cooperate and work in the group accepting different role of acting and understand need of joint work in scientific researches of modern chemistry; K\_K02.
- K.3. Can evaluate correlation of acquired knowledge he/she got in the frame of specialistic subjects with those acquired from basic subjects; K\_U23.
- K.4. Understand and appreciate importance of ethical behavior connected with the executed profession of chemist; K\_K04.

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Contact hours (work with an academic teacher)

Lectures 30 h

Laboratory 30 h

Total number of hours with an academic teacher 60h

Number of ECTS points with an academic teacher 2

Non-contact hours (students' own work)

Preparation for laboratory 15 h

Literature study 10 h

Reports preparation of the laboratory experiments done 30 h

Preparation to obtain credit and obtaining credit of lab's experiments 10 h

Study to pass the exam 25 h

Total number of non-contact hours 90h

Number of ECTS points for non-contact hours 3

Total number of ECTS points for the module 5

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Written exam - W1, W2, W3, W4, W5, K3, K4, U1, U2, U3

Oral questioning - W1, W2, W3, W4, W5, K3, K4, U1, U2, U3

Intersemester tests- W1, W2, W3, W4, W5, K1, K4, U1, U2, U3

Final test - W1, W2, W3, W4, W5, K2, K4, U1, U2, U3

**Requirements**

Knowledge of fundamentals of General Chemistry, Inorganic Chemistry, Physical Chemistry Analytical Chemistry and Crystallography.

**Course credits in various terms:**

**<without a specific program>**

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	5	15/16	