



UNIVERSITY OF L'AQUILA



Department of Industrial and Information  
Engineering and Economics

**Profile of**

***2<sup>nd</sup> Cycle Degree in***  
***ELECTRICAL ENGINEERING***

**Laurea Magistrale in**  
**INGEGNERIA ELETTRICA**

<p style="text-align: center;"><b>DEGREE PROFILE OF</b>  <b>Laurea Magistrale in INGEGNERIA ELETTRICA</b>  <b>Second Cycle Degree in ELECTRICAL ENGINEERING</b></p>
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TYPE OF DEGREE & LENGTH	Single Degree (120 ECTS-credits), 2 years
INSTITUTION(S)	Università degli Studi dell'Aquila - <i>University of L'Aquila</i> , ITALY
ACCREDITATION ORGANISATION(S)	Italian Ministry of Education and Research Register of Engineers (Albo degli Ingegneri)
PERIOD OF REFERENCE	Programme validated for 3 years starting in October 2013
CYCLE /LEVEL	QF for EHEA: Second Cycle; EQF level: 7; NQF for Italy: Laurea Magistrale

<b>A</b>	<b>PURPOSE</b>
	<p>Graduates of this second cycle course, in accordance with the Italian Ministry Degree n.270/2009, are licensed professionals and high-profile specialists in the field of Electrical Engineering, able to plan and manage complex electrical engineering problems in the framework of production, distribution and use of electrical energy.</p> <p>Electrical engineering is a branch of engineering that applies principles of engineering, basic and applied science, for modeling, analysis, design, and realization of electrical systems, plants, machines with a special focus on renewable energies. Electrical engineering curriculum also prepares students to work professionally in the field of design of electrical plants and industrial automation. Electrical engineering is one of the oldest and broadest engineering disciplines.</p> <p>The programme meets the requirements of European and National laws and Directives. Degree holders, after a national exam, can be enrolled in the Italian Register of the Engineers (Albo degli Ingegneri), established with <i>D.P.R. 328/2001</i>.</p>

<b>B</b>	<b>CHARACTERISTICS</b>		
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<b>C</b>	<b>EMPLOYABILITY &amp; FURTHER EDUCATION</b>		
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2	FURTHER STUDIES	The Master Degree in Electrical Engineering normally gives ability to direct access to a wide range of PhD degrees, in the fields encompassed on engineering areas. It also gives access to some specialist professional courses.
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D	EDUCATION STYLE	
1	LEARNING & TEACHING APPROACHES	Lectures, group-work, individual study and autonomous learning, interprofessional training, self directed learning program and work placement.
2	ASSESSMENT METHODS	Assessment is normally by means of an oral or written examination. The final exam consists in the discussion of an original work, carried out under the supervision of a professor, and described through a written text. It is aimed at demonstrate that the candidate has acquired the essential professional skills and competencies related to the professional profile.

E	PROGRAMME COMPETENCES	
1	GENERIC	
	<p>During the two-year master, students in Electrical Engineering acquire a very broad general and specific education. Upon the successful completion of the degree they become electrical engineers. The degree program meets the competences and quality assurance procedures required by Italian Register of Engineers and by the National Higher Education Quality Assurance Agency (AVA) for degree courses at second level. This provides the generic competencies expected for the graduates in the second cycle, listed as follows:</p> <ul style="list-style-type: none"> <li>— <b>Analysis and synthesis:</b> Knowledge and understanding of complex issues regarding their profession identifying relationships between the various domains of science; ability to critically and systematically integrate knowledge and analyze, assess and deal with complex phenomena, issues and situations even with limited information;</li> <li>— <b>Creativity:</b> ability to design, conduct experiments, and analyze and report results in accordance with the applicable standards in more than one technical area, autonomously and with an original contribution, using appropriate methods;</li> <li>— <b>Leadership, Management and Team-working:</b> ability to assume employment status of high responsibility in public or private organizations, or in self-employed, demonstrating awareness of ethical aspects of the own role and contribution within this; ability to work, both independently and in teams, with technical and scientific problems of high complexity and to put the work into a broader context which involve the industry and society;</li> <li>— <b>Communication skills:</b> Ability to communicate both orally and in writing, in first language and in another European language, using appropriate scientific terminology;</li> <li>— <b>Learning ability:</b> ability to identify by himself the need for further knowledge and take responsibility for his/her ongoing learning; Ability to consult specialized literature, to permanently update knowledge and skills and to be familiar with recent scientific findings and developments in Electrical Engineering, and ability to formulate a critical opinion;</li> <li>— <b>Problem solving:</b> Ability to identify engineering problems, understand existing requirements and/ or constraints, articulate the problem by means of technical communication and formulate alternative creative solutions.</li> </ul>	
2	SUBJECT SPECIFIC	
	<p>The Program meets all the Specific Competences as established and agreed in collaboration with the field stakeholders taking into consideration the standards for the second cycle recommended by EUR-ACE for accreditation of engineering programs, clustered within the key overarching competences summarized below. The graduates must demonstrate:</p> <p><b>Knowledge of</b></p> <ul style="list-style-type: none"> <li>- the principal branches of mathematics relevant to Electrical Engineering (arithmetic, geometry, algebra, trigonometry, analysis, calculus, differential equations, numerical methods and linear algebra);</li> <li>- The basic sciences, including science of materials, physics, and the transformations and interactions of energy and signals, which affects the functionality of electrical systems;</li> <li>- The Physics for understanding the structure and principles that govern the natural and artificial world for obtaining solutions to problems, by means of the design of complex systems;</li> </ul> <p><b>Comprehension of</b></p> <ul style="list-style-type: none"> <li>- the Electrical engineering principles finalized to design products and electrical systems, or energy production and distribution plants;</li> <li>- the relationship between the theoretical models of an electrical system and its useful properties;</li> </ul> <p><b>Application</b></p>	

<ul style="list-style-type: none"> <li>-ability to apply logical reasoning and quantitative calculation, and to use mathematical language;</li> <li>-ability to solve electrical engineering problems using differential equations, numerical methods, calculus-based physics and chemistry;</li> </ul> <p><b>Analysis</b></p> <ul style="list-style-type: none"> <li>- ability to safely conduct electrical engineering experiments according to established procedures, and analyze, interpret, and report the results;</li> <li>- ability to analyze and solve electrical engineering problems in a creative and effectively using basic principles, modern techniques and systematic approach;</li> </ul> <p><b>Synthesis</b></p> <ul style="list-style-type: none"> <li>- ability to design electrical engineering experiments to investigate a phenomenon, conduct the experiment safely, and analyze and interpret the results;</li> <li>-capacity to contribute to innovation and practical implementation of ideas for a new electrical system, industrial products, electrical processes and in advanced industrial research;</li> <li>- ability to perform a feasibility study, for industrial product development or to design a new electrical system, from the customer need, by using the best engineering practices and by performing investment analyses or other economic considerations;</li> </ul> <p><b>Evaluation</b></p> <ul style="list-style-type: none"> <li>- ability to assess the need to implement changes in electrical systems and plants by improving unit operations in terms of product quality, environmental impacts and increased production;</li> <li>-ability to assess the impact of engineering solutions in societal context and to apply engineering principles for the development of sustainable processes.</li> </ul>
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F	COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES
	<p>Upon successful completion of the 2<sup>nd</sup> Cycle degree in Electrical Engineering, the typical outcomes of the graduates are listed as follows:</p> <ul style="list-style-type: none"> <li>- an ability to apply knowledge of mathematics, science, and engineering</li> <li>- an ability to design and conduct experiments, as well as to analyze and interpret data</li> <li>- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</li> <li>- an ability to function on multidisciplinary teams</li> <li>- an ability to identify, formulate, and solve engineering problems</li> <li>- an understanding of professional and ethical responsibility</li> <li>- an ability to communicate effectively</li> <li>- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</li> <li>- a recognition of the need for, and an ability to engage in, lifelong learning</li> <li>- a knowledge of contemporary issues</li> <li>- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;</li> </ul>

Comprehensive Scheme of the 2 <sup>nd</sup> Cycle Degree in ELECTRICAL ENGINEERING				
YEAR	CODE	COURSE	Credits (ECTS)	Semester
I	I0636	Electrical power systems	9	1
	I0743	Power Electronics	9	1
	I2L039	Electrical Energy Systems	9	1
	I2L036	Electrical Drives	9	2
	I0283	Measurements and Test of Electrical Machines and Systems	9	2
	One elective course within the following:			
	I0375	Industrial Robotics	9	1
	I0333	Digital Electronic Systems I	9	1
	I0655	Telecommunication Networks I	9	2
	I0634	Electrical Machines	9	2
II	I2L045	Electrical Automation	9	1
	I2L010	Electromagnetic Compatibility	9	1

	I2LF02	<i>Optional Course</i>	9	1/2
	I2L038	Electrical Machines Design	9	2
	DG0005	Laboratory of Electric systems	9	2
	I0379	Electric systems for mobility	9	2
	I2HAT0	<i>Further Language Competences</i>	3	1/2
	A0000157	<i>Traineeship</i>	3	1/2
	I0381	<i>Thesis</i>	6	2

[http://www.google.it/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=tCj1P5V3D5za\\_M&tbnid=KvPa6MpkVDtvRM:&ved=0CAUQjRw&url=http%3A%2F%2Fmesva.univaq.it%2F%3Fq%3Davvisi%2Fcl-clm%2F7&ei=6qvnUrWKI4qHtQbOrIG4Dw&bvm=bv.59930103,d.Yms&psig=AFQjCNE9w1pLHubE9sUX7p9BJi2NkycL7w&ust=1391000902271609](http://www.google.it/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=tCj1P5V3D5za_M&tbnid=KvPa6MpkVDtvRM:&ved=0CAUQjRw&url=http%3A%2F%2Fmesva.univaq.it%2F%3Fq%3Davvisi%2Fcl-clm%2F7&ei=6qvnUrWKI4qHtQbOrIG4Dw&bvm=bv.59930103,d.Yms&psig=AFQjCNE9w1pLHubE9sUX7p9BJi2NkycL7w&ust=1391000902271609)