MATERIALS ENGINEERING AND NANOTECHNOLOGY (LM56)

(Lecce - Università degli Studi)

Teaching CHEMISTRY 2

GenCod A003109

Owner professor Giuseppe Agostino MELE

Teaching in italian CHEMISTRY 2

Teaching CHEMISTRY 2

SSD code CHIM/07

Reference course MATERIALS ENGINEERING AND

Course type Laurea Magistrale

Credits 9.0

Teaching hours Front activity hours: 81.0

For enrolled in 2021/2022

Taught in 2021/2022

Course year 1

Language ENGLISH

Curriculum PERCORSO COMUNE

Location Lecce

Semester First Semester

Exam type Oral

Assessment Final grade

Course timetable https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION

The aim of this subject is to introduce students to the molecular-level understanding of the physicochemical properties of organic substances aimed at characteristics of materials and nanomaterials. The course will be tailored to master students with a specific background and interest in material sciences and technologies, industrial chemistry, chemical engineering. The overall aim of the course is to train the students in the basic concepts and technologies related to molecular materials possessing useful functional properties. Particular attentions will be devoted to responsive and adaptive materials and to the correlation between the (nano)structure of the molecular components and the functional properties the hybrid materials.

REQUIREMENTS

Basic knowledge of chemistry and physics

COURSE AIMS

After completing this course, the student should be able to:
- Define what constitutes an organic compound. Apply the naming and drawing conventions to describe different classes of organic compounds.
- Describe the range of molecular structures found among organic compounds.
- Describe the physical structure of chemical isomers.
- Manage general and organic chemistry issues in general.
- Understand the principles and managing the results deriving by application of spectroscopic techniques mainly devoted to the characterization of organic materials.

TEACHING METHODOLOGY

The course consists of frontal lessons by using slides and classroom simulation of experiments. The frontal lessons are aimed at improving students' knowledge through the presentation of theories, models and methods.
Part of the practice-oriented course will be focused on the application of spectroscopic techniques for analysis of organics and hybrid materials in general.

ASSESSMENT TYPE	In the final exam will be discussed the topics presented during the lectures as well as to provide a full structural interpretation of FT-IR, MS, 1H- and 13C- NMR spectra to elucidate the structures of an unknown compound.
OTHER USEFUL INFORMATION	Experimental studies carried out by spectroscopic techniques for analyzing the information obtained can be given strong modern analytical framework for the creation of new (organic, inorganic composite, nano) materials. On the other, application of spectroscopic methods is of fundamental importance for monitoring and development of a variety of industrial processes. The audience for this short practice-oriented courses include PhD students interested in deepening the analytical potential of the instruments listed as follow: 6540 UHD ACCURATE-MASS Q TOF LC/MS. GC/MS 6890 SERIES+5973NETWORK, iCAP Q ICP-MS, Dynamic Light Scattering, FT/IR-660 PLUS + IRT-30 INFRARED MICROSCOPE. NMR AV 400, EPR EMX MICRO, UV Vis SPECTROMETER CARY 100 SCAN. Magnetic resonances (NMR, ESR)
FULL SYLLABUS	Covalent bonds and shape of molecules (2 hours). Acids and bases (2 hours). Alkanes and Cycloalkanes (2 hours). Alkenes (2 hours). Alkenes: Reactivity (3 hours). Chirality (3 hours). Alkynes (2 hours). Alkyl halides (3 hours). Alcohols, ethers and thiols (1 hour). Benzene and its derivatives (3 hours). Amines (1 hour). Aldehydes and ketones (2 hours). Carboxylic acids (3 hours). Functional derivatives of carboxylic acids (3 hours). Infrared spectroscopy (6 hours). Mass Spectrometry (6 hours). NMR Spectroscopy (10 hours). Tutorials (27 hours)
REFERENCE TEXT BOOKS	McMurry J.E. - Fundamentals of Organic Chemistry, 7th ed. – 2010 Pavia, Donald L., Lampman, Gary M., Kriz, George S., Introduction to Spectroscopy William H. Brown, Thomas Poon, Introduction to Organic Chemistry, 6th Edition, Wiley