



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of Chemical and Process Engineering

Course

Field of study

Year/Semester

Environmental Protection Technologies

II/3

Area of study (specialization)

Profile of study

-

general academic

Level of study

Course offered in

First-cycle studies

polish

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

0

0

Tutorials

Projects/seminars

0

15

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr inż. Kinga Rajewska

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Faculty of Chemical Technology

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:

Knowledge acquired as part of the lecture is verified by so-called partial exam, which is carried out during the last lecture. It consists of 7-10 questions. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by email.

Skills acquired as part of the project classes are verified on the basis of tests on the elements of designing chemical engineering processes. Three tests are expected. Passing threshold: 50% of points.

Programme content



As part of this course, the basics of chemical and process engineering are laid out, with the issues discussed being divided into flow and thermal processes. Flow processes include issues of liquid and gas flow using the concepts and assumptions of fluid mechanics. The range of considerations in this topic includes the mechanics of incompressible fluids and real fluids with regard to fluid viscosity. Thermal processes include conduction, convection and radiation. The issues of heat penetration, heat transfer during free and forced convection as well as the principles of design heat exchangers are presented. The differential and integral calculus as well as the principles of dimensional analysis and the theory of similarity were used to describe the mathematical processes.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples taken on the board.
2. Design classes: solving examples on the board and completing tasks given by the teacher.

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., Szwaab 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	100	4,0
Classes requiring direct contact with the teacher	60	2,4
Student's own work (literature studies, preparation for project classes, preparation for tests, partial exam) ¹	40	1,6

¹ delete or add other activities as appropriate