



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Engineering of porous materials and media

### Course

Field of study

Chemical and process engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

5

### Lecturers

Responsible for the course/lecturer:

Dominik Mierzwa, Ph.D.

Faculty of Chemical Technology

Institute of Chemical Technology and

Engineering

ul. Berdychowo 4, 61-131 Poznań

E-mail: dominik.mierzwa@put.poznan.pl

Phone No.: 61-665-3969

Responsible for the course/lecturer:

Kinga Rajewska, Ph.D.

Faculty of Chemical Technology

Institute of Chemical Technology and

Engineering

ul. Berdychowo 4, 61-131 Poznań

E-mail: kinga.rajewska@put.poznan.pl

Phone No.: 61-665-3698

### Prerequisites

The student who starts the subject: has a basic knowledge of mathematics, physics, and chemistry acquired in the first-cycle studies, enabling understanding and interpretation of physical phenomena in capillary and porous materials; can acquire and supplement information about chemistry, physics, and mathematics from academic textbooks and other books; has the ability to self-education, can work individually and in a team, plan and carry out experiments, interpret the results obtained and draw conclusions; understands the need for continuous training and setting ambitious goals on the way to achieve higher education; is aware of the responsibility for the tasks carried out teamwork.



### Course objective

Introduction of the essential knowledge in the field of examining, description of the structure and properties of porous materials, presentation of the functional features, actual state of art and the possibilities of application of porous materials in practice.

### Course-related learning outcomes

#### Knowledge

1. Has knowledge of physics and chemistry to the extent that allows understanding and description of phenomena and processes occurring in porous materials. (K\_W02)
2. Knows the basics of control and measurement systems and equipment used in the study of porous materials. (K\_W07)
3. Knows the laws of kinetics, thermodynamics, and catalysis of chemical processes in capillary-porous materials. (K\_W10)

#### Skills

1. Can choose the right way to solve simple engineering tasks/problems related to chemical and process engineering in porous materials and media. (K\_U18)
2. Can choose the right equipment to solve simple engineering tasks/problems related to chemical and process engineering in porous materials and media. (K\_U19)

#### Social competences

1. Understands the need to train and improve your professional and personal competences. (K\_K01)
2. Is aware of the importance of behavior in a professional manner and adherence to the principles of professional ethics. (K\_K03)

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The grade for the lectures is determined on the basis of the final test result, consisting of at least 40 questions of various types (single / multiple choice, supplement, calculation, marking on a drawing / diagram, simple accounting task, etc.), assessed according to the scale: 51 % -60% (3.0), 61% -70% (3.5); 71% -80% (4.0), 81% -90% (4.5), 91% -100% (5.0). The test will be carried out stationary or remotely via the Ekursy platform.

Completion of the laboratory on the basis of an oral and written control of the student's knowledge prior to the commencement of laboratory classes, carried out in the full-time or on-line mode, depending on the method of conducting the classes. Written reports on the exercises performed.

### Programme content

The scope of the subject covers the following issues: description of the structure of porous materials, the division of porous materials and the method of their modeling, methods of structure examination,



modeling of natural saturation processes using capillary phenomenon and technological saturation in the presence of surfactants, sorption and desorption isotherms, saturation including diffusion of the closed gases, issues of extraction of substances from porous materials, diffusion of substances, issues of heat and mass exchange in porous materials in terms of drying processes, capillarity measurement, determination of thermal conduction coefficients depending on the condition of material moisture, filtration issue.

### Teaching methods

1. Lecture: multimedia presentation supported by examples presented on the board.
2. Laboratory: discussion in the laboratory group and execution of the exercises provided for in the laboratory program - practical exercises.

### Bibliography

#### Basic

1. Inżynieria materiałów porowatych wyd. 1. Kowalski S.J., Wydawnictwo Politechniki Poznańskiej, Poznań, 2004
2. Inżynieria materiałów porowatych, wyd.1. Banaszak J., Wydawnictwo Politechniki Poznańskiej, Poznań, 2005

#### Additional

1. Handbook of porous media, wyd. 3. Kambiz V. (ed.), CRC Press, Boca Raton (FL, USA), 2015.
2. Ruch masy w ciałach porowatych, Aksielrud G.A., Altszuler M.A., WNT, Warszawa, 1987.
3. The physics of flow through porous media, Scheidegger A.E., University of Toronto Press, Toronto, 1957.
4. Własności mechaniczne materii, Cottrell A.H., PWN, Warszawa , 1970.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	50	2,0

<sup>1</sup> delete or add other activities as appropriate