



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Process equipment - design of stirred vessel [S1IChiP1>APpmm]

### Course

|                                  |                   |
|----------------------------------|-------------------|
| Field of study                   | Year/Semester     |
| Chemical and Process Engineering | 2/3               |
| Area of study (specialization)   | Profile of study  |
| –                                | general academic  |
| Level of study                   | Course offered in |
| first-cycle                      | Polish            |
| Form of study                    | Requirements      |
| full-time                        | elective          |

### Number of hours

|           |                    |       |
|-----------|--------------------|-------|
| Lecture   | Laboratory classes | Other |
| 0         | 0                  | 0     |
| Tutorials | Projects/seminars  |       |
| 0         | 15                 |       |

### Number of credit points

1,00

### Coordinators

dr hab. inż. Szymon Woziwodzki prof. PP  
szymon.woziwodzki@put.poznan.pl

### Lecturers

### Prerequisites

basics of math, physics and chemistry; principles of creation of design documentation; basis of materials science and mechanical engineering; principles of technical drawing; ability to use CAD software (AutoCAD); ability to use calculation software; ability to create a design digital documentation; ability to obtain information from international standards and catalogues; A student is aware of the advantages and limitations of individual and group work in solving the problems of an industrial nature and design; A student knows the limits of his knowledge and sees the need to deepen their knowledge

### Course objective

Knowledge about design of the stirred vessel.

### Course-related learning outcomes

Knowledge:

1. a student knows construction of impellers and stirred vessel - [k\_w12]
2. a student knows methods and principles of design of stirred vessel - [k\_w15]

Skills:

1. a student knows how to design a stirred vessel for chosen two-phase systems - [k\_u01]
2. a student knows how to solve computational problems appearing during the design. - [k\_u06, k\_u19]
3. a student knows how to obtain information from databases, international standards and catalogues - [k\_u20]

Social competences:

1. a student has the awareness and understanding of aspects of the practical application of knowledge. - [k\_k01]
2. a student knows the limits of his own knowledge and understands the need for continuing education. - [k\_k02]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The skills acquired in the project classes are verified in the form of a defense taking place in the last and penultimate classes or in remote mode using eKursy system. The final assessment is the sum of the sub-points for documentation (40points) and project defense (60points). The credit threshold is 50 pts. For the remote defense mode, the student must turn on the camera and microphone.

### Programme content

Mechanical mixer design considerations.

### Course topics

principles of design of stirred vessel; calculation of physicochemical properties, minimal impeller speed; mixing power; calculation of engine power; calculation of shaft diameter; calculation the strength of the shaft; calculation of vessel support; selection of clutch and moto-reducers; application of inverters; calculation of drop diameter and interfacial area; discharge time

### Teaching methods

Multimedia presentation, presentation illustrated with examples on the table, and resolving tasks provided by the lecturer

### Bibliography

Basic

1. F. Stręk, Mieszanie i mieszalniki, WNT, Warszawa 1981.
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.

Additional

1. Aparatura chemiczna, Pikoń J., Państwowe Wydawnictwa Naukowe, Warszawa, 1983
2. A. Heim, B. Kochanski, K.W. Pyć, E. Rzyński, Projektowanie aparatury chemicznej i procesowej, Wydawnictwo Politechniki Łódzkiej, Łódź 1993.

### Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 25    | 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) | 10    | 0,50 |