DIPARTIMENTO DI SCIENZE

COURSE: **Organic Chemistry**			
ACADEMIC YEAR: **2017-2018**			
TYPE OF EDUCATIONAL ACTIVITY: **Characterizing**			
TEACHER: **Prof. Daniele CASARINI**			
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Language: **ITALIAN**			
ECTS: **10** (lessons e tutorials/practice)	n. of hours: **88** (64 lessons and 24 tutorials/practice)	Campus: **Potenza** Dept./School: **Dipartimento di Scienze** Program:	Semester: (date) from 02/10/2017 to 15-31/01/2018)

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course represents the first teaching of Organic Chemistry. The main objective of the course is to provide to the students the basis of the organic chemistry which are also the basis for the development of other related teachings, i.e. Biochemistry and other related courses.

The main knowledge to provide will be:

- the language of the organic chemistry through symbols, structural formulas and equations.
- how to write correctly the molecular structures following the IUPAC nomenclature.
- recognize and represent correctly structural isomers and stereoisomers.
- the basic concepts of conformational analysis.
- an adequate knowledge about structure and reactivity of the most important functional groups in organic molecules.
- the mechanisms and the stereochemical aspects involved in the reactions of substitution, addition and elimination for aliphatic and aromatic substrates.
- ability to analyze and design simple syntheses of functionalized organic compounds

The main ability to apply the knowledge gained will be:

- connect the concepts of organic chemistry with those of other related chemical disciplines using the appropriate terminology.
- assign the name of an organic molecule using the IUPAC nomenclature.
- represent the 3D structure of a molecule, recognize the various types of isomers, assign the R / S configuration and the E / Z geometry.
- know the mechanism of the main types of reactions studied and know how to analyze a multi-stage synthesis to obtain an assigned molecule

PRE-REQUIREMENTS

It is required to have some basic knowledge of the course of General and Inorganic Chemistry, such as:

- the electronic configuration of the atoms of the first row of the periodic system
- the concepts of electronegativity and the potential of ionization
- the basic concept of the chemical bond and the octet rule
- the concept of the acid-base pair according Lowry-Brønsted
- concept of the equilibrium constant, acidity constant and pH.

SYLLABUS

References to the theory of atomic and molecular orbitals. Hybridizations of carbon and other elements of the first row. Electronegativity, interactions between molecules. Structure and reactivity of the main functional groups. Thermodynamics, kinetics in organic reactions. Intermediate, transition state and activation energy, Hammond Postulate and Curtin-Hammett principle. (Total 6 hours)

Alkanes, nomenclature, properties, isomers of structure and conformational analysis of linear, branched and cyclic alkanes. Haloalkanes and radical halogenation. (Total 6 hours)

Nucleophilic substitution S_N1 and S_N2, enantiomers, diastereoisomers and assignment of Chirality (CIP).

Mechanisms, regio and stereochemical requirements of reactions of E1, E2 and E1cb. Alkenes, properties, structure, geometric isomerism, nomenclature E, Z. (total 8 hours)

Electrophilic addition to the π bond in alkenes and alkynes, Markovnikov rule. Stereochemistry of molecules with more than one chiral centers. Preparation and most common reactions of alkenes and alkynes. (Total 6 hours)

Nomenclature, properties, structure and main synthesis of alcohols, ethers, sulfides, epoxides, and aliphatic amines. (Total 6 hours)

Structure and reactivity of the carbonyl group, nomenclature and properties of aldehydes and ketones. Nucleophilic addition to the carbonyl, formation of imines and enamines. (Total 4 hours)

Mechanism of the acyl nucleophilic substitution. Preparation and reactions of acyl halides, anhydrides, acids, esters (Fischer) and amides. (Total 6 hours)

Enolization of acyl derivatives, α-halogenation, haloform reaction, malonic and acetoacetic synthesis and their use in the synthesis. (Total 4 hours)

Aldol condensation of aldehydes and ketones, crossed condensations and their use in the synthesis. Addition of enolates to α, β-unsaturated carbonyls. (Total 6 hours)

Requirements of aromaticity, nomenclature and properties of aromatic compounds. Electrophilic and nucleophilic aromatic substitution and most common reactions. Effect of substituents on the reactivity and orientation in poly-substituted aromatic compounds. Aromatic amines, formation of diazonium salts and Sandmayer reaction. Strategy of multifunctional derivatives synthesis. (Total 12 hours)

In the practice, 8 are devoted to the behavior and safety in the laboratory and to the explanation of the experiences to be performed; further 16 hours are devoted to the laboratory where students perform simple synthesis with the related work-up operations in order to improve the application of theoretical concepts seen in the lectures. (Total 24 hours)

TEACHING METHODS

The course is organized as follows:

- classroom lectures (64 hours) carried out with the classic use of the blackboard and slides showing the educational materials of the textbooks available in the library.
- the lectures are supported by summary exercises (material distributed by the teacher) that students are invited to play at home and are subsequently corrected in the classroom. The correction is designed to encourage the students to explain, as far as possible, the difficulties encountered.

EVALUATION METHODS

The exam consists of one or two mid-term tests (optionals) written, and a task at the end of the course followed by a brief interview in which is evaluated the ability to link through the various topics. The laboratory part is evaluated on the basis of written reports submitted at the end of each experience.

The tasks consist in a series of 10 exercises with multiple choice answers to be carried out in 2 hours, whereas the oral part consists of a brief discussion (15-20 minutes) on the final task exercises. To pass any written text must acquire at least 50% of the score.

To the final mark contribute the written tasks, the interview, as well as the evaluation of the laboratory reports.

If a student fails the final exam, or choose a single trial, the final task on the whole program will consist of a series of 15 exercises with multiple-choice answers, to be completed in2 hours. The exam is passed if it has acquired at least the 70% of the available score, whereas the interview and the final evaluation follow as reported above.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

B. Botta, Chimica Organica, Ed. Edi-ermes

J. Mc Murray, Chimica Organica, Ed. Piccin

T. W. G. Solomons, *Chimica Organica*, Ed. Zanichelli

J. C.Smith, C*himica Organica*, Ed. Mc Graw Hill

C. Vollhardt, Chimica Organica, Ed. Zanichelli

P. J. Bruice "Chimica Organica, Ed. Edises

J. Clayden "Organic Chemistry, Ed. Oxford University Press

NB. the teacher believes dispersive adding further material online since almost all the editors of the reference books, all available in the library, already include a virtual campus with additional teaching materials online

INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, program and methods of verification, the teacher informs the students of the educational material available in the library, after that he points out that the course attendance is strongly recommended but not mandatory; then he draws up a list of students who intend to enroll the course, together with name, serial number and e-mail.
Usually, the students, who often are commuters or not residents in Potenza, rather than the weekly receipt they prefer to meet the teacher by appointment or contact him by e-mail because it is quicker, easier and can be done at any time.
Telephone contacts are quite unusual.

EXAMINATION SESSIONS (FORECAST)[1]

Indicatively the exams are set in the mid of the month and for the following months: January (1) February (1) June (2) July (1) September (1) October (1).

For the 2016-17 academic year there are no exams in the period: October 15 to December 15 and March 15 to May 25, except for examination students.

SEMINARS BY EXTERNAL EXPERTS YES X NO

FURTHER INFORMATION

[1]Subject to possible changes: check the web site of the Teacher or the Department/School for updates.