



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Pharmaceutical industry equipment- design of stirred vessel [S1IFar2>APCpm]

### Course

Field of study

Pharmaceutical Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

0

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

### Number of credit points

1,00

### Coordinators

dr hab. inż. Szymon Woźniowski prof. PP  
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### Lecturers

### Prerequisites

Basics of mathematical calculations, biology, physics and chemistry; rules for creating design documentation; basics of pharmaceutical material science and machinery; technical drawing rules; ability to use CAD software; ability to use spreadsheet software; ability to create electronic documentation; ability to obtain information from standards and catalogues of structural elements; The student is aware of the advantages and limitations of individual and group work when solving problems of an industrial and design nature; The student knows the limitations of her knowledge and sees the need to deepen it.

### Course objective

Obtaining knowledge in the design of the stirred vessel for the preparation of the selected two-phase system (liquid-liquid, gas-liquid, solid liquid)

### Course-related learning outcomes

Knowledge:

1. Student has basic knowledge of stirred vessels calculations in the pharmaceutical industry and related industries [K\_W18]
2. Student has knowledge of stirred vessel construction in the pharmaceutical industry [K\_W18]

#### Skills:

1. Student can design a stirred vessel for the pharmaceutical industry [K\_U17]
2. Student takes into account and applies the standards applicable in the industrial environment [K\_U21]
3. Student can plan and organize individual work and team work and work both individually and as a team [K\_U25]

#### Social competences:

1. Student is ready to make a decision on its own, to critically assess its own actions, to take responsibility for the effects of these actions [K\_K2]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The skills acquired in the project classes are verified in the form of a defense taking place in the last and penultimate classes in stationary mode or remote mode. The final assessment is the sum of the sub-points for documentation (40points) and leave the oral questions (60points). The payment threshold is 50 pts

### Programme content

The classes discuss:

the design principles of the stirred vessel; design schedule; physico-chemical parameters of multiphase systems, minimum impeller speed; mixing power; the necessary engine power; shaft diameter calculations; strength of the shaft; calculation of supports; selection of clutch and geared motorist; the use of inverters; the diameter of the drops and the interfacial area; the time of discharge from the vessel; preparation of technical documentation, technology cards (datasheet); requirements of the pharmaceutical industry; cleanness of equipment

### Course topics

none

### Teaching methods

Multimedia presentation, presentation illustrated with examples on the board, and resolving tasks provided by the presenter; eKursy

### Bibliography

Basic:

1. F. Stręk, Mieszanie i mieszalniki, WNT, Warszawa 1982.
2. J. Kamiński, Mieszanie układów wielofazowych, WNT, Warszawa 2004.
3. J. Pikoń, Podstawy konstrukcji aparatury chemicznej, Wydawnictwo Politechniki Śląskiej, Gliwice 1973.
4. T. Wilczewski, Pomoce projektowe z podstaw maszynoznawstwa chemicznego, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2008.
5. Rozporządzenie Ministra Zdrowia z dnia 9 listopada 2015 roku w sprawie wymagań Dobrej Praktyki Wytwarzania

Additional:

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### Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50