



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Methods of technological process control [N1TCh2>MKPT]

### Course

Field of study

Chemical Technology

Year/Semester

4/7

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

20

Laboratory classes

10

Other

0

Tutorials

0

Projects/seminars

10

### Number of credit points

4,00

### Coordinators

dr hab. inż. Kasylda Milczewska  
kasylda.milczewska@put.poznan.pl

### Lecturers

### Prerequisites

Basic knowledge of physical and organic chemistry at the academic level. Knowledge of the basic processes in chemical technology, knowledge of individual processes.

### Course objective

Presentation of the basics of chromatographic processes, their use in qualitative and quantitative process analysis. Acquaintance with the apparatus used in chromatographic methods. Presentation of the possibilities of using gas and liquid process chromatography. Learning how to use gas and liquid chromatographs in practice, performing analyzes using these techniques.

### Course-related learning outcomes

Knowledge:

Acquaintance with chromatographic methods. Understanding the rules of operation of control and measurement process unit of chemical technology. K\_W06, K\_W08

Skills:

Acquaintance with the apparatus used in chromatographic techniques as methods of control of

technological processes. Acquaintance with quantitative and qualitative methods in chromatography. Ways to use chromatographic methods in the control of industrial processes. K\_U14, K\_U21, K\_U32

Social competences:

Obtaining necessary information from literature, databases and other sources, interpretation and drawing conclusions as well as justification for selection and opinions. Preparation of presentations and documentation in the field of chemical process control in teams. K\_K03, K\_K04

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing the final test of the theory lectures; current written or oral control, written reports on laboratory exercises; preparation of the presentation and report on the project related to the selected technological process and methods of its control, including chromatographic methods.

### Programme content

Issues related to monitoring methods of technological process

### Course topics

Include of the following:

1. Basic chromatographic parameters.
2. Gas chromatography technique - equipment and apparatus; theoretical basis of chromatographic separation; selection of conditions for conducting the chromatographic process.
3. The technique of liquid chromatography - types of liquid chromatography; the basics of separation; column in the liquid chromatography; HPLC and TLC equipment.
4. Qualitative and quantitative analysis in chromatographic methods.
5. Process analysis - general principles for the use of process analyzers.
6. System of sample collection and preparation for process analysis.
7. Column switching in gas and liquid chromatography.
8. Application of the delayed standard in process chromatographic analysis.
9. GC and HPLC systems used in process chromatographic analysis.
10. Examples of the use of process chromatographic analysis in the control of selected technological processes.

### Teaching methods

lectures with the use of multimedia (movies and animations). In special cases, the online form of the lecture is allowed.

project presentation (using audio-visual techniques)

practical performance of three laboratory exercises in the field of GC and LC

### Bibliography

Basic:

1. Zastosowanie metod chromatograficznych, K. Bielicka-Daszekiewicz, K. Milczewska, A. Voelkel, Wyd. PP, Poznań, 2010.
2. Podstawy chromatografii, Z. Witkiewicz, WNT, Warszawa, 2005.
3. Chromatografia procesowa, K. Kadlec, A. Voelkel, Wyd. PP, Poznań, 2011.
4. Chromatografia i techniki elektromigracyjne : słownik pięcioletni, red. Zygfryd Witkiewicz, Ewa Śliwka, WNT, Warszawa, 2015.
5. Słownik chromatografii i elektroforezy, red. Jacek Hetper, Zygfryd Witkiewicz, PWN, Warszawa, 2004.

Additional:

1. Podstawy chromatografii i technik elektromigracyjnych, Z. Witkiewicz, J. Kałużna-Czaplińska, PWN, 2017.
2. The essence of chromatography, C.F. Poole, Elsevier, 2003
3. Techniques and practice of chromatography, R.P.W. Scott, Marcel Dekker, Inc., Nowy Jork, 1995

## Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,50