



**UNIVERSITY OF L'AQUILA**



**Department of Physical and  
Chemical Sciences**

**Profile of  
2<sup>nd</sup> Cycle Degree in  
CHEMISTRY**

**Laurea Magistrale in  
*SCIENZE CHIMICHE***

<p style="text-align: center;"><b>DEGREE PROFILE OF</b>  <b>Laurea Magistrale in SCIENZE CHIMICHE</b>  <b><i>Master in CHEMISTRY</i></b></p>
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TYPE OF DEGREE & LENGTH	Single degree (120 ECTS credits, 2 years)
INSTITUTION(S)	Università degli Studi dell'Aquila (Italy) – University of l'Aquila
ACCREDITATION ORGANISATION(S)	Ministry of Education (Italy) and Italian Register of Chemists (Consiglio Nazionale dei Chimici - <a href="http://www.chimici.it/cnc/index.php">http://www.chimici.it/cnc/index.php</a> )
PERIOD OF REFERENCE	MIUR 2012, for 3 years, for cohorts starting on October 2012
CYCLE /LEVEL	QF for EHEA: 2nd cycle; EQF level: 7; Italian NQF: Laurea Magistrale

<b>A</b>	<b>PURPOSE</b>
	The main objective of the course is to prepare professionals who are qualified to work in laboratories, facilities and public and private firms where they may also occupy a managerial position. The graduates will have access to the national tests for receiving a national certificate enabling them to be enrolled in the National Register of Chemists.

B	CHARACTERISTICS	
1	DISCIPLINE(S) / SUBJECT AREA(S)	Chemistry; Physics; Others (70: 20: 10)
2	GENERAL / SPECIALIST FOCUS	The Master course is structured in two curricula which permit graduates to acquire specialisation and professional qualifications in the following areas: the chemistry of organic and bioactive molecules and the materials science.
3	ORIENTATION	Graduates will be able to promote and develop scientific and technological innovation, and to manage and design technologies. They will also be able to occupy managerial positions in the following sectors: industry, environment, health, energy, cultural heritage and public administration.
4	DISTINCTIVE FEATURES	Most of the modules of the course are taught also in English.

C	EMPLOYABILITY & FURTHER EDUCATION	
1	EMPLOYABILITY	Graduates will be able to perform professional roles in the areas of employment here indicated: Universities; Research organisations; Environmental protection agencies; Ministries, Civil Protection; Industrial and applied research, industrial production, certification agencies, quality control; Agencies for the popularisation of scientific knowledge. Teaching positions. After the enrolment in the Italian Register of Chemists, the graduates can work as professional chemists in private and public facilities, both as employee and freelance.
2	FURTHER STUDIES	Third cycle studies. Furthermore the graduates can attend the Italian specializing two-year Course.

D	EDUCATION STYLE	
1	LEARNING & TEACHING	Lectures, laboratory experiments and classes, seminars, small group work, individual study based on text books and lecture notes, individual consultations with academic staff, preparing

	APPROACHES	Diploma dissertation.
2	ASSESSMENT METHODS	Written exams, oral exams, laboratory reports, oral presentations, continuing assessments, final comprehensive exam, assessment of Diploma dissertation.

E	PROGRAMME COMPETENCES	
1	GENERIC	
	<ul style="list-style-type: none"> <li>— Capacity to generate new ideas (creativity).</li> <li>— Ability to make reasoned decisions.</li> <li>— Information management skills: ability to retrieve and analyse information from different sources.</li> <li>— Ability to undertake research at an appropriate level.</li> <li>— Knowledge and understanding of the subject area and understanding of the profession.</li> <li>— Commitment to conservation of the environment.</li> <li>— Ability to design and manage projects.</li> <li>— Commitment to health, well-being and safety</li> <li>— Ability to use information and communications technologies</li> <li>— Ability for abstract and analytical thinking, and synthesis of ideas</li> </ul>	
2	SUBJECT SPECIFIC	
	<p>The programme meets all the specific competences as established and agreed in collaboration with the field stakeholders, clustered within the key overarching competences summarized below. At the end of the programme the graduates should be able to:</p> <p><b>Chemistry-related cognitive abilities and skills</b></p> <ul style="list-style-type: none"> <li>— demonstrate knowledge and understanding that is founded upon and extends that of Bachelor's level in chemistry and materials science, and that provides a basis for originality in developing and applying ideas within a research context.</li> <li>— show competences to fit for employment as professional chemists in chemical and related industries.</li> <li>— demonstrate a standard of knowledge and competence which will give them access to the third cycle course units or degree programmes in the fields of chemistry, material sciences, chemical engineering.</li> </ul> <p><b>Chemistry-related practical skills</b></p> <ul style="list-style-type: none"> <li>— to apply the acquired knowledge and understanding, and problem solving abilities, in new or unfamiliar environments within broader (or multidisciplinary) context related to chemical and materials sciences.</li> <li>— to manage the scientific communication, especially of chemistry-related knowledge and understanding, to specialist and non-specialist audiences clearly and unambiguously.</li> <li>— demonstrate learning skills that will allow them to continue studying in the chemical and materials sciences fields in a manner that may be largely self-directed or autonomous, and take responsibility for their own professional development.</li> </ul>	

F	COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES	
	<p>Graduates of the 2<sup>nd</sup> Cycle Degree in Chemistry will acquire:</p> <p><b>Knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>— sound knowledge in various specialist areas of chemistry and materials sciences such as: chemistry of natural organic substances; organic synthesis; computational models; analytical and characterisation methodologies for biological applications for the environment and cultural heritage;</li> <li>— knowledge of the most recent methods of organic synthesis and of the action mechanisms of bioactive molecules;</li> <li>— ability to determine the molecular properties of new compounds and extrapolate their macroscopic properties;</li> <li>— ability to understand the action mechanisms and determine the molecular structure of molecular aggregates;</li> <li>— sound knowledge of English.</li> </ul> <p><b>Ability to apply knowledge and to understand</b></p> <ul style="list-style-type: none"> <li>— ability to find all the bibliographical information necessary to plan and conduct organic, inorganic and organo-metallic syntheses;</li> <li>— ability to use advanced skills in the processing of scientific data;</li> <li>— ability to design and conduct experiments in the area of synthesis and analysis;</li> </ul>	

— ability to use scientific equipment, process experimental data, design and carry out analyses on real samples;

#### Judgment skills

— capacity to interpret observations, to collect data and laboratory measurements, to manage them and to critically evaluate parameters of quality of alternative techniques on the basis of the nature of the experimental problem;  
 — ability to use independent judgement skills for the evaluation and quantification of results;  
 — ability to make judgements that include reflection on important scientific and ethical issues.

#### Communication skills

— capacity to communicate both verbally and in writing in Italian and in English and use multi-media systems;  
 — ability to support an argument on the basis of an independently developed judgement on problems connected with the area of study;  
 — capacity to work well with other people and in a team, and to adapt well to new situations;  
 — capacity to use planning and time-management skills;

#### Learning skills

— ability to find information from literature, databases and internet;  
 — ability to use personal skills in logical reasoning and a critical approach to new problems;  
 — ability to learn independently, acquire the skills to embark upon further studies and tackle new scientific and professional issues and problems and more generally, understand concrete problems within various areas of work;  
 — capacity to engage in multi-disciplinary problems and gather information useful for formulating solutions.

<b>Comprehensive Scheme of the Master Degree in “CHEMISTRY”</b>				
<b>YEAR</b>	<b>CODE</b>	<b>COURSE</b>	<b>Credits (ECTS)</b>	<b>Semester</b>
<b>I</b>	F0034	Advanced Inorganic Chemistry	9	2
	F0047	Bioorganic Chemistry	6	1
	F0049	Bioinorganic Chemistry	6	2
	F0051	Supramolecular Chemistry	6	2
	F0052	Advanced Analytical Methods	6	2
	F0986	Physical Methods in Organic Chemistry	9	2
	F0109	Advanced Organic Chemistry	9	1
	F0112	Quantum Mechanics for Material Physics	6	1
		<i>Optional course</i>	6	1 or 2
<b>II</b>	F0107	Theoretical Chemistry	6	1
	F0110	Organic Synthesis with Laboratory	6	1
	F0112	Techniques for Materials Characterization with Laboratory	9	2
		<i>Optional Course</i>	6	1 or 2
		<i>Free choice Course/Courses</i>	9	1 or 2
		<b>Placement</b>	6	1 or 2
		<b>Master Thesis</b>	30	2

<b>Optional Courses</b>				
<b>YEAR</b>	<b>CODE</b>	<b>COURSE</b>	<b>Credits (ECTS)</b>	<b>Semester</b>
<b>Academic Year 2014/15</b>				
<b>I or II</b>	F0098	Chemistry of Organometallic Compounds	6	1
	F0115	Chemistry of Natural Organic Compounds	6	2
	F0101	Chemistry of the Atmosphere	6	1
	F1140	Computer Modelling and Simulation of Biomolecules	6	1