

3.00 credits

30.0 h + 10.0 h

Q1

Teacher(s)	Elias Benjamin ;Soumilion Patrice ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	<p>As an introduction, the basic notions of thermodynamics (enthalpy, entropy, free energy and equilibrium constant) will be reviewed by placing them in the context of biochemical reactions and processes.</p> <p>Particular attention will be paid to the orders of magnitude related to these notions, as well as to the concepts of standard state and mean thermal energy.</p> <p>Bioorganic chemistry will then be addressed around two main themes.</p> <p>On the one hand, the families of basic bioorganic molecules will be described by analyzing, for each of them, the chemical reactivity and the physicochemical properties. The use of high energy bonds, which is very common in biochemical reactions, will also be widely described. This part of the course will aim to provide a good understanding of the chemical mechanisms that govern the formation and breaking of covalent bonds in biochemical processes.</p> <p>In another part, the weak forces that govern non-covalent interactions in biomolecules will be described. The notions of protonation state and chemical equilibrium will be present throughout the course, as well as the description of the free energy quantities involved in chemical reactions and non-covalent interactions.</p>
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>The course is intended for second year biology students.</p> <p>It is a cross-disciplinary course that aims to integrate basic concepts of general and organic chemistry, some of which have already been taught in the first year, into the context of biology.</p> <p>By analyzing the reactivity and nature of organic functions found in biological molecules, the course will help to better understand biochemical processes and the underlying chemical mechanisms.</p> <p>1 The course will focus on the formation and/or breaking of chemical bonds as well as non-covalent interactions.</p> <p>Within this framework, the course will aim to highlight and compare the amounts of free energy involved in biochemical reactions and non-covalent interactions in biomolecules.</p>
Evaluation methods	<p>The theoretical teaching is completed by exercise sessions (10 hours).</p> <p>The latter are an integral part of the teaching of bioorganic chemistry and constitute an inseparable part of it.</p> <p>The final exam is based on the content of the course and the exercises.</p> <p>It takes the form of a written exam that may include open-ended questions and multiple choice questions.</p> <p>An oral exam may be considered, according to the conditions that will be set out on the day of the written exam.</p> <p>The establishment of the overall grade follows the following rule :</p> <ul style="list-style-type: none"> - For any mark equal to or higher than X.50, the overall mark is rounded up to the nearest whole number (i.e. X+1) - For any mark strictly inferior to X.50, the overall mark is rounded down to the nearest unit (i.e. X-1)
Teaching methods	The teaching takes place in person.
Content	<ol style="list-style-type: none"> 1. Thermodynamic and kinetic reminders 2. Aromatic and heteroaromatic chemistry 3. Carboxylic acids and derivatives (Review) 4. Carbonyl derivatives - aldehydes and ketones 5. Redox reactions in Organic Chemistry 6. UV-visible and IR spectroscopy 7. Chemical kinetics 8. Catalysis 9. Coordination chemistry 10. Molecular oxygen chemistry 11. Concept of nuclear magnetic resonance of the proton
Inline resources	Essential course materials are available on the Moodle platform :

	<ul style="list-style-type: none"> - Slides presented in the course - Exercise session outlines
Bibliography	<p>Chimie organique. Généralités, études des grandes fonctions et méthodes spectroscopiques. Nicolas RABASSO, Editions de Boeck</p> <p>Chimie organique des processus biologiques. John McMURRY, Tadhg BEGLEY, Editions de Boeck</p>
Faculty or entity in charge	BIOL

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Biology	BIOL1BA	3	LCHM1111B AND LCHM1141B	