COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of Chemical and Process Engineering

Course

Field of study

Environmental Protection Technologies

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

II/4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Tutorials

0

Laboratory classes

45

Projects/seminars

0

Other (e.g. online)

0

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

dr inż. Kinga Rajewska

email: kinga.rajewska@put.poznan.pl

Faculty of Chemical Technology

Responsible for the course/lecturer:

Prerequisites

The student has a basic knowledge of mathematics, physics and chemistry obtained during classes at the first grade of study, enabling understanding of physical and chemical phenomena in the field of heat and mass exchange and their mathematical description. Is able to acquire and supplement information on 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 results and draw conclusions, can apply the principles of health and safety related to work. Understands the need for continuous training and setting ambitious goals on the way to achieve higher education, is aware of the responsibility for tasks carried out in team work.

Course objective

Obtaining knowledge in the field of modeling and designing flow and heat processes and apparatus for the implementation of processes in the field of chemical and process engineering in the laboratory scale and the ability to transfer results to the scale of the prototype on a real scale.

Course-related learning outcomes

Knowledge

1. Has broadened and deep knowledge in the field of mathematics necessary for modeling, planning, optimization and characterization of chemical processes as well as planning experiments and elaborating experimental results - K_W01.

2. Has extended knowledge in the field of physics allowing to understand the physical processes related to chemical engineering - K_W02.

3. Has knowledge in the field of complex chemical processes, including the appropriate selection of materials, raw materials, equipment and devices for the implementation of chemical processes and characterization of the obtained products - K_W03.

4. Has broadened and deep knowledge in the field of chemistry and other related areas of science, allowing for the formulation and solving of complex tasks related to chemical engineering - K_W06.

Skills

1. Has the ability to acquire and critically evaluate information from literature, databases and other sources, and formulate opinions and reports on this basis - K_U01.

2. Can prepare a problem in the field of study in Polish and English - K_U04.

3. Can independently determine the directions of further education and pursue self-study - K_U06.

4. Can use professional software, using them to design chemical processes and process installations - K_U07.

Social competences

1. Has awareness of the need for lifelong learning and professional development - K_K01.

2. Has an educated awareness of the limitations of science and technology related to the protection of the natural environment - K_K02.

3. Can think and act in a creative and enterprising way - K_K04.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing the laboratory based on the assessment of current work during laboratory classes and a written check of knowledge before laboratory classes. Final mark of the written exam covering the entire knowledge of the subject.

Programme content

As a continuation of this subject, the basics of chemical and process engineering are laid out, with the discussed issues refer to diffusion processes, elements of thermodynamics of humid air and the basis of filtration and filtration theory. Diffusion processes refer to the flow of multicomponent fluids. Presented are stationary and not-stationary issues of diffusion, basics of convective mass flow and design principles of heat exchangers and mass. The problems of simultaneous heat and mass exchange occurring, for example, in drying issues are discussed. For mathematical description of processes used differential and integral calculus as well as principles of dimensional analysis and theory of similarity.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples taken on the board.

2. Laboratory classes: practical exercises.

Bibliography

Basic

1. Kowalski S.J., Teoria procesów przepływowych cieplnych i dyfuzyjnych, Wydawnictwo Politechniki Poznańskiej, Wyd. 1999 oraz 2008.

2. Kembłowski Z., Michałowski S., Strumiłło Cz., Zarzycki R., Podstawy teoretyczne inżynierii chemicznej i procesowej, Warszawa, PWN 1985.

3. Malczewski J., Piekarski M., Modele procesów transportu masy, pędu i energii, Warszawa, PWN 1992.

4. Zadania projektowe z inżynierii procesowej, Biń A., Huettner M., Kopeć J., Kozłowski M., Nowo-sielski J., Sieniutycz S., Szembek-Stoeger M., Szwast Z., Wolny A., Wyd. Politechniki Warszawskiej 1986.

5. Ciborowski, J., Inżynieria procesowa, Warszawa, WNT 1973.

6. Hobler T., Ruch ciepła i wymienniki, wyd. 4, Warszawa, PWN 1971.

Additional

1. Brodowicz K., Teoria wymienników ciepła i masy, PWN-Warszawa, 1982.

2. Malczewski J., Piekarski M., Modele procesów transportu masy, pędu i energii, PWN-Warszawa, 1992.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	90	3,6
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) [1]	60	2,4

[1] delete or add other activities as appropriate