



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Processes of simultaneous heat and mass transfer

Course

Field of study

Year/Semester

Chemical and process engineering

1/1

Area of study (specialization)

Profile of study

Bioprocesses and biomaterials engineering

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

30

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr hab. inż. Andrzej Rybicki

Prerequisites

Basic knowledge of heat and mass transport theory. Ability to solve differential equations.

Course objective

Expanding knowledge in the field of basic chemical engineering operations. A look at the processes occurring in biological systems from the point of view of chemical and process engineering. Improving mathematical modeling skills.

Course-related learning outcomes

Knowledge

1. Has extended and in-depth knowledge in mathematics and computer science

necessary for modeling, planning, optimization and characterization

industrial chemical processes as well as planning experiments and development

results of experimental research - K_W01

2. Has expanded knowledge of physics to understand processes



physical, related to chemical engineering - K_W02

Skills

1. Has the ability to obtain and critically evaluate information from literature, databases and other sources, and formulating opinions and reports on this basis - K_U01
2. Is able to use professional software, using them for designing chemical processes and process installations -K_U07
3. Has the ability to analyze and solve problems related to technology chemical and process engineering using methods for this purpose theoretical, analytical, simulation and experimental - K_U09

Social competences

1. Understands the need for lifelong learning; can inspire and organize other people's learning process; is aware of validity and non-technical aspects and effects of engineering activities, including its impact on environment, and the associated responsibility for decisions taken - K_K01
2. Is able to properly define the priorities for implementation specified by yourself or other tasks - K_K04

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Activity during classes, final project
2. Written exam.

Programme content

1. Construction of general balance equations.
2. Formulation and solution of heat transfer tasks for various configurations, in steady and transient state.
3. Heat transfer phenomena in biological systems.
4. The issue of thermal comfort.
5. Simultaneous heat and mass exchange processes.
6. Heat and mass exchange in phase change conditions.



7. Numerical solving of heat and mass transfer tasks

Teaching methods

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

Project: tasks in the field of materials presented in lectures solved with the support of the MethCad package.

Bibliography

Basic

1. Kowalski S.J., Procesy transportu ciepła i masy, Wyd. Politechniki Poznańskiej, 2011
2. Cz. S.Wiśniewski, Wymiana ciepła, WNT, Warszawa1979.
3. Strumiłło, Podstawy teorii i techniki suszenia, WNT, Warszawa 1983.

Additional

1. A. ÇENGEL, A.J. GHAJAR, HEAT AND MASS TRANSFER: FUNDAMENTALS & APPLICATIONS, FIFTH EDITION Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. 2015
2. C.O.Bennett, J.E.Myers, Przenoszenie pędu, ciepła i masy, WNT, Warszawa 1967.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for tutorials, preparation for exam, project preparation) ¹	40	1,5

¹ delete or add other activities as appropriate