UCLouvain

lchm1254

2022

Elements of molecular spectroscopy

4.00 credits	30.0 h + 20.0 h	Q2

Teacher(s)	Hermans Sophie ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	General physics concepts as covered in LPHY1113 and physical chemistry as covered in LCHM1252.
Main themes	The course of molecular spectroscopy will describe the different analysis techniques based on the interaction between molecules and an electromagnetic wave, as well as mass spectrometry. General physics courses are therefore a prerequisite, as well as the course in physical chemistry. The theoretical bases of different spectroscopic methods will be discussed during the lecture (30h). The identification of organic compounds from their spectra will be acquired during exercise sessions (20h). These notions are a basis for synthetic chemistry, and therefore for many subsequent courses as well as for research. The advanced courses directly related to this one are the "practical work supplements" CHM1300, "NMR complements" CHM2152 and "advanced mass spectrometry" CHM2151.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 1. describe the basic principle of any spectroscopy, 2. explain the mode of operation, the advantages and disadvantages of each spectroscopy, 3. distinguish in a scientific text (book, article) the contribution of a particular spectroscopic technique, 4. extract the structure of an organic molecule from the interpretation of its IR, NMR, UV and mass spectra.
Evaluation methods	The certification evaluation consists of a written examination in session.
Teaching methods	Theoretical lectures including active pedagogy sessions are completed by exercise sessions given by a teaching assistant.
Content	**Part I : General Introduction** Chap. 1 molecular representation Chap. 2 wave-matter interaction and spectroscopy Chap. 3 general principles of spectroscopy **Part 2 : Common spectroscopies** Chap. 4 infrared spectroscopy Chap. 5 nuclei and electrons in a magnetic field Chap. 6 nuclear magnetic resonance spectroscopy Chap. 7 mass spectrometry Chap. 8 microwave spectroscopy Chap. 9 UV-Visible spectroscopy **Part 3 : Additional concepts** Chap. 10 Raman spectroscopies Chap. 11 molecular transitions and intensity Chap. 12 Fourier transform spectroscopies
Inline resources	All course resources are available on Moodle
Bibliography	• Colin N. Banwell, Elaine M. McCash, "Fundamentals of Molecular Spectroscopy" fourth edition, McGraw-Hill Book Company, 1994. • Laurence M. Harwood, Timothy D. W. Claridge, "Introduction to Organic Spectroscopy", Oxford Chemistry Primers n°43, Oxford University Press, 1997. • John M. Brown, "Molecular Spectroscopy", Oxford Chemistry Primers n°55, Oxford University Press, 1998. • Simon Duckett, Bruce Gilbert, "Foundations of Spectroscopy", Oxford Chemistry Primers n°78, Oxford University Press, 2000.

Faculty or entity in charge	CHIM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Chemistry	CHIM1BA	4		🔍
Minor in Chemistry	MINCHIM	4		🔍
Master [120] in Biochemistry and Molecular and Cell Biology	BBMC2M	4		🔍