

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Surface Phenomena and Industrial Catalysis</b>		Code <b>1010702211010700639</b>
Field of study <b>Chemical Technology</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Industrial Electrochemistry</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b> prof. dr hab. Elżbieta Frąckowiak email: elzbieta.frackowiak@put.poznan.pl tel. 61 6653655 Wydział Technologii Chemicznej ul. Berdychowo 4 60-965 Poznań		<b>Responsible for subject / lecturer:</b> prof. dr hab. inż. Krystyna Prochaska email: krystyna.prochaska@put.poznan.pl tel. 616653601 Wydział Technologii Chemicznej ul. Berdychowo 4 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	A preliminary knowledge in surface and supramolecular chemistry is required; student should be familiar with nomenclature of interfacial processes (adsorption, absorption, etc.)
2	<b>Skills</b>	Student should be communicative in English and should be able to study proposed literature with understanding.
3	<b>Social competencies</b>	Student should realize the need of knowledge improvement.
<b>Assumptions and objectives of the course:</b> The course aims to provide knowledge of preparation, characterization and relevant applications of heterogeneous and homogenous catalysts and enzymes, the development of skills to select proper catalysts for specific processes and methodology of efficiency evaluation of catalysts. Moreover, students will become familiar with interpretation of experimental research results.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student should be familiar with backgrounds of physical chemistry - [K_W02 ,K-W07]		
2. Student should be familiar with backgrounds of material chemistry - [K_W02 ,K-W07]		
3. Student should be familiar with backgrounds of chemical engineering - [K_W02 ,K-W07]		
<b>Skills:</b>		
1. Student should be familiar with chemical vocabulary in English - [-]		
<b>Social competencies:</b>		
1. Student understands the need for further education and improving the personal competences - [K_K01]		
2. Student can cooperate and work in a group, taking different roles - [K_K02]		
<b>Assessment methods of study outcomes</b>		
Examination tests after lecture.		
<b>Course description</b>		

Description and explanation of fundamental properties of various solids applied as heterogeneous catalysts. The focus is on interaction between reagent molecules and active centres of catalysts. Students will be introduced to modern spectroscopic techniques applied in characterization of structure and texture of the catalysts, their active centres, adsorbed molecules and interactions between them. Information on preparation of the catalysts and their applications in industry and environmental protection will be included.

**Basic bibliography:**

1. M. Ziótek, I. Nowak, Kataliza heterogeniczna wybrane zagadnienia, Wydawnictwo Naukowe UAM, Poznań 1999.
2. B. Grzybowska ?Świerkosz, Elementy katalizy heterogenicznej, Wydawnictwo Naukowe PWN 1993.
3. F. Pruchnik, Kataliza homogeniczna, Wydawnictwo Naukowe PWN 1993.
4. Z. Sarbak, Kataliza w ochronie Środowiska, Wydawnictwo Naukowe UAM, Poznań 2004
5. E. T. Dutkiewicz, Fizykochemia powierzchni, WNT Warszawa 1998.
6. B. Roop Chand, G. Meenakshi, Adsorpcja na węglu aktywnym, WNT Warszawa 2009
7. W. Turek, Z. Uziel, Wykłady i zadania obliczeniowe z kinetyki chemicznej i adsorpcji z elementami katalizy, Wydawnictwo Politechniki Śląskiej 2010
8. M. Ziótek, I. Nowak, Kataliza heterogeniczna wybrane zagadnienia, Wydawnictwo Naukowe UAM, Poznań 1999.
9. B. Grzybowska ?Świerkosz, Elementy katalizy heterogenicznej, Wydawnictwo Naukowe PWN 1993.
10. F. Pruchnik, Kataliza homogeniczna, Wydawnictwo Naukowe PWN 1993.
11. Z. Sarbak, Kataliza w ochronie Środowiska, Wydawnictwo Naukowe UAM, Poznań 2004
12. E. T. Dutkiewicz, Fizykochemia powierzchni, WNT Warszawa 1998.
13. B. Roop Chand, G. Meenakshi, Adsorpcja na węglu aktywnym, WNT Warszawa 2009
14. W. Turek, Z. Uziel, Wykłady i zadania obliczeniowe z kinetyki chemicznej i adsorpcji z elementami katalizy, Wydawnictwo Politechniki Śląskiej 2010

**Additional bibliography:**

1. P.W. Atkins, Chemia fizyczna, Wyd. Nauk. PWN, Warszawa 2003.
2. Handbook of surfaces and interfaces of materials, Vol. I Surface and interface phenomena, ed. Hari Singh Nalva, San Diego, Academic Press 2001.
3. A. Chmiek, Biotechnologia: podstawy mikrobiologiczne i biochemiczne, Wydawnictwo Naukowe PWN 1998.
4. A. Burghardt, G. Bartelmus, Inżynieria reaktorów chemicznych, T. 1: Reaktory dla układów homogenicznych, T. 2.: Reaktory dla układów heterogenicznych, Wydawnictwo Naukowe PWN 2001
5. P.W. Atkins, Chemia fizyczna, Wyd. Nauk. PWN, Warszawa 2003.
6. Handbook of surfaces and interfaces of materials, Vol. I Surface and interface phenomena, ed. Hari Singh Nalva, San Diego, Academic Press 2001.
7. A. Chmiek, Biotechnologia: podstawy mikrobiologiczne i biochemiczne, Wydawnictwo Naukowe PWN 1998.
8. A. Burghardt, G. Bartelmus, Inżynieria reaktorów chemicznych, T. 1: Reaktory dla układów homogenicznych, T. 2.: Reaktory dla układów heterogenicznych, Wydawnictwo Naukowe PWN 2001

**Result of average student's workload**

Activity	Time (working hours)
1. Lecture	30
2. Consultations to lecture	20
3. Self-education in the field	20
4. Solving a selected problem	10
5. Consultations to solving problem	10
6. Exam	2

**Student's workload**

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	60	0
Practical activities	0	0