

# ORGANIC CHEMISTRY II

**Course of Study:** Degree in Chemistry

**Learning Credit:** 6 CFU

**Compulsory attendance:** no

**Teaching Language:** Italian Language, Didactic English support for Students from foreign Countries (Erasmus, etc.).

**Schedule of Lectures:** lectures are scheduled from 2<sup>nd</sup> March to 5<sup>th</sup> June 2015

**Evaluation Methods:** The final examination will consist in a written and oral test. During the course, in addition to the final verification, there will be several exams that overall will lead to the final evaluation.

**Prerequisites:** The student shall have successfully completed the Organic Chemistry 1 exam. Good knowledge of the theories of chemical bond and structure of organic compounds. Good knowledge of physical and chemical properties of mono-functional organic compounds (contents of Organic Chemistry I).

**Mode of Delivery:** lectures (48h) accompanied by exercises aimed at strengthening the theoretical foundations; direct involvement of students in the development of theoretical subjects and exercises. The lessons are held using Power Point slide.

**Expected Results:** this intermediate organic chemistry course focuses on the study of reactions of bifunctional groups and interactions of polyfunctional compounds. Topics include classical and advanced technologies to form new C-C bonds. The student also gets an introduction to carbohydrates, proteins and nucleic acids. In addition, the activities described allow the students to acquire the methodological tools for continue their studies and to face more specialized courses.

## Content of the Program/Course:

**-Notes on some fundamental concepts of organic chemistry 1.** Keto-Enol tautomerism and reactions of enolate anions. Aldol reaction. Claisen and Dieckmann condensation. Acetoacetic ester and malonic ester synthesis. Conjugate addition to  $\alpha,\beta$ -unsaturated carbonyl compounds. Michael addition of enolate anions. Crossed enolate reactions using LDA. Enamines: alkylation and acylation reactions.

**-Organometallic reactions:** Reactions of transition metals for preparation of new carbon-carbon bonds. The Heck and Suzuki reactions.

**-Carbohydrates.** Structure and nomenclature. Mutarotation. Reaction of monosaccharides: reduction, oxidation. Oxidation by periodic acid. Acylation and Alkylation of Monosaccharides. Osazone Formation. Chain Elongation: the Kiliani-Fischer Synthesis. Chain Shortening: the Ruff Degradation. Stereochemistry of Glucose: The Fischer Proof. The Anomeric Effect

**-Amino acids:** Chirality and Acid-base properties. Reaction of an amino-acid with Ninhydrin. Resolution of Racemic Mixtures of Amino Acids. Amino and carboxyl -Protecting groups and carboxyl activation. Peptide bond forming reactions.

## Reference Texts:

1. J. Clayden, N. Greeves, S. Warren, "*Organic Chemistry*", Second edition, Oxford 2012;
2. B. Botta, "*Chimica Organica*", Ed. Edi.Ermes, Milano (ISBN 9788870513271);
3. P. Y. Bruice, "*Chimica Organica*", Ed. EDISES, Napoli;
4. J. G. Smith, "*Chimica Organica*", Ed. McGraw-Hill, Milano;
5. J. McMurry, "*Chimica Organica*", Ed. PICCIN, Padova;
6. Francis A. Carey, Richard J. Sundberg: "*Advanced Organic Chemistry – Part B: Reactions and Synthesis*", fourth edition; Kluwer Academic/Plenum Publishers.

**Office hours:** by appointment via email ([porcheddu@unica.it](mailto:porcheddu@unica.it)) every Tuesday from 3:00 p.m. until 5 p.m.