COURSE DESCRIPTION CARD - SYLLABUS

Course name
Separation of mixtures [S1IFar2>ORM1]

Course

Field of study
Pharmaceutical Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Students starting this subject should have basic knowledge in mathematics, physics, chemistry, statistics, engineering graphics, fluid mechanics and materials technology. They should also have the ability to use spreadsheets, performing statistical analysis of measurement results and be ready to work in a team.

Course objective

The aim of the subject is to obtain the knowledge and skills of separating methods of mixtures in pharmaceutical industry.

Course-related learning outcomes

Knowledge:
1. A student knows the rules for making material balances of mass exchangers. [K_W15, K_W21]
2. A student knows the methods for calculating the dimensions of mass exchangers. [K_W15]
3. A student knows the rules for making material balances of mass exchangers. [K_W15, K_W21]
4. A student knows the methods for calculating the dimensions of mass exchangers. [K_W15]
5. A student knows the theoretical basis of sedimentation, filtration, absorption and desorption, distillation, rectification, extraction and concentration of solutions. [K_W15]

Skills:
1. Based on general knowledge student can explain physical phenomena occurring in the equipment's of the pharmaceutical industry. [K_U14]
2. A student can choose a separating method of mixtures suitable for a specific technological problem in the pharmaceutical industry and related industries. [K_U16]
3. A student is able to solve problems related to the design of mass exchangers by analytical and experimental methods. [K_U13, K_U12]

Social competences:
1. A student understands the importance of knowledge in solving problems and is ready to consult experts. [K_K1]
2. A student is able to accept responsibility for the effects of their actions and is able to work in a group. [K_K2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified during the exam. The exam consists of 5 open questions for the same number of points. Minimum threshold: 50% points Exam issues, on the basis of which questions are formed, will be sent to students by e-mail using the university e-mail system.
Skills and knowledge acquired as part of the laboratory work are verified on a daily basis based on oral answers.
Skills and knowledge acquired during project classes are verified on the basis of the mass exchanger project and test, consisting of 3-4 tasks. Minimum threshold: 50% points

Programme content

The course covers the following topics:1. Material balances
2. Methods for calculating the dimensions of mass exchangers
3. Hydrodynamics of packed columns
4. Mechanical separation processesKnowledge acquired during the lecture is verified during the exam. The exam consists of 5 open questions for the same number of points (5 points). The grade will be issued according to a scale: up to 10.0 - unsatisfactory; from 10.5 to 12.0 - sufficient; from 12.5 to 14.0 - a sufficient plus; from 14.5 to 16.0 - good; from 16.5 to 18.0 - a good plus; from 18.5 - very good. Exam issues, on the basis of which questions are formed, will be sent to students by e-mail using the university e-mail system. The online exam will be conducted on the same terms via the eMeeting platform or another platform recommended by the Poznań University of Technology.
The skills and knowledge acquired during laboratory classes are verified on an ongoing basis on the basis of oral answers. To pass the laboratory you must:
1. Provide an oral answer from the material contained in the exercise instructions and from the given issues (each failing grade must be corrected to a positive).
2. Perform all laboratory exercises provided in the study program
3. Get passes for reports on the exercises performed.
4. The final grade will be based on the arithmetic average of all grades obtained from oral answers according to the following scale: up to 2.74 - unsatisfactory; from 2.75 to 3.24 - sufficient; from 3.25 to 3.74 - a sufficient plus; from 3.75 to 4.24 - good; from 4.25 to 4.74 - a good plus; from 4.75 - very good. Passing the laboratory will be in an online form, carried out on the same terms via the eMeeting platform or another platform recommended by the Poznań University of Technology.
The skills acquired during project classes are verified on the basis of a colloquium (3 tasks with the same score (5 points), grading scale: up to 7.5 - unsatisfactory; from 8.0 to 9.0 - sufficient; from 9.5 to 10 .5 - sufficient plus; from 11.0 to 12.0 - good; from 12.5 to 13.5 - good plus; from 14.0 - very good), documentation of the completed project and defense of the project. All partial unsatisfactory grades must be corrected to a positive grade. A project with a serious error must be corrected (the teacher decides whether the error requires correction of the project). The final grade will be given as follows: (1) the arithmetic mean will be calculated from all the grades received for the colloquium, (2) the arithmetic mean will be calculated from all the grades received for the project and for project defense. The two arithmetic means obtained in this way will be summed up and divided by two, and the final grade will be issued according to the following scale: (up to 2.74 - insufficient; from 2.75 to 3.24 - sufficient; from 3.25 to 3.74 - sufficient plus; from 3.75 to 4.24 - good; from 4.25 to 4.74 - good plus; from 4.75 - very good).

The remote completion of the project will be carried out on the same terms via the eMeeting platform or another platform recommended by the Poznań University of Technology.
5. Thermal-diffusion separation of mixtures (distillation, rectification, extraction, crystallization and concentration, absorption and desorption)
6. Efficiency of plate columns

Course topics

none

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.
2. Laboratory exercises: performing experiments related to separation processes of mixtures.
3. Project: multimedia presentation, illustrated with tasks solved on the board.

Bibliography

Basic:
1. Bandrowski J., Merta H., Zioło J.: Sedymentacja zawiesin. Zasady i projektowanie, Wydawnictwo Politechniki Śląskiej, Gliwice 2001.
2. Bandrowski J., Troniewski L.: Destylacja i rektyfikacja, Wyd. Politechniki Śląskiej, Gliwice 1996.
3. Koch R., Noworyta A.: Procesy mechaniczne w inżynierii chemicznej, WNT, Warszawa 1995.
4. Koch R., Kozioł A., Dyfuzyjno-cieplny rozdział substancji, WNT, Warszawa 1994.

Additional:
1. Coulson J.M., Richardson J.F.: Chemical Engineering, vol. I-VI, Butterworth Heinemann, Oxford 1999-2002.
2. Sinnott R.K. Towler G.: Chemical Engineering Design, 5th Edition, Elsevier, 2009.
3. Broniarz-Press L. i inni: Inżynieria chemiczna i procesowa. Materiały pomocnicze. I-III. Wydawnictwo Politechniki Poznańskiej, Poznań 1999-2002.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	50	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00