

5.00 credits



30.0 h + 20.0 h

Q2

Teacher(s)	Elias Benjamin (coordinator) ;Fustin Charles-André ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	Concepts and tools equivalent to those taught in teaching units LCHM1111 or LBIR1140
Main themes	<p>The principle of this course is not only to provide the basics of modern organic chemistry, but also to link it to certain fundamental concepts detailed in the general chemistry course (chemical bonding, thermochemistry, chemical kinetics, acid-base reactions).</p> <p>The first part of the course will be essentially devoted to the establishment of the basic concepts through the description of the main classes of functional groups and the organic nomenclature.</p> <p>The physico-chemical properties as well as the electronic effects will be discussed and then applied in the parts related to reactivity.</p> <p>The three-dimensional structures of organic molecules as well as the various isomerism phenomena that result from them will be detailed and applied through various examples taken from fundamental biological and biochemical phenomena.</p> <p>The introduction to chemical reactivity focuses on five major classes of organic functions: alkenes and alkynes, haloalkanes, alcohols and ethers, carboxylic acids and their derivatives, aldehydes and ketones.</p> <p>Many concepts are discussed, including the notion of transition state and reaction intermediate, nucleophile and electrophile, the notion of reaction rate, selectivity in organic chemistry, interconversion between functional groups.</p> <p>In many cases, examples from biochemical mechanisms will be used to make the link with the life sciences.</p> <p>Examples related to everyday life will also be presented.</p> <p>The lecture is completed by (10) exercises.</p>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>The main objective of this course is to provide students with the basic principles of organic chemistry.</p> <p>The first part of the course will cover the fundamentals of structural organic chemistry in order to familiarize students with the major families of functions in organic chemistry as well as the three-dimensional structure of organic molecules.</p> <p>1 The basics of reactivity will also be covered on five major classes of functions to familiarize students with the concepts of mechanism, selectivity and reactivity.</p> <p>The course will be frequently illustrated with examples related to other scientific disciplines.</p>
Evaluation methods	<p>In addition to the course, the training does <b>NOT include laboratory sessions</b>, but <b>only exercise sessions (20h)</b>. <b>The final exam</b> will cover all the material taught, <b>including the exercise sessions</b>. It will take the form of a written test that may include multiple choice questions.</p> <p>The overall grade is determined by the following rule :</p> <ul style="list-style-type: none"> <li>- for any mark equal to or higher than X.50, <b>the overall mark</b> is rounded up to the nearest whole number (i.e. X+1)</li> <li>- for any mark strictly lower than X.50, <b>the overall mark</b> is rounded down to the nearest whole number (i.e. X-1)</li> </ul>
Teaching methods	The teaching is done face-to-face. However, some courses and/or introductory sessions and exercises may be given by video due to the number of registrants and the limited capacity of the auditoriums.
Content	<p><b>1. Introduction and reminders :</b> chemistry; carbon; VSEPR theory; representing a molecule; hydrocarbons; major functional groups in organic chemistry.</p> <p><b>2. Isomerism :</b> Constitutional isomers; stereoisomerism; stereogenic center and stereogenic carbon atom; properties of enantiomers; geometric isomerism; conformational isomerism; the cycloalkanes.</p> <p><b>3. Reactivity :</b> Reactions in organic chemistry; nucleophiles and electrophiles; change in electron density on an atom or group of atoms; acidity and basicity in organic chemistry; factors that influence acidity and basicity; effect of solvent.</p> <p><b>4. Multiple bonds :</b> Preamble; stability of alkenes; reactivity of alkenes; Addition of HX to alkene; hydration of an alkene; alcoholysis of an alkene; halogenation of an alkene; hydroboration of an alkene; oxidation of an alkene; alkynes.</p> <p><b>5. Aromatic chemistry :</b></p>

	<p>Aromaticity; the electrophilic substitution reactions on aromatic ring; Halogenation, nitration, sulfonation, alkylation, and acylation of aromatic compounds.</p> <p><b>6. Substitution and elimination reactions :</b>                  Preamble; Alkanes and haloalkanes; The second-order and first-order nucleophilic substitution reaction; Elimination reactions; Substitution and elimination competition.</p> <p><b>7. Alcohols, ethers and epoxides :</b>                  Preamble; properties of alcohols and ethers; synthesis of alcohols; oxidation of alcohols; oxidation and reduction in organic chemistry; synthesis and reactivity of ethers; synthesis and reactivity of epoxides.</p> <p><b>8. Carboxylic acids and derivatives :</b>                  preamble; physical properties and reactivity; the activated and deactivated forms of a carboxylic acid; acid chloride; acid anhydride; esters; amides.</p> <p>Exercise sessions and labs illustrate key concepts seen in the theory course.</p>
<p>Inline resources</p>	<p>The essential course materials are all available on the Moodle platform :</p> <ul style="list-style-type: none"> <li>- Slides presented in the course</li> <li>- Exercise session outlines</li> <li>- Practical work manuals (laboratories)</li> </ul>
<p>Bibliography</p>	<p>Chimie organique, P. Bruice –Pearson 2° Edition                  Chimie organique, simple et intuitive D. Klein – De Boeck Edition</p>
<p>Faculty or entity in charge</p>	<p>CHIM</p>

**Programmes containing this learning unit (UE)**

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Veterinary Medicine	VETE1BA	5		
Additional module in Physics	APPHYS	5		
Minor in Scientific Culture	MINCULTS	5		