



## 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

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Tutorials

Laboratory classes

15

Projects/seminars

Other (e.g. online)

### 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 basic 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 the extended knowledge of chromatographic processes as a technique



mainly used to control technological processes, the use of chromatographic techniques in process qualitative and quantitative analysis. In practice, students will be familiarized with the apparatus used in chromatographic methods. Presentation of the possibilities of using gas and liquid process chromatography

### 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:

lecture: written exam - stationary, via website [ekursy.put.poznan.pl](http://ekursy.put.poznan.pl) in case of on-line exam (50 % test, 50 % open questions)

laboratories: oral and written test before each class, exercise reports

#### Programme content

1. Process analysis - general types and principles of using process analyzers.
2. Tasks of process analysis.
3. Economic aspects of process analysis.
4. System of sample collection and preparation for process analysis.
5. Gas chromatography - basic knowledge (apparatus, principles of separation and chromatographic analysis, retention parameters); selection of conditions for conducting the chromatographic process.
6. Liquid chromatography - types of liquid chromatography; the basics of separation; liquid chromatography column; HPLC and TLC equipment.
7. Qualitative and quantitative analysis in chromatographic methods.
8. Application of the delayed standard in process chromatographic analysis.

#### Teaching methods

lecture, discussion, practical exercises



## 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	75	3,0
Classes requiring direct contact with the teacher	30	
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	45	

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