COURSE DESCRIPTION CARD - SYLLABUS

Course name
Instrumental analysis with elements of samples preparation [S1TCh2>AIzEPP]

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
0

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

The student should know the theoretical basis of selected instrumental techniques The student should know the basics of analytical chemistry 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 to be performed during instrumental determinations of real samples, i.e. sample preparation for the determination of analytes by electrochemical, electromigration and spectrophotometric techniques. During the course the student is familiarized with selected electroanalytical techniques - cyclic voltammetry and pulse voltamperometry, isotachophoresis and solid phase extraction technique

Course-related learning outcomes

Knowledge:
1. Student is able to assess the possibility of using a given instrumental technique. [K_W03, K_W11, K_W15]
2. The student knows the rules of work in the laboratory trace analysis (in accordance with the fundamental principles of safety at work). [K_W18]

Skills:
1. The student is able to choose the appropriate method of sample preparation depending on the problem posed and select the most appropriate analytical technique to perform the final determination. [K_U14, K_U32]
2. Student has the ability to perform qualitative and quantitative determinations. [K_U21]
3. The student has the ability to interpret and critically evaluate the results obtained. [K_U12]
4. The student has the ability to use specialized vocabulary in English. [K_U01, K_U04, K_U06, K_U17]

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]
3. Student is able to interact and work in a group, taking on different roles in it. [K_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Each exercise is preceded by an oral examination assimilate the necessary theoretical basis for the method of instrumental.The exercise report will also be assessed.
In the case of online classes, the tasks related to the material discussed during the meeting, which will be prepared by the teacher, will be assessed.

Programme content

During the course students perform the following exercises:
1. Determination of hydroxymethylfurfural in honey by Winkler spectrophotometric method
2. Determination of hydroxymethylfurfural in honey by Whiter spectrophotometric method
3. Measurement of total antioxidant capacity of selected infusions using ABTS method
4. Measurement of total antioxidant capacity of selected infusions using Folin-Ciocalteu method
5.Spectrophotometric determination of caffeine in beverages (Preparation of samples for the determination of spectrophotometric techniques. Introduction to the extractive techniques: solid phase extraction, liquid-liquid extraction. Extraction of the caffeine from coffee and tea samples).
6. Voltammetric determination of capsaicine in food samples using screen printed electrodes (SPE)
7. Voltammetric determination of iodide in pharmaceutical samples using screen printed electrodes (SPE)
8. Voltammetric determination of cadmium on mercury film electrode - MFE
9. Determination of silver cations with the use of isotachophoresis
In the case of classes conducted online during the meetings will be discussed in detail above-mentioned exercises using film materials.

Teaching methods

Performing exercises according to the description given by the teacher - practical classes

Bibliography

Basic:
1. B. Buszewski, E. Dziubakiewicz, M. Szumski, Techniki elektromigracyjne, Wyd. Malamut, Warszawa 2012
2. A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa 1995
3. A. Cygański, Podstawy metod elektroanalitycznych, WNT, 1999
4. J. Minczewski, Z. Marczenko, Chemia Analityczna. Analiza Instrumentalna, T.3, PWN, Warszawa 1985
5. J. Namieśnik, Z. Jamórgiewicz, M. Pilarczyk, L. Torres, Przygotowanie próbek środowiskowych do analizy, WNT Warszawa 2000

Additional:
1. J. Dojlido, J. Zerbe, Instrumentalne metody badania wody i ścieków, Arkady, Warszawa 1997
2. W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 2002
3. D.A. Skoog, D.M. West, F.J.Holler, S.R. Crouch, Podstawy chemii analitycznej, T. 1 i 2, PWN, Warszawa 2006

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