



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Methods of Technological Process Control

### Course

Field of study

Chemical Technology

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

IV/7

Profile of study

general academic

Course offered in

English

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Beata Strzemiecka

Responsible for the course/lecturer:

### Prerequisites

Knowledge of physical chemistry, organic chemistry, basics of analytical chemistry, basics of chemical apparatus, mathematics

### Course objective

Presentation of the principles of selection of control and measuring apparatus in industry, familiarizing students with the types of industrial analyzers and methods of their installation, familiarizing students with extended knowledge of chromatographic processes as a technique in the vast majority used to control technological processes, presentation of practical solutions of process analysis used in industry

### Course-related learning outcomes

Knowledge

K\_W06, P6S\_WG, P6SI\_WG - knows the necessary principles of operation of control and measurement systems and electronic control systems used in chemical technology

K\_W07, P6S\_WG, P6SI\_WG - knows the rules of environmental protection related to chemical technology and waste management



K\_W12, P6S\_WG, P6SI\_WG - knows the principles of construction, operation and selection of devices, reactors and apparatus used in chemical technology

#### Skills

K\_U02, P6S\_UK - can work both individually and as a team in a professional and other environment

K\_U05, P6S\_UU - has the ability to self-study

K\_U06, P6S\_UK - has language skills in the fields and disciplines relevant to chemical sciences and chemical technology, in accordance with the requirements specified for level B2 of the European Language Description System

K\_U10, P6S\_UW - has the preparation and competencies necessary to work in an industrial environment and knows the principles of occupational health and safety

K\_U11, P6S\_UW, P6SI\_UW - is able to make a preliminary technical and economic analysis of engineering activities undertaken in chemical technology

K\_U12, P6S\_UW, P6S\_UO - is able to conduct a critical analysis of the functioning method and assess existing technical solutions in technology and chemical engineering, in particular devices, apparatus, systems and processes

K\_U14, P6S\_UW, P6SI\_UW - is able to assess the suitability of routine methods and techniques appropriate to solve practical engineering tasks in chemical technology, can also choose and apply the appropriate method and technique

K\_U21, P6S\_UW - selects analytical methods for qualitative and quantitative determination of chemical compounds

K\_U25, P6S\_UW, P6SI\_UW - assess the risks associated with the use of chemical products and processes

K\_U25, P6S\_UW, P6SI\_UW - assesses the risk associated with increasing the scale of chemical operations and processes

K\_U26, P6S\_UW - applies basic legal regulations and observes OHS rules related to the work performed

K\_U29, P6S\_UW, P6SI\_UW - implements proper waste management through utilization and recycling

K\_U32, P6S\_UW, P6S\_UO - selects analytical methods and techniques for process control and quality assessment of raw materials and products

#### Social competences

K\_K01 - understands the need for further training and raising their professional, personal and social competences

K\_K02, P6S\_KO, P6S\_KK - is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions made



K\_K03, P6S\_UO - can interact and work in a group, inspire and integrate engineering environments

K\_K05, P6S\_KR - correctly recognizes problems and makes the right choices related to the exercise of the profession, in accordance with the principles of professional ethics

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

written exam

### Programme content

1. Process analysis - general types and principles of using process analyzers - extension and reminder of issues from the obligatory part of the subject.
2. Tasks of process analysis - extension and reminder of issues from the obligatory part of the subject.
3. Economic aspects of process analysis - extension and reminder of issues from the obligatory part of the subject.
4. System of sample collection and preparation for process analysis - extension and reminder of issues from the obligatory part of the subject.
5. Requirements for safe design and installation installation.
6. Methods of controlling the technological process.
7. Solutions used in process analysis (among others: backflushing, column switching in process gas and liquid chromatography, dilution and concentration of the liquid sample, cutting out the main component).
8. Examples of the use of chromatographic process analysis in the control of selected technological processes.
9. Legal regulations regarding process analysis.
10. Combined techniques.

### Teaching methods

lecture, discussion

### Bibliography

Basic

1. Process control, J. Hahn, DOI: 10.1002/0471238961.1618150307091522.a01.pub2 , 2003

Additional

1. The essence of chromatography, C.F. Poole, Elsevier, Amsterdam, 2003



### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	25	1,0
Student's own work (literature studies, preparation for tests/exam) <sup>1</sup>	25	1,0

<sup>1</sup> delete or add other activities as appropriate