



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

REGOLAMENTO DIDATTICO DEL CORSO

LM-54 [PHOTOCHEMISTRY AND MOLECULAR MATERIALS]

Sede di Bologna

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Qualora, unicamente a scopo di sintesi, nel presente regolamento sia usata la sola forma maschile, questa è da intendersi riferita in maniera inclusiva a tutte le persone che operano nell'ambito della comunità stessa.

ART. 1 REQUISITI PER L'ACCESSO AL CORSO

- **Conoscenze richieste per l'accesso**

Per essere ammessi al corso di laurea magistrale in Photochemistry and Molecular Materials occorre essere in possesso di una laurea, di un diploma universitario di durata triennale, o di altro titolo di studio conseguito all'estero, riconosciuto idoneo.

Occorre, altresì, il possesso dei seguenti requisiti curriculari:

Avere conseguito la laurea in una delle seguenti classi:

- ex D.M. 270:

L-27 Scienze e Tecnologie Chimiche

- LM-13 Farmacia e Farmacia Industriale

- ex. D.M. 509/99:

L-21 - Scienze e Tecnologie Chimiche

14/S - Farmacia e Farmacia Industriale

- Previgente ordinamento (ante ex D.M.509/99):

Laurea in Chimica e Chimica Industriale

- Altro titolo di studio conseguito all'estero, riconosciuto equivalente dal Consiglio del corso di laurea magistrale

Oppure essere in possesso di una laurea appartenente ad una classe differente da quelle indicate ed avere acquisito almeno 60 crediti formativi universitari in discipline scientifiche di base, di cui almeno 30 nei seguenti settori scientifico disciplinari:

- da CHIM/01 a CHIM/12;

L'ammissione al corso di laurea magistrale è subordinata, inoltre, al superamento di una verifica dell'adeguatezza della personale preparazione che avverrà secondo le modalità definite nel punto Modalità di ammissione.

È richiesta inoltre la conoscenza della lingua inglese di livello B2 del Quadro comune europeo di riferimento per la conoscenza delle lingue. La verifica è effettuata secondo le modalità definite nel punto Modalità di ammissione.

- **Modalità di ammissione**

La verifica dell'adeguatezza della personale preparazione sulle conoscenze a livello universitario di matematica, fisica e chimica, effettuata da parte di una Commissione sarà effettuata attraverso l'analisi del curriculum al quale potrà seguire un colloquio, in lingua inglese, secondo le modalità, i criteri e le procedure fissate dal Consiglio di Corso di Studio e rese note tramite pubblicazione sul portale di Ateneo. La verifica della conoscenza dell'inglese è considerata assolta per gli studenti in possesso di idonea certificazione. Sono esonerati dalla presentazione dell'attestato/certificato relativo alla conoscenza della lingua inglese i candidati di madre lingua inglese.

ART. 2 REGOLE DI MOBILITÀ FRA I CURRICULA DEL CORSO DI STUDIO

Il corso di studio è articolato in curricula.

Lo studente può effettuare le scelte indicate nel piano didattico, con le modalità indicate nei termini resi noti tramite il Portale di Ateneo.

È consentito il passaggio tra i curricula previsti entro i termini resi noti tramite il Portale di Ateneo.

ART.3 PIANI DI STUDIO INDIVIDUALI

È prevista la possibilità di presentazione di piani di studio individuali con le modalità, i criteri e i termini resi noti tramite il Portale di Ateneo.

I piani di studio individuali, approvati dal Consiglio di corso di studi, non possono comunque prescindere dal rispetto dell'ordinamento didattico.

Il Consiglio del corso di studio può valutare la coerenza del piano individuale proposto prevedendo attività formative alternative coerenti con l'ordinamento e con il progetto formativo del corso di studio.

Qualora il piano di studio preveda la scelta di attività formative attivate presso corsi di studio a numero programmato, l'ammissione alle stesse deve essere previamente approvata anche dal Consiglio di corso di studio a numero programmato sulla base di criteri da questo preventivamente individuati.

ART. 4 MODALITÀ DI SVOLGIMENTO DELLE ATTIVITÀ FORMATIVE E TIPOLOGIA DELLE FORME DIDATTICHE

Il piano didattico allegato indica le modalità di svolgimento delle attività formative e la relativa suddivisione in ore di didattica frontale, di esercitazioni pratiche o di tirocinio, nonché la tipologia delle forme didattiche.

Eventuali ulteriori informazioni in merito saranno rese note annualmente sul Portale di Ateneo.

ART. 5 FREQUENZA E PROPEDEUTICITÀ

L'obbligo di frequenza alle attività didattiche è indicato nel piano didattico allegato, così come le eventuali propedeuticità delle singole attività formative.

Le modalità e la verifica dell'obbligo di frequenza, ove previsto, sono stabilite annualmente dal Corso di Studio in sede di presentazione della programmazione didattica e rese note agli studenti prima dell'inizio delle lezioni tramite il Portale di Ateneo.

ART. 6 PERCORSO FLESSIBILE

Lo studente può optare per il percorso flessibile che consente di completare il corso di studio in un tempo superiore o inferiore alla durata normale secondo le modalità definite nel Regolamento Studenti.

Le attività formative previste dal percorso di studio, in caso di necessaria disattivazione, potranno essere sostituite, per garantire la qualità e la sostenibilità dell'offerta didattica.

ART. 7 PROVE DI VERIFICA DELLE ATTIVITÀ FORMATIVE

Il piano didattico allegato prevede i casi in cui le attività formative si concludono con un esame con votazione in trentesimi ovvero con un giudizio di idoneità.

Le modalità di svolgimento delle verifiche sono stabilite annualmente dal Consiglio del Corso di Studio in sede di presentazione della programmazione didattica e rese note agli studenti prima dell'inizio delle lezioni tramite il Portale di Ateneo.

ART. 8 ATTIVITÀ FORMATIVE A SCELTA DELLO STUDENTE

Lo studente può scegliere tra le attività formative attivate in Ateneo purché coerenti con il percorso formativo. Il Corso di studio considera coerenti con il progetto formativo le attività formative individuate dal Consiglio di Corso di studio e previste nell'allegato piano didattico.

Se lo studente sceglie un'attività formativa diversa da quelle considerate coerenti, secondo i suddetti criteri predeterminati, deve fare richiesta al Consiglio di corso di studio nei termini previsti annualmente e resi noti tramite pubblicazione sul Portale di Ateneo.

Il Consiglio valuterà la coerenza della scelta con il percorso formativo dello studente.

ART. 9 CRITERI DI RICONOSCIMENTO DEI CREDITI ACQUISITI IN CORSI DI STUDIO DELLA STESSA CLASSE

Il riconoscimento dei crediti acquisiti nei precedenti studi universitari è determinato, su istanza dello studente, dal Consiglio di corso di studio.

I crediti formativi universitari acquisiti sono riconosciuti per non meno della metà e fino a concorrenza dei crediti dello stesso settore scientifico disciplinare previsti dall'ordinamento didattico del corso di studio.

Qualora, effettuati i riconoscimenti in base alle norme del presente regolamento, residuino crediti non utilizzati, il Consiglio di Corso di studio può riconoscerli valutando il caso concreto sulla base delle affinità didattiche e culturali.

ART. 10 CRITERI DI RICONOSCIMENTO DEI CREDITI ACQUISITI IN CORSI DI STUDIO DI DIVERSA CLASSE, PRESSO UNIVERSITÀ TELEMATICHE E IN UNIVERSITÀ ESTERE

Il riconoscimento dei crediti acquisiti nei precedenti studi universitari è determinato, su istanza dello studente, dal Consiglio di corso di studio.

I crediti formativi universitari acquisiti sono riconosciuti dal Consiglio di Corso di studio sulla base dei seguenti criteri:

- analisi del programma svolto
- valutazione della congruità dei settori scientifico disciplinari e dei contenuti delle attività formative in cui lo studente ha maturato i crediti con gli obiettivi formativi specifici del corso di studio e delle singole attività formative da riconoscere, perseguendo comunque la finalità di mobilità degli studenti.

Il riconoscimento è effettuato fino a concorrenza dei crediti formativi universitari previsti dall'ordinamento didattico del corso di studio.

Qualora, effettuati i riconoscimenti in base alle norme del presente regolamento, residuino crediti non

utilizzati, il Consiglio di Corso di studio può riconoscerli valutando il caso concreto sulla base delle affinità didattiche e culturali.

ART. 11 CRITERI DI RICONOSCIMENTO DELLE CONOSCENZE E ABILITÀ EXTRAUNIVERSITARIE

Possono essere riconosciute competenze acquisite fuori dall'Università nei casi previsti dalla normativa vigente.

La richiesta di riconoscimento sarà valutata dal Consiglio di Corso di studio tenendo conto del numero massimo di crediti riconoscibili fissato nell'ordinamento didattico del corso di studio.

Il riconoscimento potrà avvenire qualora l'attività sia coerente con gli obiettivi formativi specifici del corso di studio e delle attività formative che si riconoscono, visti anche il contenuto e la durata in ore dell'attività svolta.

ART. 12 TIROCINIO CURRICULARE

Il Corso di Studio, prevede un tirocinio curriculare finalizzato alla preparazione della tesi di laurea o comunque collegato ad un progetto formativo mirato ad affinare il suo processo di apprendimento e formazione da svolgersi secondo le procedure stabilite dal Regolamento generale tirocini di Ateneo e dai programmi internazionali di mobilità.

Tali esperienze formative della durata massima di 12 mesi, che dovranno concludersi entro la data del conseguimento del titolo di studio, potranno essere svolte prevedendo l'attribuzione di crediti formativi:

- nell'ambito di quelli attribuiti alla prova finale;
- per attività di tirocinio previsto dal piano didattico;
- per attività a scelta dello studente configurabili anche come tirocinio;
- per attività aggiuntive i cui crediti risultino oltre il numero previsto per il conseguimento del titolo di studio.

ART. 13 PROVA FINALE

- **Caratteristiche della Prova finale**

La prova finale di laurea per il conseguimento della laurea magistrale consiste nella redazione e nella discussione pubblica di una tesi scritta in lingua inglese scritta ed elaborata in modo originale dallo studente su un argomento coerente con gli obiettivi del corso di studio, sotto la guida di un relatore che, di regola, è un docente dell'Ateneo.

La tesi di laurea magistrale in "Photochemistry and Molecular Materials" ha carattere originale e sperimentale e deve essere collegata a un progetto o a un tirocinio.

La dissertazione deve dimostrare la padronanza degli argomenti, capacità critica, l'attitudine a operare in modo autonomo e una capacità di comunicazione di buon livello.

- **Modalità di svolgimento della prova finale**

La prova finale è pubblica, e consiste nella presentazione, di fronte alla Commissione della prova finale, di una tesi redatta in lingua inglese e nella dissertazione sul lavoro svolto. La Commissione di laurea verifica la capacità del laureando di lavorare in modo autonomo e di esporre e discutere con chiarezza e piena padronanza i risultati del suo progetto di ricerca.

La Commissione esprime il suo giudizio finale con un voto in centodecimi, con le seguenti regole:

- base di laurea: media pesata dei voti ottenuti, convertita in una scala in centodecimi
 - per ogni esame superato “con lode”, si aggiunge un punteggio pari a 0.05 moltiplicato per il numero di crediti associati all’esame
 - si aggiunge fino a un massimo di 7 punti, così suddivisi:
 - voto del supervisore: fino a un massimo di 4 punti
 - voto della Commissione esaminatrice: fino a un massimo di 3 punti
 - al raggiungimento di un voto pari ad almeno 113/110 è possibile assegnare la lode; la lode è proposta dal relatore ed è assegnata per decisione unanime della Commissione esaminatrice.
- L’esame è superato con un voto minimo pari a 66/110.

La Commissione Paritetica docenti-studenti ha espresso parere favorevole sulla coerenza dei crediti assegnati alle singole attività formative e gli specifici obiettivi formativi programmati, ai sensi dell’articolo 12 comma 3 del DM 270/04.



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

TEACHING REGULATIONS OF THE MASTER DEGREE

LM-54 [PHOTOCHEMISTRY AND MOLECULAR MATERIALS]

Bologna Campus

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In the event that, solely for the sake of brevity, the masculine form is used in this regulation, it is to be understood as inclusive and referring to all individuals operating within the community

ART. 1 ADMISSION REQUIREMENTS

- **Entry requirements**

To be admitted to the Master's Degree program in *Photochemistry and Molecular Materials*, candidates must hold a bachelor's degree, a three-year university diploma, or another qualification obtained abroad, recognized as equivalent.

Additionally, the following curricular requirements must be met.

Candidates must have obtained a degree in one of the following categories:

- **Under D.M. 270:**
L-27 Chemical Sciences and Technologies
LM-13 Pharmacy and Industrial Pharmacy
- **Under D.M. 509/99:**
L-21 Chemical Sciences and Technologies
14/S Pharmacy and Industrial Pharmacy
- **Previous system (before D.M. 509/99):**
Degree in Chemistry and Industrial Chemistry
- **Other qualifications obtained abroad**, recognized as equivalent by the Master's Degree Programme Board.

Alternatively, candidates with a degree in a different category must have acquired at least 60 university credits in basic scientific disciplines, with at least 30 credits in the following scientific-disciplinary sectors:

- from CHIM/01 to CHIM/12;

Admission to the Master's Degree program is also subject to passing an assessment of the adequacy of the candidate's personal knowledge, which will be carried out according to the procedures outlined in the "Admission Procedures" section.

In addition, a B2 level knowledge of English, according to the Common European Framework of Reference for Languages (CEFR), is required. The verification will be conducted as specified in the "Admission Procedures" section.

- **Admission procedures**

The assessment of the adequacy of personal preparation in university-level knowledge of mathematics, physics, and chemistry, carried out by a Commission, will be conducted through an analysis of the curriculum, which may be followed by an interview in English. The methods, criteria, and procedures for this assessment will be determined by the Degree Programme Board and made available through publication on the University portal. Verification of English language proficiency is considered fulfilled for students who hold an appropriate certification. Candidates who are native English speakers are exempt from presenting a certification of English language proficiency.

ART. 2 MOBILITY AMONG THE COURSE PATHS

The master's degree programme in Photochemistry and Molecular materials is divided into course paths.

Students may choose from the courses available in the course structure diagram, following the methods indicated in the structure itself and in the terms published on the University website.

Mobility among the course paths is allowed, following the deadlines published on the University website.

ART.3 INDIVIDUAL STUDY PLANS

Students will be allowed to present individual study plans according to the methods, deadlines and criteria published on Unibo web site. The individual study plans, approved by the Degree Programme Board, must be compliant with the teaching regulations.

If students choose teaching activities that are activated in degree programmes with restricted access, the choice must also be authorized by the concerned Degree programme boards, based on criteria previously defined.

ART. 4 IMPLEMENTATION OF LEARNING ACTIVITIES AND TYPES OF TEACHING ACTIVITIES

The enclosed teaching plan indicates all the learning activities and their division into hours of classroom teaching, practical exercises, or internship, as well as the type of teaching methods.

Any further information will be published annually on the University website.

ART. 5 ATTENDANCE AND PREPARATORY ACTIVITIES

Compulsory attendance of teaching activities is indicated in the attached teaching plan, together with any preparatory activities involved in the individual learning activities.

The methods of compulsory attendance and any verification thereof are laid down annually in the study program during the presentation of the teaching plan and are notified to the students prior to the start of the program on the University website.

ART. 6 FLEXIBLE STUDY PLAN

Students can opt for flexible study plans, which allows to complete the 2nd cycle degree course in a longer or lesser time with respect to the normal number of years, according to the rules defined within the Students' Regulation.

The teaching activities of the study program can be replaced, in case of forced deactivation, by other activities, in order to guarantee quality and sustainability of the educational courses on offer.

ART. 7 ASSESSMENT OF LEARNING ACTIVITIES

The attached teaching plan indicates all cases in which the learning activities end with an exam, marked with a score out of 30, or by a simple “pass” when the necessary competencies have been acquired. The assessment methods are laid down annually by the Degree Program during the presentation of the teaching plan and notified to the students prior to start of the program on the University website.

ART. 8 ELECTIVE LEARNING ACTIVITIES

The Degree Programme Board considers all the learning activities defined by the Degree Programme Board and listed in the annexed Teaching Plan consistent with the teaching project.

If a student intends to attend one learning activity that is not included in the previewed list, she/he must submit a request to the Degree Programme Board within the deadlines and conditions published on UniBo web portal.

The Board shall verify the coherence of the request with the student’s own study plan.

ART. 9 CRITERIA FOR THE RECOGNITION OF CREDITS ACQUIRED IN DEGREE PROGRAMS IN THE SAME CLASS

The recognition of credits earned in previous university studies is determined, upon the student's request, by the Degree Programme Board.

The acquired university credits are recognized from a half up to the number of credits indicated for the same subject group laid down in the degree program teaching regulations, in compliance with the relative subject area and the type of learning activities.

If, after having evaluated and accepted the credits according to the provisions of this regulation, there remain unused residual credits, the Degree Programme Board may also accept their validity, after assessing each specific case on the basis of teaching and cultural affinities.

ART. 10 CRITERIA FOR THE RECOGNITION OF CREDITS ACQUIRED WITHIN DEGREE PROGRAMS IN DIFFERENT CLASSES, FROM TELEMATIC UNIVERSITIES OR INTERNATIONAL DEGREE PROGRAMS

The recognition of credits earned in previous university studies is determined, upon the student's request, by the Degree Programme Board.

The acquired credits are recognized by the Degree Programme Board according to the following criteria:

- analysis of the course contents
- assessment of the coherence of the scientific-disciplinary fields and the contents of the learning activities

in which the student has acquired the credits with the specific learning outcomes of the study program and the individual learning activities to be recognized, in any case pursuing the aim of promoting student mobility.

The credits are recognized up to the maximum number of university credits provided for the program, as laid down in the degree program teaching regulations.

If, after having recognized the credits according to the provisions of this regulation, there are unused residual credits, the Degree Programme Board may recognize them by assessing the specific case in coherence with the teaching and cultural affinities.

ART. 11 CRITERIA FOR THE RECOGNITION OF EXTRA-UNIVERSITY COMPETENCIES AND SKILLS

Skills acquired outside the university may be recognized in the cases provided for by current regulations. The recognition request will be evaluated by the Degree Programme Board, taking into account the guidelines provided by the Academic Bodies and the maximum number of credits allowable under the program's teaching regulations.

Recognition may be granted if the activity is consistent with the specific educational objectives of the study program and the recognized learning activities, considering both the content and the duration in hours of the activity undertaken.

ART.12 INTERNSHIP

The master's degree programme includes a compulsory internship for the purposes of preparing the dissertation or in any case linked to a project aiming to develop learning and academic skills.

The internship must be carried out in compliance with Unibo Training Regulations or International Mobility Programmes for Traineeships rules.

These learning experiences shall not exceed 12 months and shall be completed by the date of graduation; learning credits may be awarded for these activities:

- included in the quota for the final examination;
- for the internship activities laid down in the course structure diagram;
- for elective activities counting towards the internship;
- for additional activities if the number of credits exceeds the one required for graduation.

ART. 13 FINAL EXAMINATION

- **Final examination characteristics**

The final examination of the Master's degree consists of the preparation and public defense of a dissertation written in English. The thesis must be an original work developed by the student on a topic aligned with the objectives of the program, under the guidance of a supervisor who is typically a faculty member of the university.

The Master's thesis in *Photochemistry and Molecular Materials* must be original and experimental, and it should be linked to a project or an internship.

The dissertation should demonstrate mastery of the subject matter, critical thinking skills, the ability to work independently, and a high level of communication proficiency.

- **Final examination criteria**

The final examination is public and consists in the presentation, in front of a Final Examination Board, of a thesis written in English and in the discussion of the related experimental work.

The Board must ascertain the student ability to work independently, to describe and discuss clearly and autonomously the results obtained in the research project. The Board expresses its final assessment with a grade out of one hundred and ten, and comprises a general evaluation of the student's curriculum.

The Board expresses its final assessment with a grade out of one hundred and ten, as a result of the following features:

- Weighted average (of the marks obtained) converted to a scale with grades up to 110
- **Max 7 points**, made up of:
 - Supervisor's mark: **up to 4 points**;
 - Examination board's mark: **up to 3 points**
- 'Cum laude' honours: 0.05 multiplied by ECTS credits of each exam passed with honours
- 'Cum laude' honours final exam mark is awarded to students who have reached **at least 113/110**; the honours are proposed by the Supervisor and they are awarded by unanimous decision of the Examination Board.

The exam is deemed to be passed with a minimum grade of **66/110**.

The Faculty- Student Joint Committee gave a favorable opinion on the consistency of the credits assigned to each teaching activity and its learning outcomes pursuant to Art. 12, par. 3, of Ministerial Decree 270/04.

Anno Accademico 2025/2026
Scuola Scienze
Classe LM-54 R-SCIENZE CHIMICHE
Corso 6753-PHOTOCHEMISTRY AND MOLECULAR MATERIALS
CURRICULUM ENERGY (C35)

Primo Anno di Corso

Gruppo: Compulsory learning activities

TAF: Ambito:

Cfu min: Cfu max:

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
6753 000 000 98672 - 0 - CRYSTAL ENGINEERING	CON	CHIM/03		6	40/0/16/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired knowledge to design, prepare and characterize crystalline molecular materials and coordination networks and to study crystal polymorphs and co-crystals. Obiettivi inglese: At the end of the course the student has acquired knowledge to design, prepare and characterize crystalline molecular materials and coordination networks and to study crystal polymorphs and co-crystals.							
6753 000 000 91208 - 0 - FUNCTIONAL POLYMERIC MATERIALS	CON	CHIM/04		6	40/0/16/0	Si	Voto
Ambito: 2072 - Chimico-industriale B Obiettivi: At the end of the course the student has acquired knowledge on structure-property relationships of polymeric materials designed to perform specific functions. The student will be able to identify the elements of the macromolecular chemical structure that influence the requested functionality, as well as the structural and morphological parameters that influence the final properties of the material. Obiettivi inglese: At the end of the course the student has acquired knowledge on structure-property relationships of polymeric materials designed to perform specific functions. The student will be able to identify the elements of the macromolecular chemical structure that influence the requested functionality, as well as the structural and morphological parameters that influence the final properties of the material.							
6753 000 000 91224 - 0 - MATERIALS ORGANIC CHEMISTRY WITH LABORATORY	CON	CHIM/06		6	32/0/32/0	Si	Voto
Ambito: 2090 - Organico-biotecnologico B Obiettivi: At the end of the course the student has acquired knowledges towards the design and synthesis of conjugated organic compounds and laboratory experience of multi-step synthesis and analytical/spectroscopic characterization of conjugated organic molecular materials. Obiettivi inglese: At the end of the course the student has acquired knowledges towards the design and synthesis of conjugated organic compounds and laboratory experience of multi-step synthesis and analytical/spectroscopic characterization of conjugated organic molecular materials.							

6753 000 000 99153 - 0 - MOLECULAR AND SUPRAMOLECULAR PHOTOCHEMISTRY (8 CFU)	CON	CHIM/03	8	64/0/0/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired knowledge to analyze photoinduced intra- and intermolecular processes and to design photoactive molecular and supramolecular systems with applications for energy conversion, smart materials and luminescent biosensors. Obiettivi inglese: At the end of the course the student has acquired knowledge to analyze photoinduced intra- and intermolecular processes and to design photoactive molecular and supramolecular systems with applications for energy conversion, smart materials and luminescent biosensors.						
6753 000 000 91910 - 0 - MOLECULAR MATERIALS: PROPERTIES AND MODELLING	CON	CHIM/02	6	32/12/16/0	Si	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course, the student has acquired knowledge of the main computational techniques useful for the study of molecules and aggregates in their ground and excited states and for the study of static and dynamic properties of molecular materials. Obiettivi inglese: At the end of the course, the student has acquired knowledge of the main computational techniques useful for the study of molecules and aggregates in their ground and excited states and for the study of static and dynamic properties of molecular materials.						
6753 000 000 98678 - 0 - MOLECULAR NANOTECHNOLOGY	CON	CHIM/03	6	48/0/0/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired the basic concepts and the main strategies for the bottom-up construction of functional nanostructures, starting from molecules and using the paradigms of supramolecular chemistry: molecular devices and machines, dendrimers, nanoparticles, self-assembled monolayers and thin films. Obiettivi inglese: At the end of the course the student has acquired the basic concepts and the main strategies for the bottom-up construction of functional nanostructures, starting from molecules and using the paradigms of supramolecular chemistry: molecular devices and machines, dendrimers, nanoparticles, self-assembled monolayers and thin films.						
6753 000 000 98675 - 0 - PHOTOACTIVE MATERIALS AND TECHNIQUES FOR ENERGY CONVERSION			10			Voto
Modulo integrato: 98676 - PHOTOACTIVE MATERIALS FOR ENERGY CONVERSION	CON	CHIM/03	6	48/0/0/0	Si	
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course, the student has acquired knowledge and skills necessary to design, characterize, and critically analyze photoactive materials for various energy conversion applications, including lighting (LEDs and OLEDs), solar energy conversion and storage, and photocatalysis. Obiettivi inglese: At the end of the course, the student has acquired knowledge and skills necessary to design, characterize, and critically analyze photoactive materials for various energy conversion applications, including lighting (LEDs and OLEDs), solar energy conversion and storage, and photocatalysis.						
Modulo integrato: 98677 - PHOTOCHEMISTRY LABORATORY	CON	CHIM/03	4	16/0/32/0	Si	
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the students have acquired the ability to use the instrumentation normally used for the optical characterization of molecules and materials used for energy conversion and photocatalysis: UV-Vis spectrophotometers, fluorimeters, Transient absorption spectrometers and systems for time correlated single photon counting. Obiettivi inglese: At the end of the course the students have acquired the ability to use the instrumentation normally used for the optical characterization of molecules and materials used for energy conversion and photocatalysis: UV-Vis spectrophotometers, fluorimeters, Transient absorption spectrometers and systems for time correlated single photon counting.						
6753 000 000 98673 - 0 - PHYSICAL CHEMISTRY: CHEMICAL AND ELECTROCHEMICAL PROPERTIES (C.I.)			12			Voto

Modulo integrato: 91207 - MOLECULAR ELECTROCHEMISTRY

CON

CHIM/02

6

32/12/32/0

No

Ambito: 2094 - Inorganico-chimico fisico

B

Obiettivi: At the end of the course the student has acquired the theoretical and experimental basis for the comprehension and investigation of the physical-chemical processes associated to electron transfer processes, either heterogeneous or homogeneous and intramolecular.

Obiettivi inglese: At the end of the course the student has acquired the theoretical and experimental basis for the comprehension and investigation of the physical-chemical processes associated to electron transfer processes, either heterogeneous or homogeneous and intramolecular.

Modulo integrato: 91909 - PROPERTIES AND PROCESSES IN THE CONDENSED PHASE

CON

CHIM/02

6

24/24/16/0

No

Ambito: 2094 - Inorganico-chimico fisico

B

Obiettivi: At the end of the course the student has acquired knowledge necessary to bridge molecular, surface and solid state properties and to investigate also dynamical aspects of matter.

Obiettivi inglese: At the end of the course the student has acquired knowledge necessary to bridge molecular, surface and solid state properties and to investigate also dynamical aspects of matter.

Secondo Anno di Corso

Gruppo: Compulsory learning activities

TAF: **Ambito:**

Cfu min: Cfu max:

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ. VER.
6753 000 000 98682 - 0 - APPLIED PHYSICAL CHEMISTRY (C.I.)				12		Voto
Modulo integrato: 98683 - LASERS	CON	CHIM/02		6	32/12/16/0	Si
Ambito: 2094 - Inorganico-chimico fisico			B			
Obiettivi: At the end of the course the student has acquired the basic principles of laser operation, knowledge of their optical properties and the chemical applications of the main commercially available laser sources.						
Obiettivi inglese: At the end of the course the student has acquired the basic principles of laser operation, knowledge of their optical properties and the chemical applications of the main commercially available laser sources.						
Modulo integrato: 91238 - ELECTROCHEMICAL SYSTEMS FOR ENERGY STORAGE AND CONVERSION	CON	CHIM/02		6	40/0/16/0	Si
Ambito: 2094 - Inorganico-chimico fisico			B			
Obiettivi: At the end of the course the student has acquired basic and technological knowledge of the most advanced materials for energy storage and/or conversion systems (lithium batteries, supercapacitors and fuel cells) and main electrochemical techniques for testing and characterization of materials and devices.						
Obiettivi inglese: At the end of the course the student has acquired basic and technological knowledge of the most advanced materials for energy storage and/or conversion systems (lithium batteries, supercapacitors and fuel cells) and main electrochemical techniques for testing and characterization of materials and devices.						

6753 000 000 86228 - 0 - FINAL EXAMINATION		1	0/0/0/0	No	
Ambito: 1018 - Per la prova finale	E				
Obiettivi: At the end of the activity, the student has acquired the competencies to write and publicly discuss a dissertation in English. The student will gain critical capabilities, communication skills and the ability to describe and discuss clearly and autonomously the results obtained in the research project.					
Obiettivi inglese: At the end of the activity, the student has acquired the competencies to write and publicly discuss a dissertation in English. The student will gain critical capabilities, communication skills and the ability to describe and discuss clearly and autonomously the results obtained in the research project.					
Note: The activity does not imply your continuous presence in Unibo premises nor at external companies/institutions.					
6753 000 000 91994 - 0 - FRONTIERS IN SCIENCE		2	12/0/0/0	No	Giudizio
Ambito: 1147 - Altre conoscenze utili per l'inserimento nel mondo del lavoro	F				
Obiettivi: At the end of the course the student has been exposed to the most recent results and developments in chemistry and science, and has been given the opportunity of interacting with scientists from all over the world. He has a broad perspective of scientific open issues and is aware of state-of-the-art problems, solutions and applications in a scientific context.					
Obiettivi inglese: At the end of the course the student has been exposed to the most recent results and developments in chemistry and science, and has been given the opportunity of interacting with scientists from all over the world. He has a broad perspective of scientific open issues and is aware of state-of-the-art problems, solutions and applications in a scientific context.					
6753 000 000 98714 - 0 - INTERNSHIP FOR PREPARATION FOR THE FINAL EXAMINATION (20 CFU)		20	250/0/0/0	No	Giudizio
Ambito: 1018 - Per la prova finale	E				
Obiettivi: At the end of the activity, the student has developed an original scientific project at a research laboratory of either a public or private institution, working in the field of photochemistry and molecular materials, acquiring data for the dissertation and final examination. The student will acquire the competencies to work independently, carry out experimental investigations by means of synthetic, characterization and/or computational tools, and make operational proposals, both from an experimental and theoretical point of view, to increase the knowledge on the topic under investigation.					
Obiettivi inglese: At the end of the activity, the student has developed an original scientific project at a research laboratory of either a public or private institution, working in the field of photochemistry and molecular materials, acquiring data for the dissertation and final examination. The student will acquire the competencies to work independently, carry out experimental investigations by means of synthetic, characterization and/or computational tools, and make operational proposals, both from an experimental and theoretical point of view, to increase the knowledge on the topic under investigation.					
Note: With this activity, you start an internship by applying on SOL – Internship (to know more go on your degree course's website > homepage > studying>internship for the preparation of the final thesis.					
6753 000 000 B9243 - 0 - SINOSSI	CON	1	6/0/0/0	No	Giudizio
Ambito: 1007 - Ulteriori conoscenze linguistiche	F				
Obiettivi: Alla fine del corso lo studente è in grado di contestualizzare, analizzare e rielaborare in lingua italiana le informazioni raccolte nelle attività seminariali e di ricerca bibliografica					

Gruppo: Elective learning activities**TAF: C Ambito: 2019 - Attività formative affini o integrative****Cfu min: 12 Cfu max: 12**

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ. VER.
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6753 000 000 97475 - 0 - ADVANCED ORGANIC SYNTHESIS FOR FUNCTIONAL MATERIALS	CON	CHIM/06	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student has acquired the theoretical basis necessary to design and undertake the synthesis of principal molecular building blocks used in optoelectronics, the covalent functionalization of carbon nanoforms, sustainable C-H activation protocols, visible-light photo- and carbocatalysis. Obiettivi inglese: At the end of the course the student has acquired the theoretical basis necessary to design and undertake the synthesis of principal molecular building blocks used in optoelectronics, the covalent functionalization of carbon nanoforms, sustainable C-H activation protocols, visible-light photo- and carbocatalysis.						
6753 000 000 99129 - 0 - ELECTRONIC AND OPTICAL MICROSCOPY	CON	CHIM/03	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student has acquired knowledge of the most common electronic and optical microscopies used for the characterisation of materials and biomolecules and the analysis of the acquired images. Obiettivi inglese: At the end of the course the student has acquired knowledge of the most common electronic and optical microscopies used for the characterisation of materials and biomolecules and the analysis of the acquired images.						
6753 000 000 98716 - 0 - ENVIRONMENTAL PHOTOCHEMISTRY AND PHOTOPROTECTION	CON	CHIM/03	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student has acquired the basic principles and conventional techniques used for environment-related photoprocesses, such as air purification and water treatment/disinfection, as well as photoprotection of materials and living organisms. Obiettivi inglese: At the end of the course the student has acquired the basic principles and conventional techniques used for environment-related photoprocesses, such as air purification and water treatment/disinfection, as well as photoprotection of materials and living organisms.						
6753 000 000 91239 - 0 - MATERIALS SPECTROSCOPY	CON	CHIM/02	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course, the student has acquired the fundamentals of materials spectroscopy, quantum theory of solids, as well as spectroscopic techniques based on absorption/emission, light scattering, and magnetic properties. Obiettivi inglese: At the end of the course, the student has acquired the fundamentals of materials spectroscopy, quantum theory of solids, as well as spectroscopic techniques based on absorption/emission, light scattering, and magnetic properties.						
6753 000 000 B2435 - 0 - MECHANOCHEMISTRY	CON	CHIM/03	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student has acquired knowledge of (i) mechanochemical synthesis of organic and metallorganic materials, (ii) techniques for in-situ reaction monitoring, and (iii) sustainable processes alternative to traditional solution methods. Obiettivi inglese: At the end of the course the student has acquired knowledge of (i) mechanochemical synthesis of organic and metallorganic materials, (ii) techniques for in-situ reaction monitoring, and (iii) sustainable processes alternative to traditional solution methods.						
6753 000 000 91236 - 0 - ORGANIC ELECTRONICS: MATERIALS AND APPLICATIONS	CON	CHIM/02	6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student has acquired the basic knowledge for studying the electronic and photonic processes involved in molecular solids, as well as some basics on organic materials and organic electronic devices. Obiettivi inglese: At the end of the course the student has acquired the basic knowledge for studying the electronic and photonic processes involved in molecular solids, as well as some basics on organic materials and organic electronic devices.						

6753 000 000 97510 - 0 - POLYMERS FOR ENERGY AND ADVANCED APPLICATIONS	CON	CHIM/04	6	48/0/0/0	No	Voto
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Ambito: 2019 - Attività formative affini o integrative

C

Obiettivi: At the end of the course the student has acquired the knowledge for the comprehension of the structure-property correlations in polymeric materials to achieve stimuli responsiveness and the knowledge of the most important classes of polymeric materials used for energy storage, energy conversion and for advanced applications.

Obiettivi inglese: At the end of the course the student has acquired the knowledge for the comprehension of the structure-property correlations in polymeric materials to achieve stimuli responsiveness and the knowledge of the most important classes of polymeric materials used for energy storage, energy conversion and for advanced applications.

6753 000 000 98715 - 0 - STATISTICAL TREATMENT OF EXPERIMENTAL DATA	CON	CHIM/02	6	48/0/0/0	No	Voto
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Ambito: 2019 - Attività formative affini o integrative

C

Obiettivi: At the end of the course the student has acquired the basic concepts of probability distributions, statistical tools used in treating experimental data, fluctuation analysis and classification of noise sources.

Obiettivi inglese: At the end of the course the student has acquired the basic concepts of probability distributions, statistical tools used in treating experimental data, fluctuation analysis and classification of noise sources.

Gruppo: Free Choice learning activities

TAF: D Ambito: 1008 - A scelta dello studente

Cfu min: 12 Cfu max: 12

Num. Esami: 1 Num. Idoneità: 0

Il Dipartimento 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/I/E/L/N	FREQ. VER.
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Anno Accademico 2025/2026
Scuola Scienze
Classe LM-54 R-SCIENZE CHIMICHE
Corso 6753-PHOTOCHEMISTRY AND MOLECULAR MATERIALS
CURRICULUM HEALTH (C36)

Primo Anno di Corso

Gruppo: Compulsory learning activities

TAF: Ambito:

Cfu min: Cfu max:

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ. VER.
6753 000 000 98995 - 0 - BIOCONJUGATION AND RADICAL CHEMISTRY				10		Voto
Modulo integrato: 98996 - BIOCONJUGATE TECHNIQUES	CON	CHIM/06		5	24/0/32/0	Si
Ambito: 2090 - Organico-biotecnologico B Obiettivi: At the end of the course the student has acquired knowledge of the general strategies of synthesis, purification and characterization of bioconjugates/nanobioconjugates and will be able to identify, theoretically and in the lab, the design principles and protocols for making an optimal bioconjugate. Obiettivi inglese: At the end of the course the student has acquired knowledge of the general strategies of synthesis, purification and characterization of bioconjugates/nanobioconjugates and will be able to identify, theoretically and in the lab, the design principles and protocols for making an optimal bioconjugate.						
Modulo integrato: B2008 - PHYSICAL ORGANIC CHEMISTRY	CON	CHIM/06		5	40/0/0/0	Si
Ambito: 2090 - Organico-biotecnologico B Obiettivi: At the end of the course, the student has acquired knowledge of radical reactions that lead to the oxidation of organic and biological materials, the main mechanisms of antioxidant action, and the relationship between structure and antioxidant activity. Obiettivi inglese: At the end of the course, the student has acquired knowledge of radical reactions that lead to the oxidation of organic and biological materials, the main mechanisms of antioxidant action, and the relationship between structure and antioxidant activity.						

6753 000 000 98990 - 0 - BIOMIMETIC MATERIALS	CON	CHIM/03	6	48/0/0/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired knowledge to design, develop and characterize inorganic and organic-inorganic materials with tailored technological properties, according to the biomimetic principles, such as synthesis in confined reaction spaces, templated synthesis, morphosynthesis, crystal tectonics. Obiettivi inglese: At the end of the course the student has acquired knowledge to design, develop and characterize inorganic and organic-inorganic materials with tailored technological properties, according to the biomimetic principles, such as synthesis in confined reaction spaces, templated synthesis, morphosynthesis, crystal tectonics.						
6753 000 000 98991 - 0 - COMPUTATIONAL METHODOLOGY AND STATISTICAL ANALYSIS			8			Voto
Modulo integrato: 98992 - COMPUTATIONAL METHODOLOGY	CON	CHIM/02	5	24/0/32/0	No	
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired theoretical skills on the main qualitative and computational quantitative methods to study the properties of health related (photoactive) materials, including complex molecular architectures and their desing. Obiettivi inglese: At the end of the course the student has acquired theoretical skills on the main qualitative and computational quantitative methods to study the properties of health related (photoactive) materials, including complex molecular architectures and their desing.						
Modulo integrato: 98993 - STATISTICAL ANALYSIS	CON	CHIM/02	3	16/12/0/0	No	
Ambito: 2019 - Attività formative affini o integrative C Obiettivi: At the end of the course the student will be able to handle fundamental concepts of error analysis, probability distributions and statistical tools that are used to handle experimental data. Obiettivi inglese: At the end of the course the student will be able to handle fundamental concepts of error analysis, probability distributions and statistical tools that are used to handle experimental data.						
6753 000 000 98672 - 0 - CRYSTAL ENGINEERING	CON	CHIM/03	6	40/0/16/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired knowledge to design, prepare and characterize crystalline molecular materials and coordination networks and to study crystal polymorphs and co-crystals. Obiettivi inglese: At the end of the course the student has acquired knowledge to design, prepare and characterize crystalline molecular materials and coordination networks and to study crystal polymorphs and co-crystals.						
6753 000 000 91208 - 0 - FUNCTIONAL POLYMERIC MATERIALS	CON	CHIM/04	6	40/0/16/0	Si	Voto
Ambito: 2072 - Chimico-industriale B Obiettivi: At the end of the course the student has acquired knowledge on structure-property relationships of polymeric materials designed to perform specific functions. The student will be able to identify the elements of the macromolecular chemical structure that influence the requested functionality, as well as the structural and morphological parameters that influence the final properties of the material. Obiettivi inglese: At the end of the course the student has acquired knowledge on structure-property relationships of polymeric materials designed to perform specific functions. The student will be able to identify the elements of the macromolecular chemical structure that influence the requested functionality, as well as the structural and morphological parameters that influence the final properties of the material.						
6753 000 000 99153 - 0 - MOLECULAR AND SUPRAMOLECULAR PHOTOCHEMISTRY (8 CFU)	CON	CHIM/03	8	64/0/0/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired knowledge to analyze photoinduced intra- and intermolecular processes and to design photoactive molecular and supramolecular systems with applications for energy conversion, smart materials and luminescent biosensors. Obiettivi inglese: At the end of the course the student has acquired knowledge to analyze photoinduced intra- and intermolecular processes and to design photoactive molecular and supramolecular systems with applications for energy conversion, smart materials and luminescent biosensors.						

6753 000 000 98673 - 0 - PHYSICAL CHEMISTRY: CHEMICAL AND ELECTROCHEMICAL PROPERTIES (C.I.)			12			Voto
Modulo integrato: 91207 - MOLECULAR ELECTROCHEMISTRY	CON	CHIM/02	6	32/12/32/0	No	
Ambito: 2094 - Inorganico-chimico fisico			B			
Obiettivi: At the end of the course the student has acquired the theoretical and experimental basis for the comprehension and investigation of the physical-chemical processes associated to electron transfer processes, either heterogeneous or homogeneous and intramolecular.						
Obiettivi inglese: At the end of the course the student has acquired the theoretical and experimental basis for the comprehension and investigation of the physical-chemical processes associated to electron transfer processes, either heterogeneous or homogeneous and intramolecular.						
Modulo integrato: 91909 - PROPERTIES AND PROCESSES IN THE CONDENSED PHASE	CON	CHIM/02	6	24/24/16/0	No	
Ambito: 2094 - Inorganico-chimico fisico			B			
Obiettivi: At the end of the course the student has acquired knowledge necessary to bridge molecular, surface and solid state properties and to investigate also dynamical aspects of matter.						
Obiettivi inglese: At the end of the course the student has acquired knowledge necessary to bridge molecular, surface and solid state properties and to investigate also dynamical aspects of matter.						
6753 000 000 98994 - 0 - PROCESSES OF CELL MATTER	CON	CHIM/02	6	40/0/16/0	No	Voto
Ambito: 2094 - Inorganico-chimico fisico			B			
Obiettivi: At the end of the course the student has acquired knowledge on i) the physico-chemical principles governing physiological and pathological cellular processes and driving biological macromolecule activities; ii) cellular processes that can be targeted for specific drug delivery and tissue and organ engineering.						
Obiettivi inglese: At the end of the course the student has acquired knowledge on i) the physico-chemical principles governing physiological and pathological cellular processes and driving biological macromolecule activities; ii) cellular processes that can be targeted for specific drug delivery and tissue and organ engineering.						

Secondo Anno di Corso

Gruppo: Compulsory learning activities

TAF: **Ambito:**

Cfu min: **Cfu max:**

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ. VER.
6753 000 000 86228 - 0 - FINAL EXAMINATION				1	0/0/0/0	No
Ambito: 1018 - Per la prova finale			E			
Obiettivi: At the end of the activity, the student has acquired the competencies to write and publicly discuss a dissertation in English. The student will gain critical capabilities, communication skills and the ability to describe and discuss clearly and autonomously the results obtained in the research project.						
Obiettivi inglese: At the end of the activity, the student has acquired the competencies to write and publicly discuss a dissertation in English. The student will gain critical capabilities, communication skills and the ability to describe and discuss clearly and autonomously the results obtained in the research project.						
Note: The activity does not imply your continuous presence in Unibo premises nor at external companies/institutions.						

6753 000 000 91994 - 0 - FRONTIERS IN SCIENCE	CON		2	12/0/0/0	No	Giudizio
Ambito: 1147 - Altre conoscenze utili per l'inserimento nel mondo del lavoro F Obiettivi: At the end of the course the student has been exposed to the most recent results and developments in chemistry and science, and has been given the opportunity of interacting with scientists from all over the world. He has a broad perspective of scientific open issues and is aware of state-of-the-art problems, solutions and applications in a scientific context. Obiettivi inglese: At the end of the course the student has been exposed to the most recent results and developments in chemistry and science, and has been given the opportunity of interacting with scientists from all over the world. He has a broad perspective of scientific open issues and is aware of state-of-the-art problems, solutions and applications in a scientific context.						
6753 000 000 98714 - 0 - INTERNSHIP FOR PREPARATION FOR THE FINAL EXAMINATION (20 CFU)			20	250/0/0/0	No	Giudizio
Ambito: 1018 - Per la prova finale E Obiettivi: At the end of the activity, the student has developed an original scientific project at a research laboratory of either a public or private institution, working in the field of photochemistry and molecular materials, acquiring data for the dissertation and final examination. The student will acquire the competencies to work independently, carry out experimental investigations by means of synthetic, characterization and/or computational tools, and make operational proposals, both from an experimental and theoretical point of view, to increase the knowledge on the topic under investigation. Obiettivi inglese: At the end of the activity, the student has developed an original scientific project at a research laboratory of either a public or private institution, working in the field of photochemistry and molecular materials, acquiring data for the dissertation and final examination. The student will acquire the competencies to work independently, carry out experimental investigations by means of synthetic, characterization and/or computational tools, and make operational proposals, both from an experimental and theoretical point of view, to increase the knowledge on the topic under investigation. Note: With this activity, you start an internship by applying on SOL – Internship (to know more go on your degree course's website > homepage > studying>internship for the preparation of the final thesis.						
6753 000 000 99113 - 0 - NANOMEDICINE AND LIGHT-RESPONSIVE MATERIALS			10			Voto
Modulo integrato: 91241 - NANOMEDICINE	CON	CHIM/03	5	40/0/0/0	Si	
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course the student has acquired, with a critical approach, the foundational biomedical terminology essential for nanomedicine, along with an understanding of the optimal strategies for applying nanotechnology in in vitro diagnostics and designing contrast agents for the most widely used in vivo imaging techniques. Furthermore, the student has gained knowledge of the most prevalent methods for fabricating nanostructures of different materials, taking profit of their peculiar characteristics. Obiettivi inglese: At the end of the course the student has acquired, with a critical approach, the foundational biomedical terminology essential for nanomedicine, along with an understanding of the optimal strategies for applying nanotechnology in in vitro diagnostics and designing contrast agents for the most widely used in vivo imaging techniques. Furthermore, the student has gained knowledge of the most prevalent methods for fabricating nanostructures of different materials, taking profit of their peculiar characteristics.						
Modulo integrato: 99114 - SOFT AND LIGHT -RESPONSIVE MATERIALS	CON	CHIM/03	5	24/0/32/0	Si	
Ambito: 2094 - Inorganico-chimico fisico B Obiettivi: At the end of the course, the student has acquired comprehensive knowledge of colloidal systems and stimuli-responsive molecules and materials. They will also develop a strong understanding of the theory and practical application of key photochemical techniques used to study these systems, including absorption and emission spectroscopy, emission lifetimes and quantum yields, dynamic light scattering, and fluorescence anisotropy. Obiettivi inglese: At the end of the course, the student has acquired comprehensive knowledge of colloidal systems and stimuli-responsive molecules and materials. They will also develop a strong understanding of the theory and practical application of key photochemical techniques used to study these systems, including absorption and emission spectroscopy, emission lifetimes and quantum yields, dynamic light scattering, and fluorescence anisotropy.						
6753 000 000 B9243 - 0 - SINOSI	CON		1	6/0/0/0	No	Giudizio
Ambito: 1007 - Ulteriori conoscenze linguistiche F Obiettivi: Alla fine del corso lo studente è in grado di contestualizzare, analizzare e rielaborare in lingua italiana le informazioni raccolte nelle attività seminariali e di ricerca bibliografica						

Gruppo: Elective learning activities**TAF: C Ambito: 2019 - Attività formative affini o integrative****Cfu min: 12 Cfu max: 12**

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
6753 000 000 99126 - 0 - APPLIED BIOMATERIALS	CON	CHIM/03		6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative Obiettivi: At the end of the course the student has acquired basic knowledge of bone and articular tissue, biomaterials commonly used for the bone tissue regeneration and for bone implants. Obiettivi inglese: At the end of the course the student has acquired basic knowledge of bone and articular tissue, biomaterials commonly used for the bone tissue regeneration and for bone implants.							
6753 000 000 99127 - 0 - BIOMIMETIC SUPRAMOLECULAR CHEMISTRY	CON	CHIM/03		6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative Obiettivi: At the end of the course the student has acquired knowledge of the properties and transformations of the main classes of supramolecular systems, the biomimetic approach to their design and application, the main techniques used for their characterization. Obiettivi inglese: At the end of the course the student has acquired knowledge of the properties and transformations of the main classes of supramolecular systems, the biomimetic approach to their design and application, the main techniques used for their characterization.							
6753 000 000 99124 - 0 - DIAGNOSTIC AND MICROFABRICATION TECHNIQUES FOR HEALTHCARE	CON	CHIM/02		6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative Obiettivi: At the end of the course the student has acquired knowledge on: i) the advanced techniques for the investigation of cell/material interfaces; ii) the signal transduction strategies, which are based on physico-chemical and electrochemical principles, employed in the clinical diagnosis; iii) nano-microfabrication tools and surface modification routes used in healthcare sensors and medical devices. Obiettivi inglese: At the end of the course the student has acquired knowledge on: i) the advanced techniques for the investigation of cell/material interfaces; ii) the signal transduction strategies, which are based on physico-chemical and electrochemical principles, employed in the clinical diagnosis; iii) nano-microfabrication tools and surface modification routes used in healthcare sensors and medical devices.							
6753 000 000 91243 - 0 - PHOTOBIOPHYSICS AND PHOTOBIOLOGY	CON	CHIM/02		6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative Obiettivi: At the end of the course the student has acquired an interdisciplinary basis for the study of photobiological processes at the molecular level, with special emphasis on photosynthesis and photoreception. Obiettivi inglese: At the end of the course the student has acquired an interdisciplinary basis for the study of photobiological processes at the molecular level, with special emphasis on photosynthesis and photoreception.							
6753 000 000 91237 - 0 - POLYMERIC MATERIALS FOR LIFE SCIENCE	CON	CHIM/04		6	48/0/0/0	No	Voto
Ambito: 2019 - Attività formative affini o integrative Obiettivi: At the end of this Course the student will have a deep knowledge of the properties of the main polymeric materials that are used in the biomedical and pharmaceutical field. In particular the student will gain basic knowledge regarding the principles of biocompatibility and biodegradability of the polymeric materials that are used for regenerative medicine and drug release applications. Obiettivi inglese: At the end of this Course the student will have a deep knowledge of the properties of the main polymeric materials that are used in the biomedical and pharmaceutical field. In particular the student will gain basic knowledge regarding the principles of biocompatibility and biodegradability of the polymeric materials that are used for regenerative medicine and drug release applications.							

6753 000 000 B5462 - 0 - PREBIOTIC CHEMISTRY IN THE EARLY UNIVERSE

CON

CHIM/02

6

48/0/0/0

No

Voto

Ambito: 2019 - Attività formative affini o integrative

C

Obiettivi: At the end of the course the student has acquired a deep knowledge of the chemistry occurring in space in connection with the formation of prebiotic molecules, as well as the principles and the techniques for the discovery of molecules in space and the theories at the basis of the origin of life on Earth.

Obiettivi inglese: At the end of the course the student has acquired a deep knowledge of the chemistry occurring in space in connection with the formation of prebiotic molecules, as well as the principles and the techniques for the discovery of molecules in space and the theories at the basis of the origin of life on Earth.

Gruppo: Free Choice learning activities**TAF: D Ambito: 1008 - A scelta dello studente**

Cfu min: 12 Cfu max: 12 Num. Esami: 1 Num. Idoneità: 0
Il Dipartimento 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.****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.