

Molecular structural characterization and analysis

Lecturers

Gilles BRUYLANTS (Coordinator) and Sebastiaan EELTINK

Course mnemonic

CHIM-H407

ECTS credits

5 credits

Language(s) of instruction

English

Course period

Second term

Campuses

Solbosch and Other campus

Course content

Introduction: Raison d'être of the course

I. Molecules

II. Non Covalent Interactions

III. Importance of Separation Sciences

A. Separation Sciences

A.I. HPLC instrumentation and hyphenation to detectors

A.II. Types of Liquid Chromatography

A.III. Optimization of HPLC separations

A.IV. Band broadening in LC

A.V. Kinetic performance limits

A.VI. Multi-dimensional separations

A.VII. Chip Technology

A.VIII. Gas chromatography

B. Molecular Structure Characterization

B.I. Spectroscopy: general considerations

B.II. Electronic spectroscopies

B.III. Vibrational spectroscopies

B.IV. NMR spectroscopy

Objectives (and/or specific learning outcomes)

The aim of the course is to give you insight into the chromatographic methods available for the isolation and purification of molecules of industrial importance. In addition, we aim to teach you the fundamentals and application possibilities of different spectroscopic methods available for the determination and characterization of molecular structures.

Pre-requisites and co-requisites

Required knowledge and skills

Basic knowledge in organic chemistry and intermolecular interactions.

Teaching method and learning activities

Interactive course with powerpoint presentations.

Seminars and practicals illustrate the theory seen during classes.

Contribution to the teaching profile

This teaching unit contributes to the following competences:

- In-depth knowledge and understanding of exact sciences with the specificity of their application to (bio)engineering
- A creative, problem-solving, result-driven and evidence-based attitude, aiming at innovation and applicability in industry and society
- The flexibility and adaptability to work in an international and/or intercultural context
- An integrated insight in (bio)chemical process technology and materials' technology
- Insight in chemistry as a link between process and materials technology

References, bibliography and recommended reading

Separation Sciences

www.chromacademy.com

HPLC Columns: Theory, Technology, and Practice; U.D. Neue
Wiley-VCH (1997)

Contemporary Instrumental Analysis; K.A. Robinson and J.F. Robinson
Prentice-Hall (2000)

Molecular Structure Determination

Introduction to Organic Spectroscopy; L.M. Harwood and T.D.W. Claridge

Oxford Chemistry Primers, Oxford Science Publications (1997)

Molecular Spectroscopy; J.M. Brown

Oxford Chemistry Primers, Oxford Science Publications (1998)

Spectrometric Identification of Organic Compounds; R. M. Silverstein, F. X. Webster

John Wiley & Sons Inc (7th edition, 2005 or any other edition)

Understanding NMR Spectroscopy, J. Keeler

Wiley-Blackwell; 2nd Edition (2010)

Other information

Place(s) of teaching

Other campus and Solbosch

Contact(s)

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Prof. Sebastiaan Eeltink: Sebastiaan.Eeltink@vub.be (VUB)

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRBC | Master in Chemistry and Bio-industries Bioengineering | finalité Professional/unit 2 and MA-IRMA | Master of Science in Chemical and Materials Engineering | finalité Professional/unit 1

Programmes proposing this course at the faculty of Sciences

MA-IRBC | Master in Chemistry and Bio-industries Bioengineering | finalité Professional/unit 2