



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Process equipment - design of static mixer [S1IChiP1>APpms]

### Course

Field of study	Year/Semester
Chemical and Process Engineering	2/4
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  
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### Lecturers

### Prerequisites

basics math, physics and chemistry; principles of creation of design documentation; basis of materials science and mechanical engineering; principles of technical drawing; construction and principles of design of stirred vessels; construction of momentum exchange equipment; ability to use CAD software (AutoCAD); ability to use calculation software; ability to create a digital design 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

The major objectives of the course are to obtain skills and knowledge about design of static mixers

### Course-related learning outcomes

Knowledge:

1. a student knows construction of static mixers - [k\_w12]
2. a student knows principles of mixing dynamics in static mixer [k\_w14]
3. a student knows methods and principles of design of static mixers - [k\_w15]

#### Skills:

1. a student knows how to select static mixer in various flow regimes - [k\_u01]
2. a student knows how to estimate homogeneity degree in static mixer. - [k\_u06]
3. a student knows how to calculate the pressure drop in static mixer - [k\_u07]
4. a student knows how to calculate shear rate and shear stress in static mixer - [k\_u19]
5. a student knows how to estimate an effect of physiochemical properties on mixing in static mixer [k\_u21]

#### 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\_k04]
3. a student knows the limitation of work in group [k\_k04]

### 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 the remote mode using eKursy platform. 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

Design issues for static mixers.

### Course topics

principles of construction of static mixers; pressure drop in static mixers; calculation of the drag coefficient for static mixers; calculation of the homogeneity degree in static mixers; length of static mixer; mixing of two-phase systems in static mixers

### 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. E.L. Paul, V.A. Atiemo-Obeng, S.M. Kresta, Handbook of industrial mixing. Science and practice, Wiley&Sons, Hoboken 2004.

Additional

1. Pikoń J., Aparatura chemiczna, Państwowe Wydawnictwa Naukowe, Warszawa, 1983

### 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