



Corso di Laurea in
**SCIENZA E TECNOLOGIA
DEI MATERIALI**

Triennale – L30

General information	
Academic subject	ORGANIC CHEMISTRY
Degree course	MATERIALS SCIENCE AND TECHNOLOGY L-30
Academic Year	Second year I semester
European Credit Transfer and Accumulation System (ECTS)	6
Language	Italian
Academic calendar (starting and ending date)	according to the course rules
Attendance	Attendance is governed by the Course rules

Professor/ Lecturer	
Name and Surname	Lucia D'Accolti
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Department and address	Chemistry and Physics Department via Orabona, 4
Virtual headquarters	Teams code
Tutoring (time and day)	Tuesday and Friday 9:00-10:00 a.m.

Syllabus	
Learning Objectives	Basic knowledge about organic compounds, the chemical processes for obtaining them, the relationships between structure and chemical-physical properties.
Course prerequisites	General and Inorganic Chemistry. Chemical bonding. Acids and bases. Basic principles of thermodynamics. Basic knowledge of mathematics
Contents	Introduction: references on the concepts of covalent and ionic bonding. Molecular orbitals. Hybridization. Alkanes: structure and nomenclature. Conformational isomers. Cycloalkanes. Stereoisomerism: configuration stereoisomers. Enantiomers and diastereoisomers. Absolute configurations. Optical activity. Alkenes and alkynes: structure and nomenclature. Geometric isomerism in alkenes and dienes. Electrophilic addition to alkenes: addition of halogen hydric acids, hydration. Regioselectivity, Markovnikov's rule. Stereoselective and stereospecific additions: addition of halogens, hydroxylation. Hydrogenation of alkenes. Alkyl halides: nomenclature. Aliphatic nucleophilic substitution reactions SN1 and SN2. Elimination reactions E1 and E2. Alcohols, ethers, and thiols: nomenclature. Acidity of alcohols and thiols. Alcohol reactions: conversion to alkyl halides, dehydration, oxidation. Reactions of formations of ethers and epoxides; opening reactions of epoxides. Oxidation of thiols. Aromatic hydrocarbons: Benzene and derivatives. Aromaticity and resonance. Electrophilic aromatic



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	substitution reactions: mechanism and effect of substituents. Halogenation reactions, sulfonation, nitration, Friedel-Crafts reactions. Notes on polynuclear and heterocyclic aromatic hydrocarbons. Phenols: acidity. Amines: structure, nomenclature, and basicity. Aldehydes and ketones: structure, nomenclature, and methods of synthesis. Reactivity of the carbonyl group and nucleophilic addition reactions: reactions with amines and alcohols. Oxidation and reduction reactions. Keto-enolic tautomerism Carboxylic acids and derivatives: nomenclature and acidity of carboxylic acids. Derivatives of carboxylic acids: chlorides, anhydrides, esters, amides. Acyclic nucleophilic substitution reactions. Condensation reactions of enolate anions: acidity of alpha hydrogens of carbonyl compounds and esters. Aldol and Claisen condensation.
Books and bibliography	Solomons Introduction to organic chemistry,
Additional materials	Any organic chemistry book can be useful integrated with classroom lessons

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
150	40	15	95
ECTS			
6	5	1	
Teaching strategy	Lesson with the use of PowerPoints and the blackboard, classroom exercises and laboratory experiences		
Expected learning outcomes			
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Students must have knowledge on the characteristics, and properties of organic molecules as well as of some organic materials 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ application of knowledge to the preparation of simple organic compounds 		
Soft skills	<ul style="list-style-type: none"> ○ Making judgements 		

Assessment and feedback	
Methods of assessment	Oral exam. In progress of the course of 2 or 3 partial tests in written form may also be adopted. Passing these tests with sufficiency may lead to a reduction in the topics to be taken to the final exam or even



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	<p>constitute the final evaluation, leaving the oral exam to those who have not achieved sufficiency or who aspire to a higher mark</p> <p>2. Oral Partial hexam on ESSE3 monthly by the teacher and in accordance with the exam calendar. For those who have not participated in the ongoing tests or have not passed them, or have not accepted the result, the partial test is the means for the overall verification of learning.</p>
Evaluation criteria	<p>Knowledge and understanding:</p> <ul style="list-style-type: none">• Minimum level for passing the exam: knowledge of the various functional groups, nomenclature and stereochemistry of organic compounds and the fundamental characteristics of the various classes.• Intermediate level: basic knowledge of the classes of reactions of organic chemistry described in the program• Higher level: detailed knowledge of the mechanisms of organic reactions with stereochemical implications. <p>Applied knowledge and understanding:</p> <ul style="list-style-type: none">• Minimum level for passing the exam: derive the structure of an organic compound from the name and identify the class to which it belongs, and the functional groups present, as well as any stereochemical implications.• Intermediate level: to identify a path of synthesis of an organic compound starting from simpler molecular structures.• Higher level: to be able to describe in detail compatible with the knowledge transmitted during the program the synthetic steps identified in the development of a synthesis path for an organic compound. <p>Making judgements:</p> <ul style="list-style-type: none">• For the intermediate and higher levels: evaluate on different paths identified for the synthesis for an organic compound the most convenient for the number of steps and reduced presence of criticality. <p>Communication skills:</p> <ul style="list-style-type: none">• For all levels: demonstrate the knowledge of the correct scientific terminology, related to the knowledge required for the three levels, and expose with language properties the topics of the exam questions.



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	<ul style="list-style-type: none">• Ability to learn:• In carrying out the exam, the proposed topics will have an increasing degree of depth to establish at what level of knowledge, fundamental, intermediate, and superior, the student's learning ability has been received. <p>○</p>
Criteria for assessment and attribution of the final mark	The exam is considered passed if all the topics of the course have been examined, while the final grade is essentially determined by the autonomy of judgment and the ability to reason autonomously
Additional information	