INFORMATION ABOUT THE COURSE

- **WHY CHOOSE THIS POST-GRADUATE DEGREE COURSE**

This post-graduate Chemical Sciences course provides students with a solid, in-depth background on fundamental chemistry subjects. The competencies gained during this University course are spendable in modern and advanced chemical sectors with high economic and social impact, above all in terms of the environment, energy, process sustainability and innovative materials.

The course gives ample space to Chemical Sciences both from a theoretical and experimental point of view. A highly qualified chemist will be trained who can draw-up original ideas, study new reactions, design new processes, create new materials with highly-advanced properties, hone innovative, complex analytical methods and autonomously manage advanced instruments.

This post-graduate degree course pans out over two modules. Both provide core teaching designed to deepen aspects of basic chemistry which more specialised modules then hook into, with the aim of gaining specific expertise on themes regarding the environment and the local area, as well as energy materials.

ENTRANCE REQUIREMENTS

The following types of degrees give access to the Post-Graduate Chemical Sciences course:

1) L-27 or L-21 (ex. D.M. 509/99) Chemistry course graduates, or overseas Chemistry course graduates or equipollent Italian Chemistry course graduates with knowledge of the English language at B1 level. In the absence of a language certificate, language skills will be tested by the University Linguistic Centre:

or

2) 3-year Chemistry course graduates with at least 72 University Credits in basic subjects: Chemistry (CHIM/01-12), Maths (MAT/01-09) and Physics (FIS/01-07), with at least 18 University Credits in Maths (MAT/01-09) and Physics (FIS/01-07) and with knowledge of the English language at B1 level. In the absence of a language certificate, language skills will be tested by the University Linguistic Centre.

Admission to the Post-Graduate Chemical Sciences course is subject to adequate competency levels being ascertained with CVs being checked by a specific committee, as outlined in the Course teaching Regulations.

OBJECTIVES AND COURSE OUTLINE

This post-graduate course provides students with a solid, in-depth background in fundamental chemistry subjects (inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry). The course outline includes a certain number of University Credit Modules of a theoretical nature and a more consistent number of University Credit Modules of a practical nature dedicated to hands-on and laboratory-based activities. Educational objectives are to provide students with a solid background in aspects of basic chemistry which more specific competencies and knowledge then being added on with the course panning out into themes regarding the environment and the local area or energy materials.

The course lasts two years: most of the exams are concentrated in the first year of the course during which time it is expected that the student will also reach B2 level in the English language. The second year is mostly dedicated to thesis work. For details of courses, programmes and lecturers, please consult the Programme for each course.

Teaching is organised into two semesters with intervals during which exams sessions are timetabled. Details on evaluation methods are set out in the Programme for each course. The teaching method provides for frontal instruction in classrooms and laboratories. The course comes to a close after two years with the appropriate number of University Credit Modules dedicated to elaborating a Post-Graduate Thesis containing original research, where the student will be able to apply the knowledge they have gained previously and hone their autonomous, critical elaboration skills.

EXPECTED LEARNING RESULTS

1) Knowledge and understanding: a successful post-graduate degree student will have in-depth knowledge of concepts in all the fundamental areas of Chemistry. He or she will also have knowledge and competencies in relation to sustainable chemical technologies, the environment, using renewable resources, energy conversion. He or she will be able to design and use new materials, new processes, new molecules and will be able to put actions into place to safeguard the environment and protect health.

2) Ability to apply knowledge and understanding: a successful post-graduate degree student will be sufficiently well-learned to be able to move and operate in strategic and innovative, including international, contexts. He or she will be able to use chemistry fundamentals for the advancement of chemical technologies, for scientific research, for the sustainable development of the local area. He or she will be able to plan molecule structures based on their required properties, design processes by evaluating them comparatively based on their economics criteria, sustainability and safety. He or she will be able to characterise and interpret the properties of a compound or a material using modern scientific instrument techniques.

3) Autonomy of judgement: a successful post-graduate student will be able to critically interpret and elaborate results and observations collected during experiments. He or she will be able to plan the typology of experimental activities as well as times and methods. He or she will be able to highlight methodological strengths and weaknesses and offer original modifications in order to make improvements. Autonomy of judgement is developed during the period in which thesis work is undertaken, when the student puts the knowledge they have gained into practice autonomously and demonstrates decision-making and organisational abilities in order to proceed with research activity.

4) Communicative abilities: a successful post-graduate student knows how to communicate on scientific culture and techniques, ideas, problems and solutions to a specialist and non-specialist audience. He or she also knows how to do so in English. He or she communicates using multimedia tools. He or she can take part in debate thanks to their autonomously developed judgement, interact with other people at the same educational level or in similar disciplines. These abilities are developed during oral testing, in preparing laboratory reports, while taking part in seminars, in thesis discussions, which represent the point of synthesis in this particular course of study.

5) Learning ability: a successful post-graduate student will have developed autonomy in their logical reasoning and critical thinking. He or she will know how to find the information which is needed to solve a problem or to contextualise it, by using electronic databases and scientific literature.

- **ENROLLMENT**

Enrol on a degree course http://www.unife.it/studenti/en/admission-and-recognition/enroll-to-a-degree-course-1

- **PROGRAMS, COURSES AND TEACHERS A.A. 2016/17**

Important information for students when consulting programmes:

Programmes can be consulted (in English as well as in Italian) by clicking on the subject name in the table below:

Course: "CHEMISTRY, ENVIRONMENT AND TERRITORY"- first year

Semester when courses are on offer	Course (click on course name to access the programme)	Cfu	Teacher
1° anno - 1° semestre	Chimica analitica strumentale	6	Maurizio Remelli
1° anno - 1° semestre	Chimica organica	6	Alessandro Massi
1° anno - 1° semestre	Chimica dell'ambiente	6	Luisa Pasti
1° anno - 1° semestre	Lingua inglese - Livello B2	6	Richard Chapman
1° anno - 2° semestre	Advanced inorganic chemistry	6	Carlo Alberto Bignozzi
1° anno - 2° semestre	Elettrochimica	6	Jusef Hassoun
1° anno - 2° semestre	Processi chimici sostenibili	6	Pier Paolo Giovannini

Course: "CHEMISTRY, MATERIALS AND ENERGY"- first year

Semester when courses are on offer	Course (click on course name to access the programme)	Cfu	Teacher
1° anno - 1° semestre	Chimica analitica strumentale	6	Maurizio Remelli
1° anno - 1° semestre	Chimica organica	6	Alessandro Massi
1° anno - 1° semestre	Fotochimica	6	Maria Teresa Indelli
1° anno - 1° semestre	Lingua inglese - Livello B2	6	Richard Chapman
1° anno - 2° semestre	Advanced inorganic chemistry	6	Carlo Alberto Bignozzi
1° anno - 2° semestre	Elettrochimica	6	Jusef Hassoun
1° anno - 2° semestre	Moderni sviluppi nella caratterizzazione strutturale di materiali organici e polimerici	6	Giancarlo Fantin

In order to select the 6 type-C credits to be attained in the first year, students should apply the following guidelines:

- choose from both the syllabus in "Table C – *Environment and Territory*" and the syllabus in "Table C – *Materials and Energy"* ;
- choose from the type-B syllabus (with teaching units which are not featured on either of these courses) in a syllabus on offer for a different course from the one the student is enrolled onto (in order to check which specific syllabi for other courses are considered type-B, please see the 2016/2017 Course Outline);
- choose from a type-B syllabus which has been offered in Teaching Plan no.1 for the second year, which can be found in the 2016/2017 Course Outline;

Table C – *Environment and Territory*”

Course	Cfu	Teacher	Where the course is on offer	semester
Metodologie chimiche per il monitoraggio ambientale	6	Maria Chiara Pietrogrande	Scienze chimiche	1st
Tecnologie per il riciclo dei rifiuti	6	Paola Pedrini	Biotecnologie per l'ambiente e la salute	1st
Chimica delle sostanze organiche naturali	6	Simonetta Benetti	Scienze chimiche	1st
Prodotti dietetici e nutraceutica	6	Annalisa Maietti	Farmacia	1st
Depurazione biologica	6	Giuseppe Castaldelli	Biotecnologie per l'ambiente e la salute	1st
Economia e gestione aziendale	6	Laura Ramaciotti	Informatica	1st
Caratterizzazione strutturale di composti organici	6	Giancarlo Fantin	Scienze chimiche	2nd
Impatto ambientale	6	Anna Fano	Biotecnologie per l'ambiente e la salute	2nd

Table C – *Materials and Energy"*

Course	Cfu	Teacher	Where the course is on offer	semester
Strutturistica chimica	6	Valerio Bertolasi	Scienze chimiche	1st
Economia e gestione aziendale	6	Laura Ramaciotti	Informatica	1st
Chimica fisica avanzata	6	Celestino Angeli	Scienze chimiche	2nd
Tecniche spettroscopiche ottiche	6	Roberto Argazzi	Scienze chimiche	2nd
Sistemi fotochimici per la conversione dell'energia	6	Mirco Natali	Scienze chimiche	2nd

In order to select the 12 type-D credits to be attained in the first year, students could:

- choose from the syllabus in "Table D - academic year 2016/2017";
- choose from a Teaching Unit on offer for another Course at the University of Ferrara, as long as it is a subject which is coherent in terms of content with the teaching objectives of the Post-Graduate Degree in Chemical Sciences.

Table D - academic year 2016/2017

Course	Cfu	Teacher	Where the course is on offer	semester
Fisica dello stato solido	6	Federico Spizzo	Fisica	1st
Heterocyclic chemistry	6	Claudio Trapella	Chimica e tecnologia farmaceutiche	1st
Fisica delle superfici e nanostrutture	6	Federico Montoncello	Fisica	1st
Tecniche mineralogiche avanzate	6	Annalisa Martucci	Scienze geologiche, georisorse e territorio	1st
Introduzione al trattamento statistico del dato per le scienze fisiche e della vita	6	Luisa Pasti	Scienze chimiche	1st
Metodiche e tecniche analitiche in campo alimentare, farmaceutico e nutrizionale	6	Nicola Marchetti	Scienze chimiche	2nd
Chimica bioinorganica e catalisi	6	Alessandra Molinari	Scienze chimiche	2nd
Tossicologia	6	Stefania Merighi	Scienze chimiche	2nd
Microscopia elettronica, teoria ed applicazioni	6	Matteo Ferroni	Fisica	2nd

Prospezioni geochimiche	6	Gianluca Bianchini	Scienze geologiche, georisorse e territorio	2nd
Sensori, fisica e tecnologia	6	Cesare Malagù	Fisica	2nd

SECOND YEAR

Please note: the second year course on offer for academic year 2016/2017 belongs to that academic year and in that *Course Outline* is known as **Teaching Plan no.1** (so it is NOT valid for students who enrol in the first year of the 2016/2017 academic year, as Teaching Plan no.1 is solely for that specific course of study).

To see how the LM-54 courses will be organised for the second year with the two course of studies which will be offered in the 2017/18 academic year, click on: http://www.unife.it/scienze/lm.chimica/allegati/schema-della-nuova-laurea-magistrale-in-scienze-chimiche-attivata-a-partire-dalla-a-16-17/at_download/file