



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Separation of mixtures [S1IFar1>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 (e.g. online)

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:

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Knowledge acquired during the lecture is verified during the exam. The exam consists of 4 open questions for the same number of points. Minimum threshold: 51% 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. The online exam will be conducted on the same terms via the eMeeting platform or another platform recommended by the Poznań University of Technology.

Skills and knowledge acquired as part of the laboratory work are verified on a daily basis based on oral answers. To pass the laboratory you must:

1. Provide an oral answer from the material contained in the exercises 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 issued based on the arithmetic mean calculated from all grades obtained from the oral responses according to the 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 the project classes are verified on the basis of a test (3-4 tasks), documentation of the project and defense of the project. The final grade is issued based on the arithmetic mean calculated from the grades obtained for the test and the grades obtained for the design and defense of the project (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).

Examination will be in an online form on the same terms via the eMeeting platform or another platform recommended by the Poznań University of Technology.

## 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 processes (sedimentation and filtration)
5. Thermal-diffusion separation of mixtures (distillation, rectification, extraction, crystallization and concentration, absorption and desorption)
6. Efficiency of plate columns

## 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., Ziolo 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., Koziol A., Dyfuzyjno-ciepłny 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 |