

Erasmus Mundus Joint Master GREENANO

SYLLABUS

Semester 2

COURSE NAME:	Atomic Controlled Nanostructures by Organic Molecules		
HOSTING UNIVERSITY:	Tor Vergata University of Rome		
SEMESTER:	NUMBER OF ECTS:		PILLAR:
2	6		2
DISTRIBUTION OF HOURS			
Lectures	Seminars	Lab work	Individual student work
20	2	24	104
PROFESSOR:	Giorgio Contini		
LEARNING AND TEACHING METHODS:	Classroom lectures		
PREREQUISITES:	Basics of Physics and organic Chemistry. Quantum physics applied to solid state matter (metals, semiconductor, energy bands and structure of solids, density of states, etc.)		
OBJECTIVES OF THE COURSE:	The aim of the course is to introduce the student to nanotechnologies based on organic molecules on surfaces. The organic molecules on surfaces play a particular importance for molecular electronic devices and sensors, in enantioselective catalysis and corrosion and in mineral extraction.		
CONTENT OF THE COURSE:	The lessons focus on the realization of molecular systems on surfaces and their study by spectroscopic and microscopic techniques. Some applications of molecular systems are studied. The course aims to provide the students with the basic tools needed to understand the macroscopic and microscopic properties of molecular structures. Interdisciplinary knowledge between physics, chemistry and engineering of molecular materials will be provided. Introduction: the study of surfaces and interfaces (surfaces morphology and nanostructures; methods for preparation of atomic controlled nanostructures under ultra-high vacuum). Experimental techniques for the analysis of adsorbates on surfaces: laboratory and synchrotron radiation experimental techniques (LEED, Photoelectron spectroscopies (PES), NEXAFS, STM, nc-AFM, other spectroscopies). Applications: chirality in 2D nanostructures; on-surface synthesis of 1D and 2D polymers using different molecular precursors (e.g. polypropylene, graphene nanoribbons, porous graphene, Kagome lattices).		
INTENDED LEARNING OUTCOMES:	At the end of the course the students should be able to know the basic properties of molecular structures, identify which information can be obtained from the different spectroscopic techniques that can be used for their study. Moreover, they will be able to know on possible applications.		
FORM OF ASSESSMENT:	Oral exam		