

Course title: **Fundamentals of analytical chemistry**

Institute/Division: **FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY**

Number of contact hours: **60 hours** (30 h lectures/seminars & 30 h laboratories)

Course duration: 1 semester (5th semester of regular I cycle studies – fall/winter)

ETCS credits: **5**

Course description:

This course introduces the principles of analytical chemistry and provides how these principles are applied in chemistry and related disciplines - especially in life sciences, environmental sciences and geochemistry. This course will familiarize students with fundamental concepts in analytical chemistry and their practical application. Main modules include: Basic tools of analytical methods; Chemical Equilibria for Quantitative Analysis; Electrochemical analysis and spectrophotometry; Spectrochemical analysis and analytical separations (AAS, MS, GC, HPLC, ICP-OES, ICP-MS).

The laboratory part illustrates the theoretical and practical material associated with common analytical chemistry techniques. It includes: 1. Qualitative analysis of hydrocarbons by Gas Chromatography (GC). 2. Quantitative determination of nitrophenols by High-Performance Liquid Chromatography (HPLC). 3. Study of glass electrode characteristics and potentiometric titration. 4. Conductometric methods for determination of the titration endpoint. 5. Iodometric titration as a tool for the quantitative determination of phenol. 6. Determination of acetic acid content by alkalimetric titration.

Education effects :

- knowledge as evident by:

· How to follow advanced procedures for operating quantitative analysis experiments; How to collect and organize complex experimental data; Operation of modern analytical instrumentation such as computer-based interface, GC, HPLC, UV-Vis spectrophotometer; Development of procedures for operating analytical equipment; Important safety precautions that should be practiced in the laboratory; How to prepare in a professional manner data in an informative graphical representation; How to explain the equipment principles, procedures, data, results and conclusions? How to report experimental principles, procedures, data, results and conclusions?

- skills as demonstrated by:

· The capability to use modern analytical instrumentation; The capability to collect and evaluate experimental data; The competence to write a scientific laboratory report; A comprehension of analytical instrumentation through hands on use.

- social:

· student is able to work independently and in a group when solving the problems related to analytical techniques and methods which can be used to work for the local community or company.

Literature: [1] Fundamentals of analytical chemistry, Douglas A. Skoog, Donald M. West, F. James Holler
[2] Quantitative Chemical Analysis, Daniel C. Harris
[3] Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch

Assessment method: Exam / discussions / laboratory reports

Prerequisites: Basic course on general, inorganic and organic chemistry.

Primary target group: Students from all specialties

Lecturer: **prof. Sławomir Wybraniec, Dariusz Karcz Ph.D., Karolina Starzak Ph.D.**

Contact person: **prof. Sławomir Wybraniec, e-mail: swybran@chemia.pk.edu.pl**

Remarks: Regular course