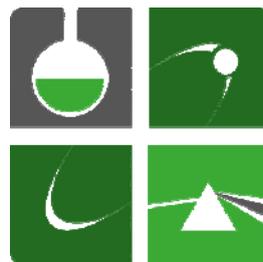




UNIVERSITY OF L'AQUILA



Department of Physical and  
Chemical Sciences

**Profile of**  
**1<sup>st</sup> Cycle Degree in**  
**CHEMISTRY AND MATERIALS SCIENCES**

**Laurea in**  
***SCIENZE E TECNOLOGIE CHIMICHE***  
***E DEI MATERIALI***

**DEGREE PROFILE OF**  
**Laurea in SCIENZE E TECNOLOGIE CHIMICHE E DEI MATERIALI**  
***Bachelor in CHEMISTRY AND MATERIALS SCIENCES***

TYPE OF DEGREE & LENGTH	Single degree (180 ECTS credits, 3 years)
INSTITUTION(S)	Università degli Studi dell'Aquila (Italy) - <i>University of L'Aquila</i>
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, validated for 3 years, for cohorts starting on October 2012
CYCLE /LEVEL	QF for EHEA: 1st cycle; EQF level: 6; Italian NOF: Laurea

<b>A</b>	<b>PURPOSE</b>
	The main objective of the course is to form graduates who have the necessary basic skills and knowledge in Chemistry and Materials Sciences, both theoretical and applied, and to prepare them with particular interest in specialised areas of Chemistry for further studies. 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 and work as professionals.

<b>B</b>	<b>CHARACTERISTICS</b>	
1	DISCIPLINE(S) / SUBJECT AREA(S)	Chemistry; Mathematics; Physics; Informatics; Others (60: 10: 15: 5: 10)
2	GENERAL / SPECIALIST FOCUS	General education in theoretical and applied Chemistry with special emphasis on Inorganic, Analytical, Physical, Organic and Pharmaceutical Chemistry, Biochemistry and Materials Sciences.
3	ORIENTATION	The degree programme is primarily oriented to research, with a strong component of application skills in several contexts: analysis, quality control and certification laboratories; environment, health and energy sectors; cultural heritage.
4	DISTINCTIVE FEATURES	The degree programme is divided into two training tracks: "Chemistry" and "Materials Sciences". After a first common year, the student may choose between the two programs at the beginning of the second year. The programme is developed in a multicultural environment where basic sciences cooperate in joint learning and research activities.

<b>C</b>	<b>EMPLOYABILITY &amp; FURTHER EDUCATION</b>	
1	EMPLOYABILITY	The main employment opportunities are in the following sectors: Public and private research bodies; Analysis, quality control and certification laboratories; Public and/or private organisations; Work places or industries that require basic knowledge of chemistry and materials sciences sectors; 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	Master degree programs in Chemical Sciences, Chemical and Materials Engineering. Furthermore the graduates can attend the Italian specializing one-year Course.

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

		preparing 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>– <b>Capacity for analysis and synthesis:</b> capacity for analysis and synthesis using logical arguments and proven facts.</li> <li>– <b>Capacity for applying knowledge in practice.</b></li> <li>– <b>Team-work:</b> capability to perform guided teamwork in a lab setting and related special skills demonstrating capacity for handling the rigor of the discipline and for time management (including meeting deadlines).</li> <li>– <b>Planning and time management.</b></li> <li>– <b>Communication skills:</b> ability to communicate effectively and to present complex information in a concise manner orally and in writing and using appropriate technical language.</li> <li>– <b>Knowledge of a second major European language.</b></li> <li>– <b>Ability to work autonomously.</b></li> <li>– <b>Decision-making.</b></li> <li>– <b>Capacity to adapt to new situations.</b></li> <li>– <b>Ethical commitment</b></li> <li>– <b>Popularisation skills:</b> ability to communicate with non-experts, including some teaching skills.</li> <li>– <b>Learning ability:</b> ability, through independent study, to enter new fields.</li> <li>– <b>Flexible mind:</b> acquisition of a flexible mind, open to apply knowledge and competences in a wide range of job opportunities and in everyday life.</li> <li>– <b>Problem solving:</b> capacity to handle stress and to deal effectively with practical problems.</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 of essential facts, concepts, principles and theories relating to the Chemistry and Materials Sciences areas.</li> <li>– apply such knowledge and understanding to the solution of qualitative and quantitative problems of a familiar nature.</li> <li>– demonstrate skills in the evaluation, interpretation and synthesis of chemical information and data.</li> <li>– recognise and complement good measurement science and practice.</li> <li>– present scientific material and arguments in writing and orally to an informed audience.</li> <li>– demonstrate computational and data-processing skills, relating to chemical information and data.</li> </ul> <p><b>Chemistry-related practical skills</b></p> <ul style="list-style-type: none"> <li>– demonstrate skills in the safe handling of chemical materials, taking into account their physical and chemical properties, including any specific hazard associated with their use.</li> <li>– demonstrate skills required for the conduct of standard laboratory procedures involved and use of instrumentation in synthetic and analytical work, in relation to both organic and inorganic systems.</li> <li>– demonstrate skills in monitoring, by observation and measurement, of chemical properties, events or changes, and the systematic and reliable recording and documentation thereof.</li> <li>– interpret data derived from laboratory observations and measurements in terms of their significance and relate them to appropriate theory.</li> </ul>
F	COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES	
		<p>Graduates of the 1<sup>st</sup> Cycle Degree in Chemistry and Materials Sciences have an integrated theoretical and practical knowledge allowing them to address their interest of specialisation to several connected fields. These graduates will acquire:</p> <p><b>Knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>– A good grounding in the core areas of chemistry (inorganic, organic, physical, biological and analytical chemistry) and materials sciences. In addition the necessary background in mathematics and physics.</li> <li>– A basic knowledge in several other more specialised areas of chemistry and materials sciences.</li> </ul>

- A standard of knowledge and competence which gives access to second cycle course units or degree programmes.
- Competences to fit for entry-level graduate employment in the general workplace, including the chemical industry.

#### Ability to apply knowledge and to understand

- Built up practice skills in chemistry during laboratory courses, at least inorganic, organic and physical chemistry, in which the graduates have worked individually or in groups as appropriate to the area.
- Generic skills in the context of chemistry and materials sciences which are applicable in many other contexts.
- Acquisition of good working habits concerning both working alone (e.g. diploma thesis) and in teams (e.g. lab reports, including team-leading), achieving results within a specified time-frame, with an emphasis on awareness about professional integrity and on how to avoid plagiarism.
- Demonstrated proficiency in using English language, including subject area terminology, for literature search.

#### Judgement skills

- Ability to gather and interpret relevant scientific data and make judgments that include reflection on relevant scientific and ethical issues.
- Ability to plan and conduct an experiment, planning times and methods, using independent judgment skills in evaluating and quantifying results.
- Ability to formulate an analytical problem and propose ideas and solutions.
- Ability to give opinions that include reflection on important scientific issues.
- Ability to find and evaluate information sources, data, and chemical literature.

#### Communication skills

- Ability to communicate information, ideas, problems and solutions to informed audiences.
- Ability to interact with other people and work in a team.
- Ability to report and present experimental data also with the aid of multi-media systems.
- Ability to describe and communicate on general subjects in simple and critical terms.

#### Learning skills

- Learning skills necessary to undertake further study with a sufficient degree of autonomy.
- Learning skills necessary to adapt to different working environments and deal with a range of themes.
- Learning skills necessary to pursue objectives, working both alone and in a group.

### Comprehensive Scheme of the 1<sup>st</sup> Cycle Degree in "CHEMISTRY AND MATERIALS SCIENCES"

YEAR	CODE	COURSE	Credits (ECTS)	Semester
I	F0006	General and Inorganic Chemistry	12	1 and 2
	F0042	General Physics	12	1 and 2
	F0182	Mathematics	12	1 and 2
	F0056	Basic Practice in Chemistry	9	1 and 2
	F0043	Laboratory of General Physics	6	2
	F0187	Computational Methods	6	2
		<i>English</i>	3	1
II	F0283	Analytical Chemistry I with Laboratory	9	1
	F0298	Analytical Chemistry II with Laboratory	9	2
	F0303	Physical Chemistry I with laboratory	9	2
	F0288	Organic Chemistry I with Laboratory	9	1
	F0293	Organic Chemistry II with Laboratory	9	2
	F0092	Macromolecular Chemistry	9	2
	F0091	Physics of Matter	6 or 9	1
	F0078	Materials Science	6 or 9	1
III	F0093	Biochemistry	6	1
	F0094	Methods of Molecular Structure Investigation	6	1
	F0100	Environmental Chemistry	6	1
	F0308	Physical Chemistry II with laboratory	9	1
	F0096	Medicinal Chemistry	6	1
	F0198	Solid State Physics with Laboratory	9	1
	F0188	Physics of Semiconductors and Devices with Laboratory	9	2
		<i>Free choice Course/Courses</i>	12	1 or 2
		<i>Placement</i>	6	1 or 2
		<i>Thesis</i>	6	2