COURSE DESCRIPTION CARD - SYLLABUS

Course name

Microcontrolers for chemistry

Course

Field of study

Chemical Technology

Year/Semester

III/6

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

English

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

Tomasz Rębiś, PhD, Eng.

email: tomasz.rebis@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

The student should know the theoretical basis of analytic instruments.

The student should know the basics of instrumental chemistry, measurements in chemistry and analysis of data.

The student should use English.

The student should be able to implement self-education.

The student should understand the need for further self-education and learning of other people (students).

Course objective

The aim of the course is to familiarize students with the basic operations in the field of chemical sensors, chemical actuators and analytical microsystems involving microcontroles. Fabrication technology of chemical sensors, biosensors, chip-based detection devices, microarray systems, lab-on-a-chip and other

biochips will be presented and discussed. During the course the student is familiarized with selected electroanalytical techniques - cyclic voltammetry and pulse voltamperometry.

Course-related learning outcomes

Knowledge

1. The graduate is able to assess the knowledge covering measurement and metrology fundamentals, sensing fundamentals, measurement instruments, measurement and estimation techniques, measurement data processing. [K_W03, K_W13, K_W15]

2. The graduate knows the necessary operating principles of control systems and electronic control systems used in chemical technology. [K_W06]

3. The graduate has the necessary knowledge of the techniques and methods of characterization and identification of chemical substances. [K_W06]

Skills

1. The graduate can obtain necessary information from literature, databases and other sources related to chemical sciences, interpret them properly, draw conclusions, formulate and justify opinions. [K_U01]

2. The graduate has the ability to interpret and critically evaluate the measurment results obtained. [K_U12]

3. The graduate has the ability to interpret the large amount of statistical data obtained during a various technological precesses. [K_U7]

4. The graduate has the ability to distinguish a proper measurement system for qualitative and quantitative determinations. [K_U21]

5. The graduate has the ability to use specialized vocabulary in English. [K_U01, K_U04, K_U06, K_U17]

6. The graduate can, in accordance with specifications, plan measurments and control processes typical of chemical technology using appropriate methods, techniques and tools. [K_U15]

Social competences

1. The student understands the need for self-education and raising their professional competences. [K_K01]

2. The student is aware of compliance with the principles of engineering ethics in a broad sense. [K_K02, K_K05]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Current knowledge control during lectures.

Programme content

1. Chemical sensors - fundamentals and technology

2. Microsystems for meaurments in chemistry and chemical technology

3. Construction and application of chip-based detection devices

4. Construction and application of lab-on-a-chip and and biochips

5. Microarray systems

6. Chemical transistors

7. Electrochemical techniques applied for target substances detection

Teaching methods

Lecture: multimedia presentation, analysis of examples of the application of different measurment devices an microsystems - in the form of discussion

Bibliography

Basic

Janata, J., Principles of Chemical Sensors, Second Edition, Springer

Banica, F.-G., Chemical Sensors and Biosensors Fundamentals and Applications, Wiley, 2012

Gründler, P., Chemical Sensors An Introduction for Scientists and Engineers, Springer, 2007

Lambrechts M., Sansen W., Biosensors: Microelectrochemical Devices, Taylor Francis Group, 1992

Additional

Ida, N., Sensors, Actuators, and their Interfaces, SciTech Publishing Inc, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for tests) [1]	10	0,5

[1] delete or add other activities as appropriate