

Anno Accademico 2008/2009
 Facoltà 0040-CHIMICA INDUSTRIALE
 Classe LM-71-SCIENZE E TECNOLOGIE DELLA CHIMICA INDUSTRIALE
 Corso LAUREA MAGISTRALE in ADVANCED SPECTROSCOPY IN CHEMISTRY (0885)

Norme transitorie: Il Piano didattico si applica agli studenti iscritti a partire dall'A.A. 2008/09

Primo Anno di Corso

Gruppo: A SCELTA AUTONOMA

TAF: D Ambito: 1008 - A scelta dello studente

Cfu min: 4 Cfu max: 4 Num. Esami: 1 Num. Idoneità: 0
 La Facoltà garantisce che, ai fini del rispetto del limite massimo di 12 esami/5 idoneità i CFU a scelta saranno acquisibili con 1 esami e 0 idoneità

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
0885 000 000 30733 - 2 - COMPUTATIONAL MOLECULAR SPECTROSCOPY AND LABORATORY LM	CON	CHIM/02		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente Obiettivi: Survey of the main computational methods used to calculate rotational, vibrational and electronic spectra of small and medium sized molecules.							
0885 000 000 29141 - 2 - INORGANIC MATERIALS LM	CON	CHIM/03		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente Obiettivi: Students will acquire knowledge about the problems of assembling ordered 3-D networks of atoms, ions or molecules and the limits imposed by stoichiometry, with particular regards to the chemistry of hydrides, borides, carbides, nitrides and oxides. In addition, students will learn general methods of synthesis for bulk materials, films and single crystals and some characterization techniques. The applications of some functional materials are critically analyzed with the help of a few significant examples.							
0885 000 000 30736 - 2 - MAGNETIC RESONANCE SPECTROSCOPY II AND LABORATORY LM	CON	CHIM/06		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente Obiettivi: The aims of this unit are: -To highlight the most up to date advances in NMR instrumentation and techniques, including high-resolution solid-state NMR. -To understand in a comprehensive way the pulse programs for 2D NMR spectroscopy and for some advanced application of NMR in the pharmaceutical, industrial and related fields.							

0885 000 000 29139 - 1 - ORGANOMETALLIC COMPOUNDS IN THE ENVIROMENT LM	CON	CHIM/03	4	28/7/0/0	No	Voto
<p>Ambito: 1008 - A scelta dello studente D</p> <p>Obiettivi: Environmental organometallic chemistry provides knowledge on the syntheses and mechanisms related to products and processes affecting the environment as vegetables animals and human beings. The description of some peculiar case histories and relative drawbacks of industrial plants in the past will help to find new environmentally compatible solutions.</p>						
0885 000 000 30735 - 1 - SPECTROSCOPIC METHODS IN ORGANOMETALLIC AND COORDINATION CHEMISTRY AND LABORATORY LM	CON	CHIM/03	4	28/7/0/0	No	Voto
<p>Ambito: 1008 - A scelta dello studente D</p> <p>Obiettivi: The aim of this course is to provide the necessary tools for the structure elucidation of organometallic and inorganic compounds. At the end of the course the student should have an understanding of: solution- and solid-state Infrared Spectroscopy, Multinuclear NMR Spectroscopy. Mass Spectrometry, Electron Spin Resonance Spectroscopy. In addition, the students will gain some basic knowledge about the preparation of the main classes of coordination compounds.</p>						
0885 000 000 30734 - 2 - SPECTROSCOPY OF THE ATMOSPHERE AND LABORATORY LM	CON	CHIM/02	4	28/7/0/0	No	Voto
<p>Ambito: 1008 - A scelta dello studente D</p> <p>Obiettivi: - To provide knowledge about the physical and chemical mechanisms that take place in the atmosphere with specific reference to the problems connected with the ozone layer and the greenhouse effect. - To provide knowledge about the investigation techniques adopted to determine the physical properties and the chemical composition of the atmosphere. - Acquisition of the fundamental chemical and physical principles necessary to evaluate the impact of industrial processes on the environment.</p>						
0885 000 000 30732 - 2 - SPECTROSCOPY OF THE ORGANIC SOLID STATE AND LABORATORY LM	CON	CHIM/02	4	28/7/0/0	No	Voto
<p>Ambito: 1008 - A scelta dello studente D</p> <p>Obiettivi: The course aims to provide a basic understanding of the principles and applications of the spectroscopy of molecular crystals.</p>						
0885 000 000 30731 - 1 - X-RAY ABSORPTION SPECTROSCOPY AND LABORATORY LM	CON	CHIM/01	4	28/7/0/0	No	Voto
<p>Ambito: 1008 - A scelta dello studente D</p> <p>Obiettivi: The course provides educational experiences which challenge students to: be aware of the characteristics of the XAS technique as a structural tool: advantages, disadvantages, and applicability; be aware of the electronic information contained in the XAFS spectrum and its applicability; perform a preliminary XAS data reduction.</p>						

Gruppo: ATTIVITA' FORMATIVE OBBLIGATORIE

TAF: Ambito:

Cfu min: Cfu max:

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
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0885 000 000 29125 - 1 - LANGUAGE UNIT	CON		F	5	35/9/0/0	No	Giudizio
Ambito: 1007 - Ulteriori conoscenze linguistiche Obiettivi: After completing this unit the student is able to master the english language as the essential tool for taking courses, i.e. to achieve a level of proficiency that approximates to B2/B1 in the European Language Portfolio (Listening and Reading at the level B2, Writing at the level B1).							
0885 000 000 30055 - 1 - MAGNETIC RESONANCE LM (I.C.)				7			Voto
Modulo integrato: 30029 - MAGNETIC RESONANCE (LABORATORY) LM	CON	CHIM/06	B	3	9/6/26/0	No	
Ambito: 051 - Discipline chimiche Obiettivi: The theoretical lectures will be supported by some experimental sessions on the spectrometers, during which the students can make practice on real samples and spectra.							
Modulo integrato: 29119 - MAGNETIC RESONANCE LM	CON	CHIM/06	B	4	28/7/0/0	No	
Ambito: 051 - Discipline chimiche Obiettivi: The aims of this unit are: to provide the basic theory and instrumental concepts of NMR at a higher level than the bachelor program, and to develop competence for obtaining structural elucidation of medium complexity molecules.							
0885 000 000 32328 - 1 - MASS SPECTROMETRY AND LABORATORY LM	CON	CHIM/06	B	5	24/8/24/0	No	Voto
Ambito: 051 - Discipline chimiche Obiettivi: The aim of the course is to introduce modern analytical mass spectrometry techniques and their applications. The course will focus both on instrumentation (mass analyzers, ionization sources, detectors, inlet systems, etc.) and on the practical aspects of spectral interpretation. Informatics tools useful for interpreting of the information given in the mass spectra will also be examined, especially with respect to MALDI- or SELDI-MS analysis of peptide mixtures for protein identification and proteome fingerprinting.							
0885 000 000 32421 - 1 - METHODOLOGIES IN ORGANIC CHEMISTRY AND LABORATORY LM	CON	CHIM/06	B	5	24/8/24/0	No	Voto
Ambito: 051 - Discipline chimiche Obiettivi: In this course the student is facing the applications of the most up-to-date spectroscopic methodologies, including multinuclear NMR, MASS and IR. The complementary set of information originated by these techniques is used for solving problems regarding the structural determination of complex organic molecules of natural origin as well as coming from multistep syntheses. The stereochemical assignments and the recognition of the reaction intermediates generated in the catalytic processes outline other challenging themes to which the student is exposed.							
0885 000 000 30058 - 1 - OPTICAL SPECTROSCOPY LM (I.C.)				8			Voto
Modulo integrato: 30036 - OPTICAL SPECTROSCOPY (LABORATORY) LM	CON	CHIM/02	B	3	9/6/26/0	No	
Ambito: 051 - Discipline chimiche Obiettivi: The lectures will be completed by laboratory activities , where the students may practice on ir, Raman , uv , laser spectrometers , Raman and ir microspectroscopy.							
Modulo integrato: 29120 - OPTICAL SPECTROSCOPY LM	CON	CHIM/02	B	5	35/9/0/0	No	
Ambito: 051 - Discipline chimiche Obiettivi: The main goal of this course is to teach the basic spectroscopic methods from both a theoretical and an experimental point of view. An important part will be devoted to the study of practical applications as well as to the description of newly developed spectroscopic.							

0885 000 000 32428 - 1 - PHYSICAL CHEMISTRY OF MATERIALS LM (I.C.)			10		Voto
Modulo integrato: 29131 - IMAGING AND SPECTROSCOPY LM	CON	ING-IND/21	5	35/9/0/0	No
Ambito:	1269 - Discipline chimiche ambientali, biotecnologiche, industriali, tecniche ed economiche		B		
Obiettivi: At the end of the course, the student will learn how to take advantage of scanning electron microscopy (SEM) techniques as well as of elemental (EDS and XRF) and structural (Raman, IR) microanalysis systems for the study of materials. In particular, the student will be able to: (a) set up an investigation campaign, (b) choose the best working conditions as a function of the material characteristics and (c) correctly evaluate the results.					
Modulo integrato: 29124 - PHYSICAL CHEMISTRY OF MATERIALS LM	CON	CHIM/02	5	35/9/0/0	No
Ambito:	051 - Discipline chimiche		B		
Obiettivi: At the end of the course the student has the skills needed to rationalize the properties of various modern materials (particularly liquid crystals, micelles, glasses, polymers, thin films, nanoporous materials) in terms of molecular properties and knows their technological applications (e.g. in LCD displays, thermography, nanotechnology and organic electronics, solar cells, sensors, photonics). The student will be familiar with various characterization techniques (Optical, calorimetric, X rays, dielectric) as well as modelling and computer simulation techniques.					
0885 000 000 32344 - 0 - SPECTROSCOPIC METHODS IN INDUSTRIAL CHEMISTRY LM (I.C.)			11		Voto
Modulo integrato: 29130 - SPECTROSCOPIC METHODS FOR POLYMERS LM	CON	CHIM/05	4	28/7/0/0	No
Ambito:	1269 - Discipline chimiche ambientali, biotecnologiche, industriali, tecniche ed economiche		B		
Obiettivi: At the end of the course the student will have developed the knowledge related to various spectroscopic techniques useful to the characterization of macromolecular structures and polymeric materials.					
Modulo integrato: 29128 - SPECTROSCOPIC METHODS IN CATALYSIS LM	CON	CHIM/04	4	28/7/0/0	No
Ambito:	1269 - Discipline chimiche ambientali, biotecnologiche, industriali, tecniche ed economiche		B		
Obiettivi: At the end of the course the student will have gained competencies in the use of spectroscopic methods for the study of the interaction between chemical compounds and heterogeneous catalyst in gas-phase catalytic reactions, and the evaluation of potentialities of spectroscopic methods in catalysis.					
Modulo integrato: 32354 - SPECTROSCOPIC METHODS IN INDUSTRIAL CHEMISTRY (LABORATORY) LM	CON	CHIM/04	3	9/6/26/0	No
Ambito:	1269 - Discipline chimiche ambientali, biotecnologiche, industriali, tecniche ed economiche		B		
Obiettivi: At the end of the course the student will have gained competencies in the experimental methodologies for the use of spectroscopic techniques in the study of the interactions between reactants, products and heterogeneous catalysts in gas-phase catalytic reactions, and of spectroscopic techniques useful to the characterization of the macromolecular structures and polymeric materials.					
0885 000 000 29121 - 1 - X-RAY DIFFRACTION LM	CON	CHIM/03	5	35/9/0/0	No Voto
Ambito:	051 - Discipline chimiche		B		
Obiettivi: Students will acquire the basic principles of theoretical and experimental diffractometric crystallography. The geometrical and symmetry aspects of the crystalline state will be studied from the macroscopic and microscopic points of view. The experimental methods of measurement of the diffraction pattern and the computational processes leading to the reconstruction of the molecular structure will be mastered. Students will also become familiar with the principal x-ray diffraction techniques carried out on polycrystalline, polymeric and single-crystal samples.					

Secondo Anno di Corso

Gruppo: A SCELTA AUTONOMA

TAF: D Ambito: 1008 - A scelta dello studente

Cfu min: 8 Cfu max: 8

Num. Esami: 2 Num. Idoneità: 0

La Facoltà garantisce che, ai fini del rispetto del limite massimo di 12 esami/5 idoneità i CFU a scelta saranno acquisibili con 2 esami e 0 idoneità

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
0885 000 000 30733 - 2 - COMPUTATIONAL MOLECULAR SPECTROSCOPY AND LABORATORY LM Ambito: 1008 - A scelta dello studente Obiettivi: Survey of the main computational methods used to calculate rotational, vibrational and electronic spectra of small and medium sized molecules.	CON	CHIM/02	D	4	28/7/0/0	No	Voto
0885 000 000 29141 - 2 - INORGANIC MATERIALS LM Ambito: 1008 - A scelta dello studente Obiettivi: Students will acquire knowledge about the problems of assembling ordered 3-D networks of atoms, ions or molecules and the limits imposed by stoichiometry, with particular regards to the chemistry of hydrides, borides, carbides, nitrides and oxides. In addition, students will learn general methods of synthesis for bulk materials, films and single crystals and some characterization techniques. The applications of some functional materials are critically analyzed with the help of a few significant examples.	CON	CHIM/03	D	4	28/7/0/0	No	Voto
0885 000 000 30736 - 2 - MAGNETIC RESONANCE SPECTROSCOPY II AND LABORATORY LM Ambito: 1008 - A scelta dello studente Obiettivi: The aims of this unit are: -To highlight the most up to date advances in NMR instrumentation and techniques, including high-resolution solid-state NMR. -To understand in a comprehensive way the pulse programs for 2D NMR spectroscopy and for some advanced application of NMR in the pharmaceutical, industrial and related fields.	CON	CHIM/06	D	4	28/7/0/0	No	Voto
0885 000 000 29139 - 1 - ORGANOMETALLIC COMPOUNDS IN THE ENVIROMENT LM Ambito: 1008 - A scelta dello studente Obiettivi: Environmental organometallic chemistry provides knowledge on the syntheses and mechanisms related to products and processes affecting the environment as vegetables animals and human beings. The description of some peculiar case histories and relative drawbacks of industrial plants in the past will help to find new environmentally compatible solutions.	CON	CHIM/03	D	4	28/7/0/0	No	Voto
0885 000 000 30735 - 1 - SPECTROSCOPIC METHODS IN ORGANOMETALLIC AND COORDINATION CHEMISTRY AND LABORATORY LM Ambito: 1008 - A scelta dello studente Obiettivi: The aim of this course is to provide the necessary tools for the structure elucidation of organometallic and inorganic compounds. At the end of the course the student should have an understanding of: solution- and solid-state Infrared Spectroscopy, Multinuclear NMR Spectroscopy. Mass Spectrometry, Electron Spin Resonance Spectroscopy. In addition, the students will gain some basic knowledge about the preparation of the main classes of coordination compounds.	CON	CHIM/03	D	4	28/7/0/0	No	Voto

0885 000 000 30734 - 2 - SPECTROSCOPY OF THE ATMOSPHERE AND LABORATORY LM	CON	CHIM/02		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente			D				
Obiettivi: - To provide knowledge about the physical and chemical mechanisms that take place in the atmosphere with specific reference to the problems connected with the ozone layer and the greenhouse effect. - To provide knowledge about the investigation techniques adopted to determine the physical properties and the chemical composition of the atmosphere. - Acquisition of the fundamental chemical and physical principles necessary to evaluate the impact of industrial processes on the environment.							
0885 000 000 30732 - 2 - SPECTROSCOPY OF THE ORGANIC SOLID STATE AND LABORATORY LM	CON	CHIM/02		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente			D				
Obiettivi: The course aims to provide a basic understanding of the principles and applications of the spectroscopy of molecular crystals.							
0885 000 000 30731 - 1 - X-RAY ABSORPTION SPECTROSCOPY AND LABORATORY LM	CON	CHIM/01		4	28/7/0/0	No	Voto
Ambito: 1008 - A scelta dello studente			D				
Obiettivi: The course provides educational experiences which challenge students to: be aware of the characteristics of the XAS technique as a structural tool: advantages, disadvantages, and applicability; be aware of the electronic information contained in the XAFS spectrum and its applicability; perform a preliminary XAS data reduction.							
Gruppo: ATTIVITA' FORMATIVE OBBLIGATORIE							
TAF: Ambito:							
Cfu min: Cfu max:							
Note:							
Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
0885 000 000 33024 - 0 - MASTER THESIS	CON			30	0/0/600/0	No	
Ambito: 1018 - Per la prova finale			E				
Obiettivi: After completing this unit, the student has gained the capacities to complete a project involving experimental researches in the field of applied spectroscopy. The project will be strongly encouraged to be based on a collaborative project between two of the partner institutions.							
0885 000 000 33025 - 2 - PROJECT CASE STUDY	CON	CHIM/02		10	0/0/200/0	No	Giudizio
Ambito: 1144 - Attività formative affini o integrative			C				
Obiettivi: After completing this unit the student will have gained competencies in the methodologies required to complete a project in experimental research.							
0885 000 000 29133 - 2 - SPECTROSCOPY AND CULTURAL HERITAGE LM	CON	CHIM/02		6	43/11/0/0	No	Voto
Ambito: 1144 - Attività formative affini o integrative			C				
Obiettivi: After completing this unit, the student should be able to sketch a plan for the analysis of a Cultural Heritage sample, he should be familiar with the sample preparation. The student should also know the modern spectroscopic techniques and be able to interpret the spectra obtained from the analysis of the samples.							

0885 000 000 32356 - 2 - THEORETICAL AND COMPUTATIONAL CHEMISTRY LM (I.C.)				6	Voto	
Modulo integrato: 32357 - THEORETICAL AND COMPUTATIONAL CHEMISTRY (LABORATORY) LM	CON	CHIM/02	3	9/6/26/0	No	
Ambito: 1144 - Attivita' formative affini o integrative			C			
Obiettivi: Project case study: computation of molecular proprieties on Linux clusters.						
Modulo integrato: 29132 - THEORETICAL AND COMPUTATIONAL CHEMISTRY LM				3	21/6/0/0	
Ambito: 1144 - Attivita' formative affini o integrative			C			
Obiettivi: Theoretical modelling of products , materials and reactions is an indispensable tool in materials science and technology . Methods of theoretical chemistry are the basis for understanding the spectroscopic behavior of materials.						

Legenda:

CFU: crediti formativi universitari

TAF: tipologia attività formativa (A-di base; B-caratterizzanti; C-affini o integrative; F-ulteriori attività formative; D-a scelta autonoma dello studente; S- stages e tirocini presso imprese, enti pubblici o privati, ordini professionali; E-per la prova finale)

SSD: settore scientifico disciplinare

F/E/L/N: indica le ore Frontali/Esercitazioni/Laboratori/Ore di esercitazione e/o laboratorio tenute da non docenti

Freq.: segnala l'esistenza di un obbligo di frequenza

Ver.: indica la modalità di verifica del profitto finale

TIP.: indica la tipologia delle forme didattiche. Queste possono essere CON: convenzionali, E-L: in e-learning, MIX: miste, C/E: convenzionali e/o e-learning. Il corso di studio può definire annualmente una delle modalità.