



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	<p>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.</p> <p>General physics courses are therefore a prerequisite, as well as the course in physical chemistry.</p> <p>The theoretical bases of different spectroscopic methods will be discussed during the lecture (30h).</p> <p>The identification of organic compounds from their spectra will be acquired during exercise sessions (20h).</p> <p>These notions are a basis for synthetic chemistry, and therefore for many subsequent courses as well as for research.</p> <p>The advanced courses directly related to this one are the "practical work supplements" CHM1300, "NMR complements" CHM2152 and "advanced mass spectrometry" CHM2151.</p>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <ol style="list-style-type: none"> <li>1. describe the basic principle of any spectroscopy,</li> <li>2. explain the mode of operation, the advantages and disadvantages of each spectroscopy,</li> <li>3. distinguish in a scientific text (book, article) the contribution of a particular spectroscopic technique,</li> <li>4. extract the structure of an organic molecule from the interpretation of its IR, NMR, UV and mass spectra.</li> </ol>
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	<p><b>Part I : General Introduction</b></p> <p>Chap. 1 molecular representation</p> <p>Chap. 2 wave-matter interaction and spectroscopy</p> <p>Chap. 3 general principles of spectroscopy</p> <p><b>Part 2 : Common spectroscopies</b></p> <p>Chap. 4 infrared spectroscopy</p> <p>Chap. 5 nuclei and electrons in a magnetic field</p> <p>Chap. 6 nuclear magnetic resonance spectroscopy</p> <p>Chap. 7 mass spectrometry</p> <p>Chap. 8 microwave spectroscopy</p> <p>Chap. 9 UV-Visible spectroscopy</p> <p><b>Part 3 : Additional concepts</b></p> <p>Chap. 10 Raman spectroscopies</p> <p>Chap. 11 molecular transitions and intensity</p> <p>Chap. 12 Fourier transform spectroscopies</p>
Inline resources	All course resources are available on Moodle
Bibliography	<ul style="list-style-type: none"> <li>• Colin N. Banwell, Elaine M. McCash, "Fundamentals of Molecular Spectroscopy" fourth edition, McGraw-Hill Book Company, 1994.</li> <li>• Laurence M. Harwood, Timothy D. W. Claridge, "Introduction to Organic Spectroscopy", Oxford Chemistry Primers n°43, Oxford University Press, 1997.</li> <li>• John M. Brown, "Molecular Spectroscopy", Oxford Chemistry Primers n°55, Oxford University Press, 1998.</li> <li>• Simon Duckett, Bruce Gilbert, "Foundations of Spectroscopy", Oxford Chemistry Primers n°78, Oxford University Press, 2000.</li> </ul>

Faculty or entity in charge	CHIM
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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		