COURSE DESCRIPTION CARD - SYLLABUS

Course name
Separation of Mixtures - Membrane Water Purification for the Pharmaceutical Industry

Course

Field of study
Pharmaceutical Engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
4/7
Profile of study
general academic
Course offered in
polish
Requirements
elective

Number of hours

Lecture
0
Laboratory classes
15
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
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Faculty of Chemical Technology

Institute of Chemical Technology and Engineering

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Responsible for the course/lecturer:
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Prerequisites

Basic knowledge in the field of general, inorganic, organic and physical chemistry as well as familiarity with the elementary equipment of pharmaceutical industry.

Course objective

The aim of course it to gain the knowledge and practical skills in membrane separation techniques used in pharmaceutical industry. Laboratory excercises are based on active practical learning of membrane filtration techniques for water treatment for pharmaceutical industry.

Course-related learning outcomes

Knowledge

*K_W15 has detailed knowledge in sepration processes and treatment of raw materials and products used in pharmaceutical, cometic and chemical industry (P6S_WG P6SI_WG)

* K_W18 has basic knowledge in terms of construcion of equipment and installations in pharmaceutical industry and in related industries (P6S_WG P6SI_WG)

Skills

* K_U15 is able to identify basic unit processes and operations of pharmaceutical engineering and formulate their specifications (P6SI_UW)

* K_U16 is able to select the proper approach and equipment tosolve elemenatry and complex engineering problems related to pharmaceutical engineering; is able to analyze and evaluate the functioning of basic equipment of pharmaceutical industry (P6S_UW P6SI_UW)

Social competences

*K_K2 is ready to: take the individual desicions and lead the team, to critically evaluathe his or her own activity and activity of the team, to take the responsibility for the effects of those activities; he or she is able to collaborate and work in group, inspire and integrate the people in his or her prefessional work environment (P6S_KK)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The writing assignment before each laboratory excersice composed of 3-5 questions and graded in the range: 0-10 pts. The following grading scale will be used

3,0: 5,5-6,5 pts,

3,5: 6,5-7,0 pts,

4,0: 7,5-8,0 pts,

4,5: 8,5-9,0 pts,

5,0: 9,5-10 pts,

All experiments must be completed and correct reports from each laboratory class must be prepared in a team. The final grade is the average of all the grades. In the case of compulsary online teaching the course will be held on E-kursy platform and the same grading criteria will we applied (except the obligatory completing all experiments which will be substitted by video material).

Programme content

The content of the course includes pressure- and current-driven membrane techniques used in pharmaceutical industry for water preparation. The students are being familiar with run of installations for reverse osmosis, forward osmosis, ultrafiltration, classic and bipolar electrodialysis for water treatment . Moreover, the laboratory excercises include practical study on technical aspects of membrane processes, e.g. mass transport resistances in membrane separation for water treatment.

Teaching methods

The students plan the experiment, make the measurements, calculation, graphically present and discuss the results, formulate the conlcusions and write the report. The students participate in these activities in teams.

Bibliography

Basic

1. M. Bodzek, J. Bohdziewicz, K. Konieczny, Techniki membranowe w ochronie środowiska, Wydawnictwo Politechniki Śląskiej, Gliwice, 1997.

2. K. Prochaska (Red.) Membranowe techniki separacji, Skrypt, Wydawnictwo Politechniki Poznańskiej, Poznań, 2013

3. J. Rautenbach, Procesy membranowe, WNT, Warszawa 1996

4. Biernacka, T. Suchecka, Techniki membranowe w ochronie środowiska, Wyd. SGGW, Warszawa 2004

Additional

1. S. Judd, C. Judd (Red.) The MBR Book. Principles and aplications of membrane bioreators for water and wastewater treatment, 2nd ed., Elsevier, 2011

2. Z. Zhang, W. Zhang, E. Lichtfouse, Membranes for Environmental Applications, Springer, 2020

3. K. Scott, Handbook of industrial membranes, Elsevier Advanced Technology, 1998

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	20	0,7
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	10	0,3

[1] delete or add other activities as appropriate