

Course Package

Material Science

Module	1A	15.0 EC
Material Science	First quartile of the first semester	

Required preliminary knowledge: Basic knowledge of Catalysis and Kinetic, Basics of Physical Chemistry, Organic and Inorganic Chemistry, Materials Science and Molecular Biology, Basic knowledge of Thermodynamics.

The module consists of the following courses:

AMM Molecular and Biomolecular Chemistry and Technology

Molecular recognition is an essential phenomenon in living systems as well as in artificial ones. It describes the specific interaction between molecules, ranging from discrete complexes to large architectures. The course will discuss supramolecular systems going from basic molecular recognition (involving single, monovalent interactions), to systems with cooperativity and/or multivalency, and finally to large polyvalent systems. For all subclasses, molecular and biomolecular examples will be discussed as well as materials applications.

AMM Characterization

In this course a wide range of modern, state-of-the-art analytical techniques and tools (microscopy, spectroscopy and diffraction methods) to characterize structure and properties of nanostructures will be introduced and discussed. The central goal is to provide a fundamental understanding of various aspects of molecular, nanoscale and continuum (macroscopic) scale characterization that are essential for the study of nanostructures.

Colloids and Interfaces

This course is about the description of colloids, surfaces and interfaces. All kinds of interfaces between different phases are treated. In addition, thermodynamic descriptions of these interfaces are deduced and several techniques for characterizing interfaces are discussed. During contact hours, the contents of the course will be presented and discussed, and exercises will be made and discussed. For each topic, a case assignment is offered. Topics include:

Lifshitz-van der Waals Interactions, Polar/Acid-Base Interactions, Wetting and Contact Angles, Electrostatics, Electrokinetic Phenomena, Electrostatic and Polymeric Stabilization of Colloids, and Colloidal Phenomena (Marangoni-Effect, Ouzo effect, etc.)