UCLouvain

lchm1141b

2021

Organic chemistry

6.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Elias Benjamin (coordinator) ;Fustin Charles-André ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	The practical work is not only based on the learning of the basic techniques of experimental organic chemistry (distillation, chromatography, extraction) but also constitutes a first approach towards organic synthesis and the use of analytical techniques (melting point, refractive index). The syntheses of organic products will be judiciously chosen and in direct relation with the theoretical part, thus comforting the student in the learning of the chemical reactivity approached in the course (nucleophilic substitution reactions, electrophilic addition).
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 The main objective of the practical work is to provide students with the fundamental principles of experimental organic chemistry, on the one hand by introducing them to the various basic techniques used in organic synthesis, and on the other hand by carrying out a first approach to organic synthesis in direct connection with the theoretical part of the course. Emphasis is also placed on learning the rules of good conduct and safety standards within a chemical laboratory. Learning how to read and apply a procedure as well as writing an experiment report are also part of the objectives of the practical work.
Evaluation methods	**<u>Bioengineers (BIR11BA) and Biologists (BIOl11BA) students</u>** In addition to the course, the training includes **laboratory sessions (8h) and exercise sessions (20h)**. Practical training is an integral and inseparable part of the organic chemistry course. Participation **in all practical sessions** is therefore **MANDATORY**. The practical work includes 2 laboratory sessions. Each laboratory session gives rise to a separate mark. The total of the 2 sessions is worth **1/20 of the global mark of the exam for the BIR and BIOL**. This grade includes the yield and purity of the synthesized products as well as the laboratory tests. Any absence from the practical work must be **REASONED** (justified by a medical certificate in case of illness or by an official document in case of death of a relative) : - In the event of a **REASONED** absence, the lab session in question will simply be cancelled. The final lab mark will only include the session performed and will count for 1/20 of the final exam mark. - In the case of two **REASONED** absences, the laboratory sessions will not be included in the overall grade of the exam. The student will only be evaluated on the written exam. - Any **NON-MOTIVATED** absence will result in a final lab grade of 0/20. **There will be no make-up session.** These conditions are also valid for **BIS students** unless they have already obtained a mark of **10/20** or higher in the practical work, in which case they **will be exempted**. **The final exam** is worth **19/20** of the overall grade. It will cover all the material taught, **including the exercises and laboratory sessions**. It will take the form of a written test that may include multiple choice questions. **The average** between the practical work grade and the final exam grade is established on Excel and follows the following rule: For any grade greater than or equal to X.50, the **overall grade** is rounded up to the next unit (i.e. X+1) For any mark strictly inferior to X,50, the **global mark** is rounded down to the lower unit (i.e. X-1)
Teaching methods	All 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	1. Introduction and reminders : chemistry; carbon; VSEPR theory; representing a molecule; hydrocarbons; major functional groups in organic chemistry. 2. Isomerism : Constitutional isomers; stereoisomerism; stereogenic center and stereogenic carbon atom; properties of enantiomers; geometric isomerism; conformational isomerism; the cycloalkanes. 3. Reactivity : 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. 4. Multiple bonds : 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. 5. Aromatic chemistry : Aromaticity; the electrophilic substitution reactions on aromatic ring; Halogenation, nitration, sulfonation, alkylation, and acylation of aromatic compounds. 6. Substitution and elimination reactions : Preamble; Alkanes and haloalkanes; The second-order and first-order nucleophilic substitution reaction; Elimination reactions; Substitution and elimination competition. 7. Alcohols, ethers and epoxides : 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. 8. Carboxylic acids and derivatives : preamble; physical properties and reactivity; the activated and deactivated forms of a carboxylic acid; acid chloride; acid anhydride; esters; amides. Exercise sessions and labs illustrate key concepts seen in the theory course.
Inline resources	The essential course materials are all available on the Moodle platform : • Slides presented in the course • Exercise session outlines • Practical work manuals (laboratories)
Bibliography	Chimie organique, P. Bruice –Pearson 2° Edition Chimie organique, simple et intuitive D. Klein – De Boeck Edition
Faculty or entity in charge	CHIM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Bioengineering	BIR1BA	6		🔍
Bachelor in Biology	BIOL1BA	6		🔍