



**KAPITAŁ LUDZKI**  
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez  
Unię Europejską w ramach  
Europejskiego Funduszu  
Społecznego

**UNIA EUROPEJSKA**  
EUROPEJSKI  
FUNDUSZ SPOŁECZNY



<b>Course title</b>		<b>ECTS code</b>	
Introduction to chemical kinetics		13.3.1207	
<b>Name of unit administrating study</b>			
null			
<b>Studies</b>			
<b>faculty</b>	<b>field of study</b>	<b>type</b>	first tier studies (BA)
Faculty of Chemistry	Chemical Business	<b>form</b>	full-time
		<b>specialty</b>	all
		<b>specialization</b>	all
Faculty of Chemistry	Chemistry	<b>type</b>	first tier studies (BA)
		<b>form</b>	full-time
		<b>specialty</b>	all
Faculty of Chemistry	Environmental Protection	<b>specialization</b>	all
		<b>type</b>	first tier studies (BA)
		<b>form</b>	full-time
Faculty of Chemistry	Environmental Protection	<b>specialty</b>	all
		<b>specialization</b>	all
		<b>specialization</b>	all
<b>Teaching staff</b>			
dr hab. Dagmara Jacewicz, profesor uczelni; dr Joanna Drzeżdżon			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>Forms of classes</b>		2	
Auditorium classes, Laboratory classes, Lecture		classes - 15 h	
<b>The realization of activities</b>		tutorial classes - 15 h	
lectures in the classroom		student's own work - 20 h	
<b>Number of hours</b>		TOTAL: 50 h - 2 ECTS	
Laboratory classes: 7 hours, Auditorium classes: 4 hours, Lecture: 4 hours			
<b>The academic cycle</b>			
2023/2024 summer semester			
<b>Type of course</b>		<b>Language of instruction</b>	
an elective course		english	
<b>Teaching methods</b>		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
<ul style="list-style-type: none"> <li>- During the auditorium classes students will learn about the different aspects of chemical kinetics and solve different exercises faced by the teacher (on the board and individually in the notebooks).</li> <li>- Lecture with the use of the multimedia presentation on the basic issues of chemical kinetics</li> <li>- Practical laboratory work - chemical experiments, analysis of obtained results and discussion.</li> </ul>		<b>Final evaluation</b>	
		Graded credit	
		<b>Assessment methods</b>	
		short test and report from laboratory work	
		<b>The basic criteria for evaluation</b>	
		Lecture, Auditorium classes, Laboratory classes: positive note from an short test with 3-6 open questions:	
		91-100% 5.0	
		81-90% 4.5	
		71-80% 4.0	
		61-70% 3.5	
		51-60% 3.0	
		< 51% 2.0	
		a. passing short test covering the material of the Lecture, Auditorium classes, Laboratory classes	
		b. assessment criteria in accordance with the University of Gdańsk Study Regulations	

### Method of verifying required learning outcomes

#### Chemistry:

Written short tests in the field of chemical kinetics. During the lecture and laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics. (K\_W02, K\_W08) and enumerates and describes the aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemical kinetics (K\_W10). Assessment of the student's independent conduct of chemical experiments. Assessment of the Student's explanation of the course of chemical experiments, assessment of the correctness of the analysis of results, drawing conclusions from the conducted experiments and preparation of reports. (K\_U01, K\_U08, K\_U09) Method of verifying the acquisition of social competences: Assessment of the Student's ability to solve scientific and research problems on the basis of work The student identifies the level of their knowledge and skills as well as the need for updating knowledge, continuous professional training and personal development. (K\_K06)

#### Environmental Protection:

Written short tests in the field of chemical kinetics. During the lecture and laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics. (K\_OŚI\_W01) The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on the issues related to this subject. Assessment of the student's independent conduct of chemical experiments. Assessment of the Student's explanation of the course of chemical experiments, assessment of the correctness of the analysis of the results, drawing conclusions from the experiments and preparation of reports. The student correctly assesses the usefulness and functioning of the existing engineering and technical solutions as well as research and measurement methods in the chemical industry. (K\_OŚI\_U04; K\_OŚI\_U09) The method of verifying the acquisition of social competences: Assessment of the student's ability to solve scientific and research problems on the basis of individual and team work. (K\_OŚI\_K05; K\_OŚI\_K08)

#### Business Chemistry:

The method of verifying the acquisition of knowledge: Written short tests in the field of chemical kinetics. During the lecture and laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics (K\_BCh\_W01, K\_BCh\_W03). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on the issues related to this subject. Assessment of independent conducting of chemical experiments by the student. Assessment of the Student's explanation of the course of chemical experiments, assessment of the correctness of the analysis of the results, drawing conclusions from the experiments and preparation of reports (K\_BCh\_U08).

### Required courses and introductory requirements

#### A. Formal requirements

lack

#### B. Prerequisites

lack

### Aims of education

- familiarize students with the main aspects of chemical kinetics
- familiarize students with the Determining the rate law of a reaction
- presenting the basis of chemical kinetics calculations
- familiarize students with the factors influencing the reaction rate

### Course contents

Introduction to Chemical Kinetics, the rate of reaction, stoichiometry and order, zero order reactions, first order reactions, second order reactions, determination of reaction order, and effect of factors on the rate of chemical reactions. Practical chemical kinetics in solution. The material that will be covered in this subject is intended to provide you with the tools and understanding to handle basic problems involving chemical systems of simple chemical reactions. Exercises (4 h). Methods of Determining Reaction Order (Zeroth-Order Reactions, First-Order Reactions, Second-Order Reactions. Determining the rate law of a reaction. Laboratory (7 h). The effect of the concentration and temperature on reaction rate in simple chemical reactions occurring in aqueous solutions.

### Bibliography of literature

- Literature required to pass the course
1. Wright Margaret Robson, Introduction to Chemical Kinetics, John Wiley and Sons Ltd
  2. Soustelle Michel, An Introduction to Chemical Kinetics, John Wiley and Sons Ltd
  3. Marin, Guy B., Kinetics of Chemical Reactions, Wiley-VCH GmbH
- Extracurricular readings
1. Turányi, Tamás, Analysis of Kinetic Reaction Mechanisms, Springer-Verlag GmbH

### The learning outcomes (for the field of study and specialization)

Chemical Business:  
K\_BCh\_W01  
describes in an advanced level the relationship between the economy and the functioning of the chemical industry

### Knowledge

Students: know formulate definition of reaction rate and know examples of chemical reactions that occur at different rates, identify variables used to monitor reaction rates (i.e change per unit of time,  $Dx/Dt$ ). Examples: pressure, temperature, pH., know the definitions: zero order reactions, first order reactions, second order

<p>K_BCh_W03 describes in an advanced level the techniques of higher mathematics and IT tools necessary to describe and model chemical phenomena and technological processes</p> <p>K_BCh_U08 uses the chemical nomenclature and engineering terminology properly</p> <p>Chemistry: K_W02 describes in an advanced level the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis</p> <p>K_W08 demonstrates knowledge of computational methods to solve problems in chemistry, physics, mathematics</p> <p>K_W10 enumerates and describes the aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences</p> <p>K_U01 identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge</p> <p>K_U08 presents in an understandable way the facts about chemistry using a scientific language typical of chemical sciences</p> <p>K_U09 is able to learn independently</p> <p>K_K06 raises her/his professional and personal competences by using information provided in various sources</p> <p>Environmental Protection: K_OŚI_W01 describes in an advanced level physical, chemical and biological phenomena occurring in nature as well as geological, geomorphological and climatic conditions of the functioning of nature</p> <p>K_OŚI_U04 uses specialist language in the discussion and properly uses the nomenclature in the field of environmental protection and individual disciplines related to it</p> <p>K_OŚI_U09 prepares in Polish/English a short description of research, observation or problem task carried out during classes using appropriate scientific terminology</p> <p>K_OŚI_K05 identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development</p> <p>K_OŚI_K08 is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work</p>	<p>reactions, are able to determine the sequence of reactions and are able to assess the influence of factors on the rate of chemical reactions, know main techniques of calculations in chemical kinetics.</p> <p><b>Skills</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>- explain how a change in concentration, change in temperature, change in pH or a change in pressure influences the rate of a reaction.</li> <li>- to determine the order of reaction</li> <li>- determine the value of the rate constant</li> <li>- fitting the reaction model to the experimental values.</li> </ul> <p><b>Social competence</b></p> <ul style="list-style-type: none"> <li>- is active in extending knowledge and understands the need for continuous education</li> <li>- undertakes to work with a new topic or technique</li> <li>- engages in scientific discussions</li> <li>- understands the need to read scientific and popular science journals in order to expand and deepen knowledge</li> <li>- understands the need for lifelong learning, recognizing self-education as a standard and condition for success on the labor market and achieving professional success</li> </ul>
<p><b>Contact</b></p>	

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