



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Analytisk kemi Analytical Chemistry

KAKF05, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Compulsory for: B3, K3

Language of instruction: The course will be given in Swedish

Aim

The goal of this course is to provide the students with theoretical and experimental insights and skills in instrumental analytical chemistry with a focus on fundamental analytical methods and techniques such as sample preparation, spectrophotometry, chromatography, mass spectrometry and potentiometry and their applications.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain the basic theories of various analytical techniques
- be able to describe the fundamental function and design of various analytical instruments
- have knowledge in different quantitation methods and be able to describe the implementation of qualitative chemical analysis with mass spectrometry

Competences and skills

For a passing grade the student must

- be able to apply the most common analytical techniques utilised in quantitative and in some cases qualitative analyses, and be able to compile experimentally obtained data into a written report

- be able to calculate and evaluate important parameters utilised in common analytical techniques
- be able to estimate the quality of analytical results by means of applied statistics
- be able to present results from laboratory work in a written report

Judgement and approach

For a passing grade the student must

- understand the importance of estimating the measurement uncertainty of an analytical result

Contents

The course offers an overview of common analytical methods employed in industrial environments and presents a short introduction on advanced techniques applied in specialised laboratories.

Laboratory work: Laboratory exercises demonstrate quantitative and to a lesser extent qualitative analyses.

Chemical analyses in solutions are performed using instruments for atomic absorption and atomic emission spectrometry, gas and liquid chromatography, potentiometry with ion-selective electrodes and flow injection analysis. Experiments provide the students with knowledge in instrumental construction and operation. The measurement uncertainty of an analysis is estimated by statistical treatment of analytical data. Some experiments aim at characterizing the properties of a method, among other things to show how the signal depends on the molecular structure of the analyse. The quantitative analytical experiments represent common industrial techniques used in analysis of pharmaceuticals, foods, environmental samples, water samples and consumer products.

Lectures: In quantitative chemical analysis, separation methods including sample preparation, gas chromatography and liquid chromatography are considered. The lectures also cover qualitative chemical analysis using spectrometric techniques such as UV-VIS spectrophotometry, atomic absorption spectrophotometry and atomic emission spectrophotometry. Among electrochemical techniques, potentiometry and ion-selective electrodes are considered. In addition mass spectrometry and quality assurance is included.

Exercises: Exercises in chromatography, spectrophotometry, potentiometry and mass spectrometry are provided.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Part 1: The students' achievements will be assessed with a written examination, on which the final grade will be based. Part 2: Compulsory participation in laboratory work and laboratory reports.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0118. **Name:** Examination.

Credits: 6. **Grading scale:** TH. **Assessment:** The students' achievements will be assessed with a written examination, on which the final grade will be based.

Code: 0218. **Name:** Laboratory Work.

Credits: 1,5. **Grading scale:** UG. **Assessment:** Compulsory participation in laboratory work and laboratory reports.

Admission

Assumed prior knowledge: KFKF01 Molecular Driving Forces 2: Interactions and Dynamics

The number of participants is limited to: No

The course overlaps following course/s: KAK016, KAKF01, KEMB16, KEMB06

Reading list

- Harris, D. C.: Quantitative Chemical Analysis, 10th ed. Freeman , 2020, ISBN: 1-319-32450-9.

Contact and other information

Course coordinator: Docent Peter Spéjel, peter.spegel@chem.lu.se

Course homepage:

http://www.kilu.lu.se/cas/education/undergraduate_education/kemibioteknik/kakf05/