

## KARTA PRZEDMIOTU

Nazwa przedmiotu: Organic physical chemistry (WTCCXCSM-OPCh)

Nazwa w języku polskim:

Nazwa w jęz. angielskim: Organic physical chemistry

### Dane dotyczące przedmiotu:

Jednostka oferująca przedmiot: Wydział Nowych Technologii i Chemii

Przedmiot dla jednostki: Wydział Nowych Technologii i Chemii

Cykl dydaktyczny: Semestr letni 2024/2025

Koordynator przedmiotu cyklu: dr hab. inż. Michał Czerwiński

### Domyślny typ protokołu dla przedmiotu:

Zaliczenie na ocenę

### Język wykładowy:

angielski

### Strona WWW:

<http://www.wtc.wat.edu.pl>

### Skrócony opis:

The extended knowledge on organic physical chemistry will be presented during the lectures. Some of the lectures will be extended by the auditorium exercises in order to accomplish all requirements to pass the exam.

### Opis:

The physical underpinnings of modern organic chemistry. The energy and entropy changes that take place during a chemical reaction. The thermodynamic stabilities of the starting materials, reactive intermediates, transition states, and products of chemical reactions. Non-covalent aspects of solvation and molecular interactions that influence chemical reactivity. The experimental tools of physical chemistry to the study of the structure of organic molecules. Classical and statistical thermodynamic calculations, quantum mechanical theory in organic chemistry. Computational chemistry to study both the rates of organic reactions and the relative chemical stability of the starting materials, transition states, and products. How changes in structure in solution or solid-state contexts impact reaction mechanism and rate for organic reactions.

### Literatura:

Basic:

1. Peter Atkins & Julio de Paula, "Physical chemistry," 8th Edn., New York, NY, USA: Macmillan, 2006

2. Eric V. Anslyn & Dennis A. Dougherty, "Modern Physical Organic Chemistry", Sausalito, Calif.: University Science Books, 2006

3. L. K. Doraiswamy, "Estimation of properties of organic compounds (Ch. 3)," pp. 36–51, 118-124 (refs.), in Organic Synthesis Engineering, Oxford, Oxon, ENG: Oxford University Press, 2005

Additional:

1. Michael B. Smith & Jerry March, "March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure," 6th Ed., New York, NY, USA: Wiley & Sons, 2007

### Efekty uczenia się:

Symbol and No. of the subject outcome / learning outcome / reference to the field outcome:

W1 To know how fundamental thermodynamic functions change during a chemical reaction K\_W02

W2 To know the relation between value of thermodynamic functions and stability of phases, mixtures and organic compounds K\_W02, K\_W03

W3 To know how intensive and extensive thermodynamic parameters influence the equilibrium constant and the reaction rate of organic reactions K\_W02, K\_W03

W4 To know the basic experimental and theoretical tools to study the structure of organic compounds and their chemical reactivity. K\_W03, K\_W05

U1 Is able using gathered knowledge to propose methods of study physicochemical properties of organic compounds. K\_U03 K\_U04

U2 Is able to predict and analyse main physicochemical parameters which influence on the stability of organic compounds, the equilibrium constant and the reaction rate. K\_U04

U3 Is able to find correlation between chemical structure of organic compounds and their reactivity and stability. K\_U04

K1 Is aware of the level of own knowledge and is able to self-containedly correct the directions of the self-education. K\_K03

K2 Is aware of the importance of the physical chemistry in science and current society. K\_K03

### Metody i kryteria oceniania:

The subject is credited based on an assessment and passing the auditorium exercises.

The assessment is conducted in a written form, which is scored with points. The student receives a 3.0 mark for getting 60%, a 3.5 mark for getting 70%, a 4.0 mark for getting 75%, a 4.5 mark for getting 80%, and a 5.0 mark for getting more than 85% of the maximum number of points.

The condition for admission to the assessment is passing the auditorium exercises.

Necessary condition to obtain credit: passing the test in problem-solving skills. The student receives a mark of 3.0 for the correct solution of three, a mark of 4.0 for the right solution of four and a mark of 5.0 for the correct answer of five tasks.

### Praktyki zawodowe:

Not applicable

### Forma studiów

stacjonarne

### Rodzaj studiów

II stopnia

### Rodzaj przedmiotu

wybieralny

<b>Przedmioty wprowadzające</b>
<p>Basic general chemistry course Initial requirements: the knowledge of principles of chemistry, basic correlations of chemical structure with its physicochemical properties</p> <p>Basic physics course Initial requirements: basic knowledge of principles of optics and electromagnetism and electrical properties of materials</p> <p>Basic organic chemistry course Initial requirements: basic knowledge related to first (BSc or equivalent) level of organic chemistry</p> <p>Basic physical chemistry course Initial requirements: basic knowledge related to first (BSc or equivalent) level of physical chemistry, basic knowledge of quantum chemistry and classical thermodynamics</p>
<b>Programy</b>
Field of study: chemistry
<b>Forma zajęć liczba godzin/rygor</b>
<p>Lectures: 16h/Graded pass (+) Exercises: 14h/ Graded pass (+)</p>
<b>Autor</b>
dr hab. inż. Michał Czerwiński, prof. WAT
<b>Bilans ECTS</b>
<p>No./Activity/ Student workload in hours:</p> <p>1 Participation in lectures 16</p> <p>2 Independent study of lecture topics 14</p> <p>3 Participation in the exercises 14</p> <p>4 Individual preparation for the exercises 16</p> <p>Hours/ECTS:</p> <p>Total student workload 60 2</p> <p>Teacher classes: 30 1</p> <p>Activities related to scientific activities: 60 2</p>
<b>Dane dotyczące przedmiotu cyklu:</b>
<b>Domyślny typ protokołu dla przedmiotu cyklu:</b>
Zaliczenie na ocenę