Course Specifications
Valid as from the academic year 2018-2019

Analytical Separation Methods (C002957)

Course
Lecturers in academic year 2018-2019
Lynen, Frederic

Course offerings and teaching methods in academic year 2018-2019
A (semester 1)  English  lecture  20.0 h
                  practicum  30.0 h

Offered in the following programmes in 2018-2019
Bachelor of Science in Chemistry  5  A

Teaching languages
English

Keywords
Extraction, chromatography, electrophoresis

Position of the course
Clarifying why separation methods often play an important role in chemical analysis. Providing insight into the most important analytical separation methods (with emphasis on solvent extraction, chromatography and electrophoresis). An active mastering of the basic principles is aimed at and should enable the student to solve problems in this application field.

Contents
• Introduction: importance of separation methods, nature of the separation process, recovery and separation factor, classification of chemical separation methods.
• Chromatography: basic principles of a chromatographic separation, classification of chromatographic methods, types of chromatographic development, introduction of basic concepts (among other distribution isotherms and peak shapes, column efficiency and Van Deemter plot, relative retention ratio, resolution, qualitative and quantitative analysis via chromatography).
• Gas chromatography: Principles of and instrumentation for GC analysis, including column types, stationary phases, injection and detector types.
• Liquid chromatography: Principles of and instrumentation for (HP)LC analysis, including among other column types and detectors. Various types of LC: adsorption, (normal phase and reversed phase) partition, ion exchange and size exclusion chromatography.
• Instrumental aspects of HPLC (pumps, injection, detection approaches)
• Hyphenation of HPLC with mass spectrometry
• Planar chromatography: Principles of and instrumentation for paper chromatography (PC) and thin layer chromatography (TLC).
• Supercritical fluid chromatography
• Electrophoresis. Basic principles of and instrumentation for electrophoretic separation methods.
• Modes in capillary electrophoresis
• Qualitative and quantitative chromatographic analysis and method validation.
• Derivatisation chemistry for gas- and liquid chromatographic applications.
• Chiral separations.

Initial competences
The student has acquired a credit for following courses: ‘Chemistry I: Structure of matter’, ‘Chemistry II: Changes in Matter’ and ‘Analytical Chemistry: Principles’.

(Approved)
'Introduction to Organic structures', 'Spectroscopic methods of analysis' and 'Physical chemistry I: mechanics' or to have acquired the therein intended competences via equivalent courses as ascertained by credits. The three courses 'organic chemistry: reactivity 1,2 and 3' form part of the curriculum followed by the student.

Final competences

1. The student has gained insight into the general concepts of the most important analytical separation methods.
2. He or she can apply this knowledge to solve chemical problems in this context.
3. Although not introduced to the technical details of the instrumentation, the student should be aware of the capabilities and limitations of the instrumental methods chromatography and electrophoresis.
4. The student is able to solve conventional qualitative and quantitative issues in theory, and under supervision in practice, and to interpret the obtained data.
5. The student is able to propose and describe functional analytical methods allowing quantitative and qualitative analysis of mixtures of molecules of various types.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, practicum

Extra information on the teaching methods

20 h teaching based on powerpoint presentations
29 h practica

Learning materials and price

• English syllabus (will be distributed through the student association)
• English slides (will be distributed through Minerva)
• English notes for practical exercises (€ 3)

References


Course content-related study coaching

Via practical exercises: Development of the insights and skills required to solve chemical problems. Providing insight into the practical aspects, capabilities and limitations of chemical separation methods.
Individual guidance by Professor or assistants
Examples and student guidance through Electronic Teaching Platform (https://minerva.UGent.be)

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Written examination with open questions

Examination methods in case of periodic evaluation during the second examination period
Written examination with open questions

Examination methods in case of permanent evaluation
Participation, skills test, job performance assessment, report

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods

Marked exercises during practical exercises.
Evaluation of understanding of basic concepts and ability to use these concepts in problem-solving.

Calculation of the examination mark

Period based evaluation (classes, 90%), non-period based evaluation (practical

(Approved)
exercises, 10%). Students who are absent without any well-justified reason or who do not participate in (part of) the permanent evaluation, do not pass the exam for this course unit. The marks resulting from the permanent evaluation are retained in the second examination period, as the second examination period only consists of a periodic evaluation.