COURSE DESCRIPTION CARD - SYLLABUS

Course name
Membrane techniques in in sewage treatment

Course

Field of study
Environmental Protection Technologies
Year/Semester
III/6
Area of study (specialization)
-
Profile of study
general academic
Level of study
First-cycle studies
Course offered in
Polish
Form of study
full-time
Requirements
elective

Number of hours

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

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
Katarzyna Dopierała, PhD Eng.

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Wydział Technologii Chemicznej

Instytut Technologii i Inżynierii Chemicznej

ul. Berdychowo 4, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge in general chemistry, inorganic and organic chemistry as well as physical chemistry and basics of environmental protection; English language skills at the level allowing studying the reserach papers

Course objective

Gaining theoretical knowledge and practical skills in industrial aplications of membrane techniques, especially in sewage treatment.

Course-related learning outcomes

Knowledge

*K_W05 knows the prinicples of environmental protection related to chemical production and waste managment (P6S_WG)

*K_W12 knows the methods, techniques, tools and materials used for solving elementary engineering tasks related to technology for environmental protection (P6S_WG)

Skills

*K_U01 gains the data form literature, databases and other sources related to chemical sciences;

, integrades and interprets the data, draws the conclusions and formulated the opininions (P6S_UW)

* K_U05 is absle to prepated and present the oral speech related to technology for environmental protection in Polish and foreign language (P6S_UK)

* K_U19 can make a project of the elementary process or object in technology for environmental protection (P6S_UW, P6SI_UW)

Social competences

*K_K02 is aware of importance and understands nontechnical apects and consequences of engineering actitivity, including its impact on environment and responsibility for making the decisions (P6S_KK P6S_KR)

* K_K03 can cooperate and work in team playing different roles in the group (P6S_KR)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Grade for presentation, particpipation in discussion and writting assignment given according to the scale:

3,0: 42-47 pts

3,5: 48-52- pts

4,0: 53-58 pts

4,5: 59-64 pts

5,0: 65-70 pts

Programme content

The major topics of the course are:

1. Pressure driven membrane methods in food industry

2. Metal recovery from aqueous solutions by membrane methods

3. Pressure driven membrane methods for sewage treatment in paper, textile and leather industry

4. Membrane techniques for treatment of landfill leacheates

5. Removing of active pharmaceutical ingredients from water

6. Membrane separation of carboxylic acids and post-fermentation liquids

7. Electrodialysis in sewage treatment

8. Membrane separation of water/oil mixtures

9. Fouling in membrane sewage treatment

10. Sepration of volatile organic compounds from air

11. Sewage treatment using membrane bioreactors

Teaching methods

Multimedia presentation of students based on scientific literature and group discussion

Bibliography

Basic

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

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

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

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

Warszawa 2004

Additional

1. A. Tamime (Red.) Membrane processing: dairy and beverage applications, Wiley-Blackwell, 2013

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

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	25	1,0

[1] delete or add other activities as appropriate