RTU Course "Physical Chemistry (basic course)"

14821 Ķīmijas katedra

General data

Code	ĶNF285
Course title	Physical Chemistry (basic course)
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Academic
Field of study	Chemistry and Chemical Technology
Responsible instructor	Svetlana Čornaja
Volume of the course: parts and credits points	1 part, 6.0 Credit Points, 9.0 ECTS credits
Language of instruction	LV, RU
Possibility of distance learning	Not planned
Abstract	Chemical thermodynamics. The first law of thermodynamics. Reversible processes. Work of expansion of an ideal gas. Entropy. The third law of thermodynamics. Thermodynamic potentials. Nernst's heat theorem. Chemical equilibrium. Phase equilibria.Equilibrium between phases. The Clausius-Clapeyron eguation. Raoult's law. Dalton law of partial pressure. Azeotropes. Phase diagrams of thermodynamics systems. Cryoscopy. Ebulioscopy. Thermal analysis. Physicochemical analysis. Three-component systems.
Goals and objectives of the course in terms of competences and skills	Provide deeper and more specific knowledge on laws of thermodynamics and their application in chemical processes. Students have a deep knowledge on thermodynamic processes and their application in chemistry. Produce the students' ability, by applying laws of thermodynamics, to predict feasibility and outcome of a chemical reaction; ability to carry out calculations of thermodynamics for chemical processes. Shape understanding of significance of physical chemistry in chemical and technological processes.
Structure and tasks of independent studies	Work with study and reference literature. Calculation of home work on separate topics (first law of thermodynamics, second law of thermodynamics, chemical equilibrium, equilibrium between phases). Independent theoretical preparation for laboratory works and filling out work protocols. Examination-tests and preparation for colloquiums on sections of the specified subject.
Recommended literature	1. Silbey, R.J., Alberty, R.A., Bawendi, M.G. Physical Chemistry. 4th ed. New York: John Wiley and Sons, Inc., 2005, 944 p. 2. Engel, T., Reid, Ph. Physical Chemistry. San Francisko: Pearson Education, Inc., 2006. 1061 p. 3. Atkins, P.W. Physical Chemistry. 3rd ed. New York: W.H.Freeman and Company, 1986. 857 p. 4. Laidler, K.J., Meiser, J.H. Physical Chemistry. 3rd ed. Boston – New York: Houghton Mifflin Company, 1999. 1019 p. 5. Maron, S.H., Lando, J.B. Fundamentals of Physical Chemistry. New York: Macmillan Publishing Co. Inc., London: Collier Macmillan Publishers, 1974, 853 p. 6. Castellan, G.W. Physical Chemistry. 2nd ed. Addison – Wesley Publishing Company, Inc., 1971. 866 p. 7. Стромберг, А.Г., Семченко, Д. П. Физическая химия. 2ое изд. Москва: Высшая школа, 1988, 496 с. 8. Balodis, J. Praktiskie darbi fizikālajā ķīmijā. 1 daļa. Rīga: Zvaigzne, 1975.
Course prerequisites	Mathematics, Physics, Inorganic and Organic chemistry

Course outline

Theme	Hours
Physicals chemistry classification, methods of studies	2
Laws of thermodynamics	10
Thermodynamic potentials	4
Chemical equilibrium. Chemical thermodynamics	8
Equilibrium between phases	24
Practical works	16
Laboratory works	32

Learning outcomes and assessment

Learning outcomes	Assessment methods
Ability to demonstrate knowledge and understanding of thermodynamic regularities, applying grasped theoretical fundamentals and skills for practical calculations and laboratory works	Home works and their formatting. Development, draw up and defense of laboratory works. Colloquiums – examination on the studied material. Tests. Final exam.
Ability to assess feasibility of chemical processes, applying theoretical knowledge	Home works and their formatting. Colloquiums – examination on the studied material. Tests. Final exam.

Ability to analyze the acquired results of practical and laboratory works, and draw up the summary	Home works and their formatting. Development, draw up and defense of laboratory works.
Ability to provide the most rational method of calculation, solving a specific problem in the field of reversible chemical processes	Tests.
Ability to make a critical comparison between results of experiments and published literature data	Development, draw up and defense of laboratory works.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	6.0	9.0	3.0	1.0	2.0		*	